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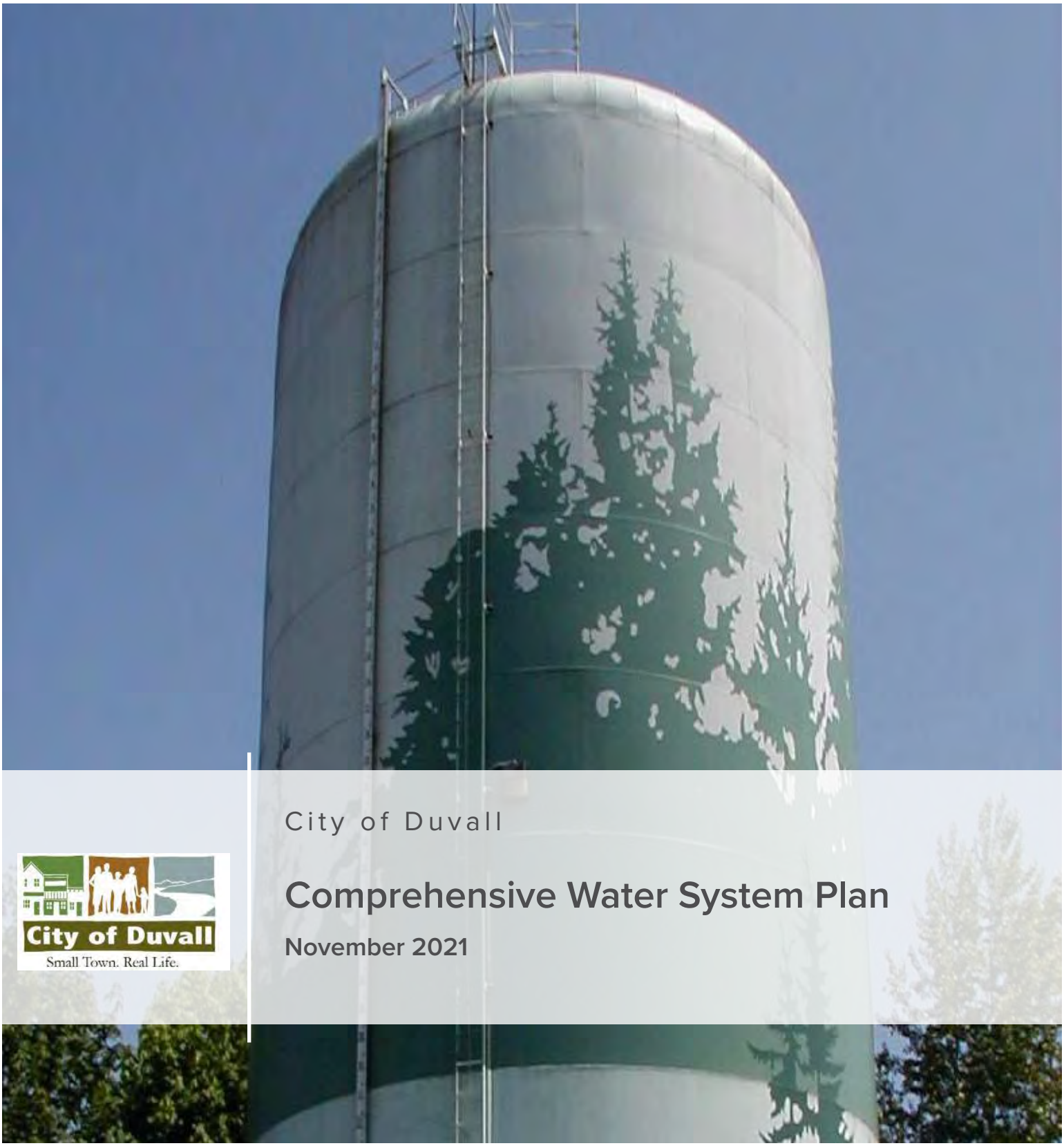

City of Duvall

# Comprehensive Water System Plan

November 2021

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## City of Duvall

*November 2021*


**Murraysmith**

1145 Broadway Plaza
Suite 1010
Tacoma, WA 98402

In Association with:
**FCS Group, Inc.**

**City of Duvall**
Steven Leniszewski, Director of Public Works

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# Executive Summary

## OVERVIEW AND PURPOSE

This water system plan is an update to the City of Duvall (City) June 2012 Comprehensive Water System Plan, which received Washington State Department of Health (DOH) approval in May 2013. The City is required to update and submit a water system plan to DOH for review and approval every ten years in accordance with current drinking water regulations under Washington Administrative Code (WAC) 246-290-100.

The purpose of this updated plan is to meet these regulatory requirements and to provide the City with a useful working document to guide the planning, scheduling, and budgeting of water system improvements. This updated plan will also be used by City staff to help maintain the water system to ensure both existing and future customers are provided with a safe and reliable supply of drinking water and fire protection. The planning period for this water system plan is 20 years.

## CHANGES SINCE THE LAST PLAN UPDATE

### Regulatory Changes

Several regulatory changes affecting water system plans have occurred since 2012. These include updates to water quality standards, such as the Revised Total Coliform Rule, which took effect on April 1, 2016, an update to DOH's "Water System Design Manual" published in June 2020, and an update to the water system plan recurrence, effective January 2017 and codified in WAC 246-290.

### Water System Changes

The City has completed several water system improvement projects since the last water system plan was completed in 2012. These include replacement of approximately 2,300 linear feet of aging and undersized asbestos-cement water main and installing approximately 4,500 linear feet of new main to improve looping in the 450 and 330 zones. Numerous developments installed approximately 16,000 linear feet of new water main. The City also made improvements to the Taylor's Landing Well site, conducted seismic evaluations on both the Crestview and Big Rock reservoirs, and installed individual meters at the mobile home park.

## SUMMARY OF KEY ELEMENTS

The City's water system plan presents a description of the existing water system and service area, forecast of future water demands, policies and design criteria for water system operation and improvements, water system analyses, the operations and maintenance program, a schedule of

improvements, and a financial plan to accomplish the improvements. A summary of the key issues related to these elements is provided in the following sections. The water system plan also includes several ancillary elements that are included in the appendix, which address water use efficiency, cross-connection control, water quality monitoring, and wellhead protection.

## Water Service Area

The City provides water service to approximately 3,059 customer accounts throughout its water service area for a population of approximately 7,840 people in 2019. The retail water service area includes the city limits and parcels immediately adjacent to the city limits. The future water service area includes areas to the north, south, east, and west within the Urban Growth Area (UGA) and unincorporated King County outside of the retail water service area. The City provides water service to mostly single-family residents, which make up approximately 93 percent of all accounts and use approximately 76 percent of all water supplied, as shown below.

## Past Water Usage and Water Use Efficiency

Total system-wide water usage has increased by approximately 11 percent from 2012 to 2019. During this same time-period, the average amount of water demand per person has decreased from approximately 69 gallons per day (gpd) in 2012 to approximately 65 gpd in 2019. This trend of decreasing water demand on a per capita basis is likely the result of water use efficiency (i.e., conservation) practices and an increase in the number of homes with water efficient plumbing. The City's 2012-2019 average per capita demand of 68 gpd and average demand per equivalent residential unit of 167 gpd are slightly less than the average for the Puget Sound area.

The City's average annual amount of distribution leakage from the rolling 3-year average of 2017-2019 was 6.9 percent, which is below the Water Use Efficiency Rule mandated maximum of 10 percent. The City's Water Use Efficiency Program identifies a water use reduction goal to "keep the total average annual retail water use of the Saving Water Partnership members under 110 million gallons per day (mgd) between 2019 and 2028, despite forecasted population growth, by reducing per capita water use." This goal was officially adopted by resolution of the Duvall City Council in 2020 (Resolution 20-23).

## Future Water Demands and Water Supply

Overall water demand within the City's system is estimated to increase between approximately 25 and 35 percent within the next ten years and between approximately 35 and 57 percent within the next 20 years, depending on the amount of future water use reductions from the City's water use efficiency program and the rate at which growth occurs in the system. The City has sufficient water supply capacity from its two existing Tolt Pipeline connections to meet the demand requirements of the system through the 20-year planning period.

## Water Source and Quality

The City receives its water from Seattle Public Utilities (SPU) under the terms of the 2011 Water Purveyor Contract, which will expire at the end of 2061. Water that the City receives from SPU is from the Tolt River source, which is located approximately 15 miles east of the City.

The City relies on the personnel and procedures of SPU to provide a reliable and high-quality supply of water to the City's system. Seattle Public Utilities is responsible for the quality of the water from the source to the City's two metered supply connections. The City is responsible for water quality within its water service area boundary. The City monitors water quality in its system but does not provide water treatment; all water treatment is provided by SPU. Source water quality has historically been excellent with very few exceptions.

## 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 and maintenance personnel have effectively operated and maintained the water system in the past. The City plans to add staff as necessary to properly maintain the system and to keep up with system growth, and as the budget allows.

The City has taken several steps to prepare for emergency situations. The City's Water System Emergency Response Plan provides information to prepare and assist the City in responding to emergency events. The City also conducted a vulnerability assessment in June 2004 and a risk and resilience analysis in December 2020 of its water system. The City's Water Shortage Response Plan identifies procedures for managing water demand during a water supply emergency or shortage situation. Water system improvements completed by the City over the last several years and proposed improvements identified in this water system plan will reduce the vulnerability of the water system during emergency situations.

## Water System Analysis

The existing water system was analyzed to determine its ability to meet the policies and design criteria of the City and those mandated by the DOH. Several analyses were performed to evaluate all components of the water system under both existing and future water demand conditions. The results of the analyses were used to identify and size improvements for the water system. The results of the analyses are summarized below:

- The City's existing reservoirs and Tolt supply stations have adequate capacity for the next 20 years.
- The Crestview Estates 0.5-million-gallon (MG) Reservoir and Big Rock Road 2.2 MG Reservoir have adequate capacity for the twenty-year planning period. Both reservoirs

should be recoated, and the Crestview Estates reservoir needs improvements to meet building-code level seismic requirements.

- The 615 Zone Booster Pump Station needs additional capacity to meet the updated DOH booster pump station requirements.
- The Tolt 2 Supply Station transmission main south of NE 144th Place, needs to be replaced to increase flow and resolve deficiencies related to undesirable pipe material and aging water main.
- Remaining aging deficient asbestos-cement water mains need to be replaced.
- Water main looping improvements are required to improve flow and water quality.
- Additional telemetry, operation and control improvements are necessary to simplify the operation of the water system and optimize control of the facilities with reduced operation costs.

## Planned Water System Improvements and Financing Plan

Improvements to the system are primarily necessary to resolve existing system deficiencies, but also to improve operations and accommodate future water customers. Improvements identified for the first ten years of the capital improvement program (2021 - 2030) are estimated to cost approximately $9,072,000, which results in an average expenditure of approximately $907,000 per year (in 2020 dollars). Improvements in the following ten years (2031 – 2040) are estimated to cost approximately $4,844,000 (in 2020 dollars).

The financial plan is intended to illustrate the feasibility of funding the operation and maintenance of the water system and planned capital improvements for the next ten years. The capital improvements can be funded from existing capital reserves, general facilities charge revenues, and revenue bonds. The proposed rate includes a 1.60 percent automatic Consumer Price Index (CPI)-based increase that has already been adopted for 2021, followed by 2.50 percent increases annually thereafter. These rate changes will allow the City to complete its 20-year Capital Improvement Program (CIP) without the need for debt, while also maintaining utility reserves at a healthy level.


# Section **1**

Chapter 1

# Introduction

## 1.1 Authorization and Purpose

In August 2019, the City of Duvall (City) authorized Murraysmith to prepare a comprehensive water system plan (Plan) as required by state law under Washington Administrative Code (WAC) 246-290-100. In accordance with WAC 246-290-100, the Plan shall be updated and submitted to the Washington State Department of Health (DOH) every six or ten years, depending on approval type. The previous comprehensive water system plan was prepared for the City in 2010 and approved by DOH in May 2012 for six years. A 10-year approval period is desired for this Plan, and therefore the Plan analyzed 10-year and 20-year planning periods. The purpose of this updated Plan is as follows:

- To evaluate historical growth and water usage for use in projecting future water demands.
- To inventory, describe and 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 prepare a Capital Improvement Program (CIP) that identifies water system improvements which resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.
- To prepare an implementation schedule of improvements and financing plan that meets the goals of the financial program.
- To review and update the water use efficiency program, water quality program, cross-connection program, and wellhead protection program.
- To document the operations and maintenance program.
- To comply with all other water system plan requirements of DOH.

## 1.2 Background

The City's existing Plan was approved by DOH in May 2012. Several changes in the City's water system and to water system regulations, as they apply to comprehensive water system plans, have occurred since 2012. The City has continued to improve and update their water system in addition to constructing new facilities. This Plan addresses these changes and improvements and states the City's plans for the next 10- and 20-year planning periods.

## 1.3 Water System Ownership and Management

The City is a municipal corporation that owns and operates a public water system within its corporate boundaries. Water system data on file at DOH for the City is shown in Table 1-1.

### Table 1-1 | Water System Ownership Information

| Information Type | Description |
|---|---|
| System Type | Group A – Community – Public Water System |
| System Name | City of Duvall |
| County | King County |
| DOH System ID Number | 207508 |
| Owner Number | 1625 |
| Address | 14525 Main St. NE<br>P.O. Box 1300<br>Duvall, WA 98019 |
| Contact | Mr. Steven Leniszewski, P.E., Public Works Director |
| Contact Phone Number | 425-788-3434 |

## 1.4 Water Service Area

The City's Retail Water Service area, which encompasses the Duvall City Limits, a portion of the City's Urban Growth Area (UGA), and a small portion of unincorporated King County, is shown in Figure 2-3. The city limits comprise an area of approximately 2.5 square miles, the existing retail water service area is approximately 3.5 square miles, and the future water service area is approximately 5.6 square miles. However, most of the future water service area lies outside of City limits and is currently undeveloped. The estimated 2019 population within the city limits was 7,840 (WA OFM – April 2020).

## 1.5 Overview of Existing System

In 2019, the City provided service to approximately 3,059 customer connections, or 3,177 equivalent residential units (ERUs). All water supply to the City is provided by Seattle Public Utilities (SPU) through its Tolt supply pipeline at two supply stations. This water is fluoridated and chlorinated by SPU, so treatment by the City is not required. Water storage is provided by two reservoirs that have a total maximum storage capacity of 2.7 million gallons (MG). In addition, the City's water system has five pressure zones with 15 pressure reducing stations, one closed zone booster pump station, three pressure relief stations, and 43 miles of water main. A summary of 2019 water system data for the City's system is shown in Table 1-2:

### Table 1-2 | 2019 Water System Data Summary

| Description | Data |
|---|---|
| Population (2019) | 7,840 |
| City Limits | 2.5 sq ml |
| Existing Retail Water Service Area | 3.5 sq ml |
| Future Water Service Area | 5.6 sq ml |
| Total Connections (2019) | 3,059 |
| Total ERU's (2019) | 3,177 |
| Demand per ERU (2019) | 146 gal/ERU |
| Demand per Capita (2019) | 59 gal/capita |
| Annual Supply (2019) | 187 MG |
| Unaccounted for Water (2017-2019) | 6.9% |
| Max Day/Average Day Demand Factor | 2.52 |
| Peak Hour/Max Day Demand Factor | 1.62 |
| Number of Pressure Zones | 5 Zones |
| Number of Supply Stations & Total Capacity | 2 SS (2,960 gpm) |
| Number of Pump Stations & Total Capacity | 1 BPS (2,000 gpm) |
| Number of Reservoirs & Total Capacity | 2 Res (2.7 MG) |
| Number of Pressure Reducing Stations | 15 |
| Number of Pressure Relief Stations | 3 |
| Total Length of Water Main | 42 miles |

## 1.6 SUMMARY OF PLAN CONTENTS

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

- Executive Summary: Provides a summary of the key elements of this plan.
- Chapter 1 - Introduction: Provides an overview of the City's water system, the objectives of the plan, and the plan organization.
- Chapter 2 - Water System Description: Presents the water service area, describes the existing water system, and identifies the adjacent water purveyors.
- Chapter 3 - Land Use and Population: Presents related plans, land use, and population characteristics.
- Chapter 4 - Water Demands: Presents historical water use patterns, existing water demands, and projected future demands.
- Chapter 5 - Policies and Design Criteria: Presents the City's water service policies, water system operation policies, and water system design criteria.

- Chapter 6 - Water Source and Quality: Discusses the City's water source and the results of past water quality monitoring.
- Chapter 7 - Operations and Maintenance: Discusses the City's operations and maintenance program.
- Chapter 8 - Water System Analyses: Presents the results of the water system analyses and summarizes existing system deficiencies.
- Chapter 9 - Water System Improvements: Presents the proposed water system improvements, their estimated costs, and implementation schedule.
- Chapter 10 - Financial Plan: Summarizes the financial status of the City's water utility and presents a program for funding the water system improvements.
- Appendices: Contain additional information and plans that supplement the chapters listed above.

## 1.7 DEFINITION OF TERMS

The following terms are used throughout this plan:

Connection Charge: A one-time fee paid by a property owner when connecting to the City's system and is made up of both the General Facilities Charge and Meter Installation Charge.

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.

Cross-Connection: A physical arrangement that connects a public water system, directly or indirectly, with anything other than another potable water system and, 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 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.
- 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 systems peak hour demand usually occurs during the same day as the peak day demand.

Distribution System Leakage (DSL): The annual amount of water calculated from the difference between the measured amount of water supplied into the system and the measured amount of water taken out of the system for consumption and other authorized uses. Authorized uses include both metered and unmetered water uses. Water use that is unmetered must be estimated to be classified as an authorized use. Examples of common unmetered water uses include the use of hydrants for flushing, firefighting, and construction. The calculated DSL volume consists primarily of water loss through leaks in the water system, but may also include meter inaccuracies, meter reading errors, water theft, and reservoir overflows.

Equivalent Residential Units (ERU's): 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 ERU's by dividing the demand of each of the other customer classes by the demand represented by one ERU.

Existing Retail Water Service Area: Includes all areas where the water system already provides direct service, remote service, or where service connections are currently available, and may include areas where new service is proposed.

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

Future Water Service Area: Includes all areas outside of the existing retail water service area where the City has the duty to provide water service to future customers.

General Facilities Charge: A one-time fee paid by a property owner when connecting to the water system. This fee pays for the new customers' 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.

Head: A measure of pressure or force 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 or Pressure 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 246-290-310.

**Meter Installation 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.

**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, 555 Zone refers to the City's second highest pressure zone which has a reservoir with a maximum water elevation (i.e., overflow elevation) of 555 feet.

**Purveyor:** An agency, special purpose district, 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, 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.

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

## 1.8 ABBREVIATIONS

The abbreviations listed in Table 1-3 are used throughout this plan.

### Table 1-3 Abbreviation Summary

| Abbreviation | Description | Abbreviation | Description |
|---|---|---|---|
| AcFt | Acre Feet | MGD | Million Gallons per Day |
| ADD | Average Day Demand | mg/L | milligrams per liter |
| AWWA | American Water Works Association | OSHA | Occupational Safety & Health Administration |
| CCR | Consumer Confidence Report | PHD | Peak Hour Demand |
| CIP | Capital Improvement Program | psi | pounds per square inch |
| City | City of Duvall | RCW | Revised Code of Washington |
| DOH | Department of Health | SDWA | Safe Drinking Water Act |
| DSL | Distribution System Leakage | SOC | Synthetic Organic Chemical |
| EPA | Environmental Protection Agency | SPU | Seattle Public Utilities |
| ERU | Equivalent Residential Unit | SWR | Surface Water Treatment Rule |
| fps | feet per second | THM | Trihalomethane |
| GMA | Growth Management Act | UGA | Urban Growth Area |
| gpm | gallons per minute | USGS | United States Geological Survey |
| MCL | Maximum Contaminant Level | VOC | Volatile Organic Chemical |
| MCLG | Maximum Contaminant Level Goal | WAC | Washington Administrative Code |
| MDD | Maximum Day Demand | WISHA | Washington Industrial Safety & Health Act |
| MG | Million Gallons | | |

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# Section **2**

Chapter 2

# Water System Description

## 2.1 Introduction

This chapter describes the City of Duvall's (City) existing and future water service areas, water service agreements, and existing water system components. The system components described in this chapter were analyzed to identify system deficiencies. The results of these analyses are described in Chapter 8.

## 2.2 History

Duvall was settled in the late 1800's, originally as a small lumber and farming based community. It was later incorporated as a city in 1913 and in the late 1970's the City began transforming into a suburban bedroom community with a rapidly growing population. By the end of 2019, the City provided water service to 3,059 customer connections.

## 2.3 Water Service Area

The City of Duvall is in north central King County, Washington, on the banks of the Snoqualmie River. The City's corporate boundary encompasses an area of approximately 2.5 square miles, as shown in Figure 2-1. The existing water system extends as far north as NE Cherry Valley Road, south to approximately Big Rock Road NE and east to 292nd Avenue NE. The Snoqualmie River serves as the distribution system's westerly boundary.

The City has identified two water service areas, a Retail Water Service Area and a Future Water Service Area. The Retail Water Service area boundary is generally located within one parcel of City limits or includes all areas where the water system already provides direct service, remote service, or where service connections are already available and may include areas where new service is proposed, as shown in Figure 2-1. The City is responsible for providing public water service, utility management and water system development within this area. At which time there is an expansion of the Retail Service Area or there is direct access available to a given parcel system tie-in will be required to the City's water system through a land use action process.

The City's Retail Water Service area is defined by DOH (331-432) as:

> *The Retail Service Area is the specific area, defined by the municipal supplier, where the supplier has a duty to provide service to new service connections as set forth in RCW 43.20.260.*

The Future Water Service Area includes all areas outside of the Retail Water Service Area where the City has the duty to provide water service to future customers.

The City's Future Water Service Area boundary extends north to NE Cherry Valley Road, west to the Snoqualmie River, and south and east to the boundary of King County Water District No. 119. This is the same boundary as the Water Service Area boundary identified in the 1989 East King County Coordinated Water System Plan. At this time the City wishes to keep its Retail Service Area intact and requires service connections as they become timely and reasonable with future expansion of the Retail Water Service Area.

### 2.3.1 Topography

Duvall's service area is located on the east side of the Snoqualmie River Valley. The topography of the area served by the City's water system varies greatly in elevation. The east portion of the City is located on an upland plateau at an elevation of approximately 500 feet. The west portion of the City is located on a west-facing slope that extends down to the Snoqualmie River at an elevation of approximately 50 feet. The western edge of the City is located within the Snoqualmie River floodplain.

## 2.4 Water Agreements and Contracts

The City has a water service agreement as part of its coordination with East King County Critical Water Supply, and a long-term water supply contract with Seattle Public Utilities (SPU). These agreements are described in more detail below.

### 2.4.1 East King County Critical Water Supply Service Area

All purveyors located within the East King County Critical Water Supply Service Area are required to have a water service area agreement that identifies the external boundary of their water service area. The City updated its water service area agreement in 1997 as part of the 1996 East King County Coordinated Water System Plan Update. A copy of this agreement is contained in Appendix A.

### 2.4.2 Seattle Water Supply Contract

The water supply contract is essentially a long-term agreement that requires SPU to supply a reliable source of treated water to the City at wholesale prices, based upon the City's long-term commitment for water demand. The original contract, dated November 1981, was amended on June 6, 1994 and was set to expire on January 1, 2012.

The City entered into a new long-term contract with SPU in May 2011 to purchase water supply at wholesale rates. The new contract remains in effect until January 1, 2062, at which time it will expire. A copy of the current water supply contract is contained in Appendix B. The City is currently working with SPU on updated to the current wholesale water purveyor contract. Most of the update is removing or editing topics that are no longer part of operations as the world has changed over the past 20 years. The work is considered an edit, not an overhaul. We expect to finish amendments in late 2022. Additional information on the water supply contract and the City's long-term water supply planning is presented in Chapter 6.

## 2.5 Satellite System Management

A Satellite Management Agency (SMA) 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.

The City, in accepting its service area, has accepted responsibility for providing water service to all customers in this area. The populated areas surrounding the City's service area are currently being served by large, stable water systems that are unlikely to be a future satellite water system operated by the City.

In the event that a neighboring water system needs assistance, the City will cooperate to provide the necessary satellite management services to meet their needs. Upon agreement between the two systems to have the City provide these services, the City will pursue the necessary steps to become an approved SMA. These steps include:

1. Submitting a notice of intent to the DOH;
2. Participating in a pre-submittal meeting with the DOH;
3. Submitting a SMA plan to DOH that meets the plan requirements;
4. Obtaining approval of the plan from DOH.

## 2.6 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 8.

General water system facility data is summarized on the DOH Water Facilities Inventory (WFI) form. A copy of this form is contained in Appendix C. Detailed data on each of the water system facilities is contained in Appendix D.

### 2.6.1 Pressure Zones

The City serves customers within an elevation range of approximately 50 feet near the banks of the Snoqualmie River to 500 feet near the Crestview Estates Reservoir. The wide elevation range requires that the water pressure be increased or reduced to maintain pressures that are safe and sufficient to meet the flow requirements of the system. This is achieved in the City's system by dividing the water system into five different pressure zones, as shown in Figure 2-1. The pressure in each pressure zone is regulated by reservoir levels, pressure reducing valve (PRV) station settings, pump station settings or a combination of these, as illustrated in the hydraulic profile, Figure 2-2, and summarized in Table 2-1.

## Table 2-1 Pressure Zone Data Summary

| Zone Name | Maximum Hydraulic Elevation | Storage Facilities | Supply Facilities |
|---|---|---|---|
| 330 | 330-ft | None | (6) 450/330 Zone PRVs |
| 450 | 450.5-ft | Big Rock Road 2.2 MG | Tolt 2 Supply<br>(4) 555/450 Zone PRVs |
| 485 | 485-ft | None | (2) 555/485 Zone PRVs |
| 555 | 555-ft | Crestview Estates 0.5 MG | (3) 615/555 Zone PRVs |
| 615 | 615-ft | None | Tolt 1 Supply Station<br>615 Zone BPS |

The 615 Zone is a closed zone (i.e., a zone without storage), which is supplied directly from the Tolt 1 Supply Station when the hydraulic grade of the Tolt Pipeline is high enough to provide adequate pressures to the 615 Zone. When the hydraulic grade of the Tolt Pipeline is too low to supply the 615 Zone directly, water from the 450 Zone Big Rock Road 2.2 million-gallon (MG) Reservoir is pumped into the 615 Zone by the 615 Zone Booster Pump Station. This zone serves customers within an approximate elevation range between 406 feet to 497 feet and is primarily located east of 278th Avenue NE. The 615 Zone fills the Crestview Estates 0.5 MG Reservoir in the 555 Zone.

The 555 Zone is supplied with water from the Crestview Estates 0.5 MG Reservoir. During fire flow events or when the Crestview Estates 0.5 MG Reservoir is out of service, the 555 Zone is supplied by three PRV stations connected to the 615 Zone. The 555 Zone is located between 272nd Avenue NE and 278th Avenue NE and serves customers within an approximate elevation range of 299 feet to 442 feet.

The 485 Zone is the system's smallest zone. The 485 Zone is supplied by the 555 Zone through two PRV stations and served by one pressure relief station. It is located south of NE 141st Place and west of 278th Avenue NE. Elevations in the 485 Zone range from approximately 294 feet to 372 feet. The 485 Zone is in the process of being decommissioned and incorporated into the 555 Zone, with completion anticipated in 2020 or 2021 at the latest.

The 450 Zone is supplied with water from the 2.2 MG Big Rock Road Reservoir during normal operating conditions. The Tolt 2 Supply Station and four PRV stations provide supplemental supply from the 555 Zone during fire flow and other emergency events. The 450 Zone is primarily located between 3rd Avenue NE and 272nd Avenue NE and serves customers within an approximate elevation range of 170 feet to 300 feet.

The 330 Zone is the lowest pressure zone and is predominately located west of 3rd Avenue NE with elevations that range from approximately 57 feet to 235 feet. The 330 Zone is supplied from the 450 Zone through six PRV stations and served by two pressure relief stations.

## 2.6.2 Supply Facilities

All water supply to the City's system is provided by SPU from its Tolt supply pipeline. All potable water that the City receives is from the Tolt River source. Water from this source is delivered to the City from east to west in a 66-inch diameter transmission main that is routed approximately two miles south of the City's downtown business district. Water is provided to the City's system from this transmission main through two active metered supply connections. Tolt 1 Supply Station is located near the southeast corner of the City's Urban Growth Area Boundary and Tolt 2 Supply Station is located to the west of Tolt 1 Supply Station.

The City also owns one well that is not connected to the water system. The Taylor's Landing well is an artesian well located southwest of the intersection of Main Street NE and NE Allen Street. The well is not potable due to high levels of arsenic, but the City maintains the well and uses the water strictly for non-potable uses by directly filling water trucks at the well site.

### Table 2-2 Source Data Summary

| Source Name | Supply Type | Year Constructed | Avg. Flow Rate (gpm) | Capacity (gpm) | Zone Supplied |
|---|---|---|---|---|---|
| Tolt 1 | SPU Intertie | 1984 (Imp 1996) | 485 gpm | 1,760 gpm | 615 Zone |
| Tolt 2 | SPU Intertie | 1962 (Imp 1973 & 1996) | 151 gpm | 1,200 gpm | 450 Zone |
| Taylor's Landing Well | Artesian Well | Unknown (closed 2000) | n/a | n/a | Unconnected |

### *2.6.2.1 Tolt 1 Supply Station*

Figure 2-4 Tolt 1 Supply Station Interior

Tolt 1 Supply Station, located near the intersection of NE Big Rock Road and SPU's Tolt Pipeline No. 1 right-of-way, provides supply directly to the 615 Zone and indirectly to all other zones (through pump and pressure reducing stations and an altitude valve). This station was constructed in 1984 and has a capacity of approximately 1,760 gallons per minute (gpm). Improvements to the facility were constructed in 1996. Tolt 1 Supply Station consists of two below-grade concrete vaults with a single 8-inch inlet pipe from the SPU supply system, 12-inch outlet piping to the 615 Zone, and 4-inch and 8-inch flow control/pressure reducing valves which are located in the larger vault. A 12-inch flow meter is located in the smaller, upstream concrete vault. Both vaults are equipped with sump pumps and intrusion switches.

### 2.6.2.2 Tolt 2 Supply Station

Figure 2-5 Taylors Landing Well

Tolt 2 Supply Station, located near the intersection of 274th Avenue NE and SPU's Tolt Pipeline No. 1 right-of-way, provides supply directly to the 450 Zone and indirectly to all other zones (through pump and pressure reducing stations). This station was originally constructed in 1962 and has a capacity of approximately 1,200 gpm. Improvements to the facility were constructed in 1973 and 1996. The station consists of two below-grade concrete vaults with a single 8-inch inlet pipe from the Seattle supply system, 12-inch outlet piping within the meter vault that reduces to 10-inch main to the 450 Zone, and 4-inch and 10-inch flow control/pressure reducing valves that are located in the larger vault. A 12-inch flow meter is located in the smaller, downstream concrete vault. Both vaults are equipped with sump pumps and intrusion switches.

### 2.6.2.3 Taylors Landing Well

Taylors Landing Well is an artesian well located in Taylors Landing Park, 16201 Main Street NE. Historically, water was pumped from the well to storage tanks on 4th Avenue and gravity fed the City until 1962 when a connection to SPU was established as the City's main water supply and the tanks were abandoned. Water was then hauled from the well to augment low or dry private wells in the unincorporated areas north of the City. In 2000, the City capped the well and closed it to public use for liability reasons. Public Works improved the well head area in 2018 including improvements to the cap, clearing of debris and vegetation, and enclosing the wellhead area with fencing and is only used in the summer by the Public Works Department to fill water trucks for irrigation purposes. However, the City is leaving the option open that the well may be used in the future as an emergency backup source for the water system.

## 2.6.3 Water Treatment

All water treatment is currently provided by SPU. The treatment process include chlorination to disinfect and kill harmful bacteria that may be present in the water and fluoridated to assist in the prevention of tooth decay. Additionally, filtration and ozonation of SPU's Tolt River source is provided by the Tolt Treatment Facility, which became operational at the end of 2000. SPU has a corrosion control program. This program protects the distribution system piping to prevent impacts to water quality including sources of lead. Additional information on the City's supply source, water treatment, and water quality monitoring is contained in Chapter 6.

## 2.6.4 Pump Station Facilities

The City's water system has one (1) pump station, the 615 Zone Booster Pump Station (BPS), as summarized in **Table 2-3**. A more detailed description of the pump station is provided below.

### Table 2-3 Pump Data Summary

| Pump Station Name | Number of Pumps | Pumps From | Pumps To | Motor (hp) | Pump Station Design Flow (gpm) | Pump Type | Variable Frequency Drive |
|---|---|---|---|---|---|---|---|
| 615 Zone BPS | (1) 350 gpm<br>(2) 1,000 gpm | 2.2 MG Big Rock Rd Reservoir | 615 Zone | 30 hp & 60 hp | 2,000 | Vertical Turbine | Yes |

### *2.6.4.1 615 Zone Booster Pump Station*

The 615 Zone Booster Pump Station is located at the site of the 2.2 MG Big Rock Road Reservoir, which is east of NE Big Rock Road and south of Roney Road. The station was constructed concurrently with the 2.2 MG Big Rock Road Reservoir in 1996. The station pumps water from the 450 Zone 2.2 MG Big Rock Road Reservoir to the 615 Zone to meet the demand requirements of the 615 Zone and to transfer storage from the 2.2 MG Big Rock Road Reservoir to the 0.5 MG Crestview Estates Reservoir via an altitude valve.

Figure 2-6 615 Zone Booster Pump Station

A concrete masonry unit (CMU) block building houses the booster pump station's mechanical and electrical equipment. The station has a total capacity of approximately 2,000 gpm, which is delivered by one 350 gpm vertical turbine pump with a 30 horsepower (hp) motor and two 1,000 gpm vertical turbine pumps with 60 hp motors. All three pumps are equipped with variable frequency drives. The station was designed to accommodate an additional fourth pump, as needed in the future. A 6-inch pressure relief valve is located on the discharge header and protects the 615 Zone from high pressures during pump operation. A 6-inch altitude valve with backpressure sustaining and pressure relief override is located outside the pump station in a below-grade vault. This control valve allows the transfer of water from the 615 Zone to the 450 Zone 2.2 MG Big Rock Road Reservoir when Tolt 1 Supply Station is supplying water to the 615 Zone and protects the 615 Zone from high pressures during this operation.

Electronic controls were added to this valve in 2009 to enable more precise control and greater flexibility for the altitude feature of the valve. A stationary engine generator set, located in a room adjacent to the pumps, is equipped with an automatic transfer switch and provides backup power supply to the facility in case of a power service interruption or emergency. A 12-inch flow meter is located outside and adjacent to the pump station in a below-grade concrete vault. The site is

fully enclosed by a chain link fence. Both the metering vault and pump station building are equipped with intrusion alarms.

## 2.6.5 Storage Facilities

The City's water system has two (2) active storage facilities: 450 Zone 2.2 MG Big Rock Road Reservoir and 555 Zone 0.5 MG Crestview Estates Reservoir. These reservoirs are summarized in Table 2-4, and a more detailed description of each reservoir is provided in the following sections.

### Table 2-4 Tank Data Summary

| Facility Name | Overflow Elevation (ft) | Zones Served | Water Storage Height[1] (ft) | Diameter (ft) | Total Volume (MG) | Volume/ft (gallons) | Material | Year Constructed |
|---|---|---|---|---|---|---|---|---|
| Big Rock Rd Reservoir | 450.5-ft | 450 & 615 | 27.0 | 138 | 2.20 | 111,000 | Steel | 1996 |
| Crestview Estates Reservoir | 556-ft | 555 | 63.0 | 65 | 0.50 | 8,400 | Steel | 1988 |

### *2.6.5.1 450 Zone 2.2 MG Big Rock Road Reservoir*

Figure 2-7 2.2 MG Big Rock Road Reservoir

The 2.2 MG Big Rock Road Reservoir, which is located east of NE Big Rock Road and south of Roney Road, provides water storage directly to the 450 Zone and indirectly to the other zones in the system. The reservoir site is shared with the City's 615 Zone Booster Pump Station. The 138-foot diameter, 27-foot tall steel reservoir was constructed in 1996 and provides approximately 111,000 gallons of storage per foot height. The reservoir's base elevation is at approximately 430 feet and the overflow elevation is at 450.5 feet.

The interior of the reservoir was cleaned in 2016 and a project is in development for a project in 2022-23 to address interior/exterior recoating and other improvements. The reservoir is equipped with an exterior level gauge and has a single 12-inch water main that serves as its common fill and drain (inlet/outlet) pipe. An internal level sensor provides accurate level measurements for data logging and level control purposes. The reservoir may be filled from the 450 Zone with water from Tolt 2 Supply Station through a 12-inch transmission main in Big Rock Road or from the 615 Zone through a 6-inch altitude valve. The altitude control valve is located onsite and adjacent to the 615 Zone Booster Pump Station building in a below-grade concrete vault and is equipped with an intrusion alarm. The altitude valve is programmed with a delayed opening and is also equipped

with backpressure sustaining and pressure relief mechanisms to maintain minimum pressures and to relieve excess pressures in the 615 Zone.

### *2.6.5.2 555 Zone 0.5 MG Crestview Estates Reservoir*

The 0.5 MG Crestview Estates Reservoir is located near the intersection of NE 144th Street and 283rd Street NE. The reservoir provides storage for the 555 Zone and can provide supplemental storage to the lower pressure zones when supplied through the pressure reducing stations. The 63-foot tall steel reservoir was constructed in 1988 and provides approximately 8,400 gallons of storage per foot height. The reservoir has a base elevation of approximately 496 feet and overflow elevation of 556 feet.

Figure 2-8 0.5 MG Crestview Estates Reservoir

The interior of the reservoir was cleaned in 2016. A mural is painted on the reservoir's exterior coating. The reservoir is equipped with an exterior level gauge and has a 6-inch water main that serves as its inlet pipe from the 615 Zone and a 12-inch water main that serves as its outlet pipe to the 555 Zone. The reservoir has an elevated inlet pipe that discharges water into the reservoir at an elevation of approximately 545 feet. A 4-inch altitude valve, which controls the level of water in the reservoir, is located on the reservoir's inlet piping in a below-grade concrete vault. A pressure transducer, which measures the pressure of the 615 Zone at this location, is also located in this vault. An 8-inch insertion meter, which was installed in 1996 in a separate below-grade concrete vault upstream of the altitude valve vault, measures the flow rate of water from the 615 Zone to reservoir. Both vaults are equipped with sump pumps and intrusion alarms. The reservoir site is fully enclosed and secured with a chain link fence topped with barbed wire.

Cell phone antennas and equipment, owned by both AT&T and Verizon, are located in a leased area of the reservoir site and on the tank itself.

## 2.6.6 Distribution and Transmission System

The City's water system contains more than 42 miles of water main ranging in size from 4-inches to 12-inches. As shown in Table 2-1, most of the water main (approximately 68 percent) within the service area is 8-inch diameter, and over 90% of all water main is 8-inch diameter or larger.

## Table 2-5 Water Main Inventory

| Diameter (inches) | Pipe Material and Length (ft) | | | Total Length (feet) | % of Total |
|---|---|---|---|---|---|
| | AC | DI | PVC | | |
| 4 and under | 339 | 4,850 | 2,834 | 8,024 | **4%** |
| 6 | 1,707 | 4,772 | 1,419 | 7,898 | **4%** |
| 8 | 797 | 121,080 | 29,685 | 151,563 | **68%** |
| 10 | 3,945 | 3,443 | 894 | 8,282 | **4%** |
| 12 | -- | 42,937 | 3,820 | 46,756 | **21%** |
| **Total Length** | **6,788** | **177,082** | **38,652** | **222,522** | **100%** |
| **% of Total** | **3%** | **80%** | **17%** | **100%** | |

All of the water main in the City's system is constructed of asbestos concrete (AC), polyvinyl chloride (PVC), and ductile iron (DI), with more than three-quarters of the water main constructed of DI. All new water main projects are generally required to use DI pipe in accordance with the City's Public Works Development Design Standards (PWDDS).

The oldest water main in the system is the AC water main that was mostly installed in 1962, and only makes up three percent of the current system. At 58 years old, this water main is past its useful service life of 50 years for this material type. The City is actively working to replace the last few segments of AC main in the coming years. The remaining water main in the system is approximately 40 years old or less and in generally good condition.

## 2.6.7 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. The City's water system has a total of 15 pressure reducing stations, as shown in **Figure 2-1** and **Figure 2-2**. Six pressure reducing stations actively supply water from the 450 Zone to the lower 330 Zone, which serves the downtown area. Four pressure reducing stations serve the 450 Zone from the 555 Zone, while the 485 Zone and the 555 Zone are served by a total of two and three pressure reducing stations, respectively. All the City's PRV stations are located in underground vaults and are not equipped with pressure relief valves. A listing of all pressure reducing stations and related data is contained in **Appendix D**.

The pressure reducing stations that serve the 330 Zone and 485 Zone function as an active supply facility by maintaining a continuous supply of water from a higher zone to a lower zone. The pressure reducing stations that serve the 450 and 555 Zone function as standby supply facilities that are normally inactive (no water flowing through them), since both zones have reservoirs that maintain pressure. Their operation is triggered by a drop-in water pressure near the downstream side of the station and supplies additional water during fire flow demand or other emergency situation.

## 2.6.8 Pressure Relief Stations

In addition to the pressure relief capabilities provided by the City's two water storage reservoirs, the City installed three pressure relief facilities in 2009, one in the 330 Zone and one in the 485 Zone. These stations are intended to relieve excess pressure to the atmosphere during high pressure events, providing protection to both the water system infrastructure and its customers.

## 2.6.9 Water System Interties

Water system interties are physical connections between two adjacent water systems (RCW 90.03.383).They permit exchange or delivery of water between those systems for other than emergency supply purposes, where such exchange or delivery is within established instantaneous and annual withdrawal rates specified in the systems' existing water right permits or certificates, or contained in claims filed pursuant to chapter 90.14 RCW, and which results in better management of public water supply consistent with existing rights and obligations. Interties include interconnections between public water systems permitting exchange or delivery of water to serve as primary or secondary sources of supply, but do not include development of new sources of supply to meet future demand.

The City does not have interties with adjacent water systems. However, an emergency intertie between the City's water system and the Water District No. 119 water system is possible, should either system become interested in the future.

## 2.6.10 Telemetry and Supervisory Control System

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

Figure 2-9 Rock Road Reservoir & Booster Pump Station Telemetry

The City's telemetry and supervisory control system was originally installed in 1997 by Systems Interface. The system consists of a master telemetry unit (MTU) at the Public Works building and remote telemetry units (RTU) at each of the two reservoir sites. The telemetry system was designed to use leased telephone lines for communication between sites, but the system was problematic and has since been abandoned.

The City is currently without Telemetry or Supervisory Control and Data Acquisition (SCADA). The City's goal is to re-establish all telemetry and control functions to essential City facilities and is currently developing a Telemetry and Controls Master Plan to define the needs of operations staff for a SCADA system and provide a guideline for budgeting and implementation.

## 2.7 Water System Operation

All water supply is provided through two metered connections from SPU's Tolt Pipeline No. 1 that follows an east/west alignment directly south of the City, as shown in **Figure 2-1**. Tolt 1 Supply Station provides water to the 615 Zone and indirectly fills the 0.5 MG Crestview Estates Reservoir in the 555 Zone through an altitude control valve at the reservoir site. Water from this supply station can also indirectly fill the 450 Zone 2.2 MG Big Rock Road Reservoir through an altitude control valve at the reservoir site. Tolt 2 Supply Station provides water directly to the 450 Zone and the 2.2 MG Big Rock Road Reservoir. The settings of the supply facilities and water usage throughout the system dictate the amount of water either flowing into or out of the reservoirs. The 615 Zone BPS draws water from the 450 Zone 2.2 MG Big Rock Road Reservoir and pumps it into the closed 615 Zone (i.e., no storage within the zone) to meet 615 Zone demands and to supply water to the 0.5 MG Crestview Estates Reservoir when the altitude valve opens for filling the reservoir. The 485 Zone and the 330 Zone are supplied by pressure reducing stations with water that originates from the 555 and 450 Zones, respectively.

The City's supply facilities have been designed to operate under a wide variation of supply heads and to comply with SPU's demand metering requirements. The following two sections describe the operation of the City's facilities during the demand metering period.

### 2.7.1 SPU Demand Metering Requirements

The SPU water supply contract requires the City to maintain a relatively constant 24-hour demand on the SPU system by supplying peak demands from storage or pay a substantial demand surcharge. The demand surcharge is imposed when the average of the demand factors from the 10 maximum supply days during the demand metering period exceeds 1.3. The current demand metering period is from May 16th through September 15th of each year.

The demand factor is calculated from the ratio of the 15-minute peak flow rate to the 24-hour average flow rate of the same day. The City's two supply facilities are considered as a single supply connection for the purpose of calculating the demand factor. The demand surcharge is calculated in the fall of each year based upon the supply rates during the demand metering period. The demand surcharge, if imposed, is applied for one year beginning in January following the summer that the peak demands occurred. To avoid the demand surcharge, the City operations personnel operate the supply facilities in a flow control mode during the summer months and adjust the flow rate of each station on a daily basis to maintain maximum storage levels and a relatively constant supply from SPU. The rate of supply is set early in the morning each day based on the prior days demand, the prior days flow control valve settings, the level in the reservoirs, and the forecasted weather condition for the upcoming day.

When demand metering is not in effect during the lower water usage months of the year, the supply facilities are usually set to maximize water turnover and maintain adequate water quality in the reservoirs.

### 2.7.2 Seattle Supply Head Variation

The hydraulic head, or pressure, of the water entering the City's supply facilities from the Tolt pipeline varies throughout the year, based on the overall water demand of users of the SPU regional system. The hydraulic head at the City's supply facilities is highest during the winter and lowest during the summer, especially during periods of extreme temperatures and high-water use throughout the region. The SPU water supply contract identifies the minimum hydraulic head of water supply that SPU must maintain at each of the City's supply facilities, which is 645 feet at Tolt 1 Supply Station and 640 feet at Tolt 2 Supply Station, based on the NAVD88 datum. The City's supply facilities are capable of providing adequate pressures and flows throughout the system, even if the SPU supply system is operated at minimum contract head levels.

## 2.8 Adjacent Water Systems

The area outside and immediately adjacent to the City's water service area is unincorporated King County. Only portions of the adjacent area are served by public water systems, King County Water District No. 119 and Woodinville Water District as shown in Figure 2-3. In addition, one of SPU's main supply lines, Tolt Pipeline No. 1, is located within the City's service area boundary. The following provides a brief description of each water system.

### 2.8.1 King County Water District No. 119

King County Water District No. 119 is immediately adjacent to the east and south sides of the City's water service area. The District provides water to a population of approximately 3,000 people within unincorporated King County. The District also purchases its water supply from SPU. The City has no plans for an intertie between the two systems at this time. Five single family customers located within the District's service area are currently served by the City under the terms of a 1998 interlocal agreement between the City and the District, which was most recently amended in 2007. These customers are located southeast of the City's current retail service area in the vicinity of the Tolt 1 Supply Station. A copy of the agreement and its amendment is contained in Appendix A.

### 2.8.2 Woodinville Water District

Woodinville Water District is located approximately one mile west of the City's water system and is bordered by several other water systems, which include Northshore Utility District, City of Bothell, City of Kirkland, and the City of Redmond. The District is a combined water and sewer district which serves customers within the City of Woodinville, a portion of the City of Bothell and unincorporated King County. Similar to the Duvall, the Woodinville Water District receives all of its water supply from SPU. There are no plans for interties between this system and Duvall's water system at this time.

N
W E
S

## Legend

- Retail Water Service Area
- Future Water Service Area
- City Urban Growth Area
- City Limits
- PRV
- Zone Valve (Normally Closed)
- Supply Station
- City Tank
- Private Tank
- City PS
- Private PS
- City Pipe
- Private Pipe

450 Zone
555 Zone
330 Zone
615 Zone
Snoqualmie River
RIVERVIEW SCHOOL DISTRICT (PRIVATE SYSTEM)
CRESTVIEW ESTATES 0.5 MG RESERVOIR
BIG ROCK ROAD 2.2 MG RESERVOIR
615 ZONE PUMP STATION
TOLT 2 SUPPLY STATION
TOLT 1 SUPPLY STATION
PS
NE WOODINVILLE-DUVALL RD
W SNOQUALMIE RIVER RD NE
NE 165TH ST
NE 169TH ST
246TH AVE NE
NE CHERRY VALLEY RD
NE 173RD ST
284TH AVE NE
NE 163RD ST
NE ANDERSON ST
NE BEADONHALL ST
NE BIRD ST
NE VIRGINIA ST
NE STEWART ST
NE CHERRY ST
NE STELLA ST
NE STEPHENS ST
NE RING ST
NE RICHARDSON ST
NE VALLEY ST
NE PARK ST
NE TAYLOR ST
NE KENNEDY DR
NE COMEGYS ST
NE MILLER ST
NE 145TH ST
NE 144TH PL
NE 143RD CT
NE 143RD PL
NE 142ND CT
NE 141ST CT
NE 140TH ST
NE 138TH ST
NE 133RD ST
NE 155TH PL
NE 153RD PL
NE 152ND ST
NE 151ST PL
NE 150TH ST
NE 149TH LN
NE 148TH WAY
NE 146TH LN
NE 145TH CT LN
NE 144TH ST
NE 143RD ST
NE 142ND PL
NE 141ST PL
NE 140TH CT
NE 140TH PL
NE 153RD LN
NE 153RD ST
NE 151ST ST
NE 150TH PL
NE 149TH PL
NE 148TH PL
NE 147TH PL
NE 147TH CT
NE 146TH ST
NE 156TH PL
NE 157TH PL
NE 158TH PL
NE RONEY RD
284TH CIR NE
NE 138TH PL
MAIN ST NE
1ST AVE NE
2ND AVE NE
3RD AVE NE
4TH AVE NE
BROADWAY AVE NE
RIVERSIDE AVE NE
RAILROAD AVE NE
BROWN AVE NE
MANVEL LN NE
STEWART LN NE
ALLEN ST NE
DUVALL-WOODINVILLE RD NE
CARNATION-DUVALL RD NE
W SNOQUALMIE VALLEY RD NE
273RD AVE NE
274TH AVE NE
275TH AVE NE
276TH AVE NE
277TH AVE NE
278TH AVE NE
280TH AVE NE
284TH AVE NE
285TH AVE NE
286TH AVE NE
287TH AVE NE
294TH AVE NE
296TH AVE NE
298TH AVE NE
300TH AVE NE
304TH AVE NE
312TH AVE NE
311TH AVE NE
292ND AVE NE
BATTEN RD NE
ODELL RD NE
ODELL RD
276TH WAY NE
NE 142ND ST
NE 141ST ST
NE 143RD ST
NE 147TH PL
NE 140TH ST
NE 138TH ST
NE 133RD ST

City of Duvall
Small Town. Real Life.

**Figure 2-1**

COMPREHENSIVE WATER SYSTEM PLAN

**Existing Water System**

murraysmith

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NORTH ⟷ SOUTH

700 — 600 — 500 — 400 — 300

Approximate SPU Tolt Supply Variation

Riverview School District Connection (Private System)

615 Zone

615 Zone

555 Zone

555 Zone

450 Zone

450 Zone

330 Zone

330 Zone

PRS (Manion Wy)

PRS (NE 150th St)

4" Altitude Valve with Backpressure Sustaining

0.5 MG
CRESTVIEW ESTATES RESERVOIR
Diameter: 37.7'
Base Elev: 496'
8,400 GAL/FT

OE = 556'

PRS (NE 140th Pl)

PRS (NE 275th Ave)

PRS (Big Rock Rd)

485 Zone

Pressure Relief (Big Rock Rd)

PRS (NE 152nd St/Bruett Rd)

PRS (Miller St)

PRS (NE 144th Pl)

PRS (NE 143rd Pl)

6" Pressure Relief Valve

6" Altitude Valve

615 ZONE PUMP STATION

OE = 450.5'

2.2 MG BIG ROCK ROAD RESERVOIR
Diameter: 138'
Base Elev: 430'
111,000 GAL/FT

4" Electronic Control Valve

TOLT 1 SUPPLY STATION (Big Rock Road)

8" Electronic Control Valve

4" Electronic Control Valve

TOLT 2 SUPPLY STATION (275th Ave)

10" Electronic Control Valve

PRS (Virginia St)

PRS (Stephens St)

PRS (Kennedy St)

PRS (NE 145th St)

PRS (NE 143rd St)

PRS (Big Rock Rd–Safeway)

Pressure Relief (Railroad Ave NE)

Pressure Relief (Main St NE)

## LEGEND

- 615 ZONE
- 555 ZONE
- 485 ZONE
- 450 ZONE
- 330 ZONE
- ADJACENT SYSTEM FACILITIES AT SAME SITE
- PUMP STATION
- PRESSURE REDUCING STATION/VALVE
- CONTROL VALVE
- MASTER METER
- PRESSURE RELIEF STATION/VALVE

## ABBREVIATIONS

| | |
|---|---|
| ELEV | ELEVATION |
| FT | FEET |
| GAL | GALLONS |
| MG | MILLION GALLONS |
| OE | OVERFLOW ELEVATION |

August 2021

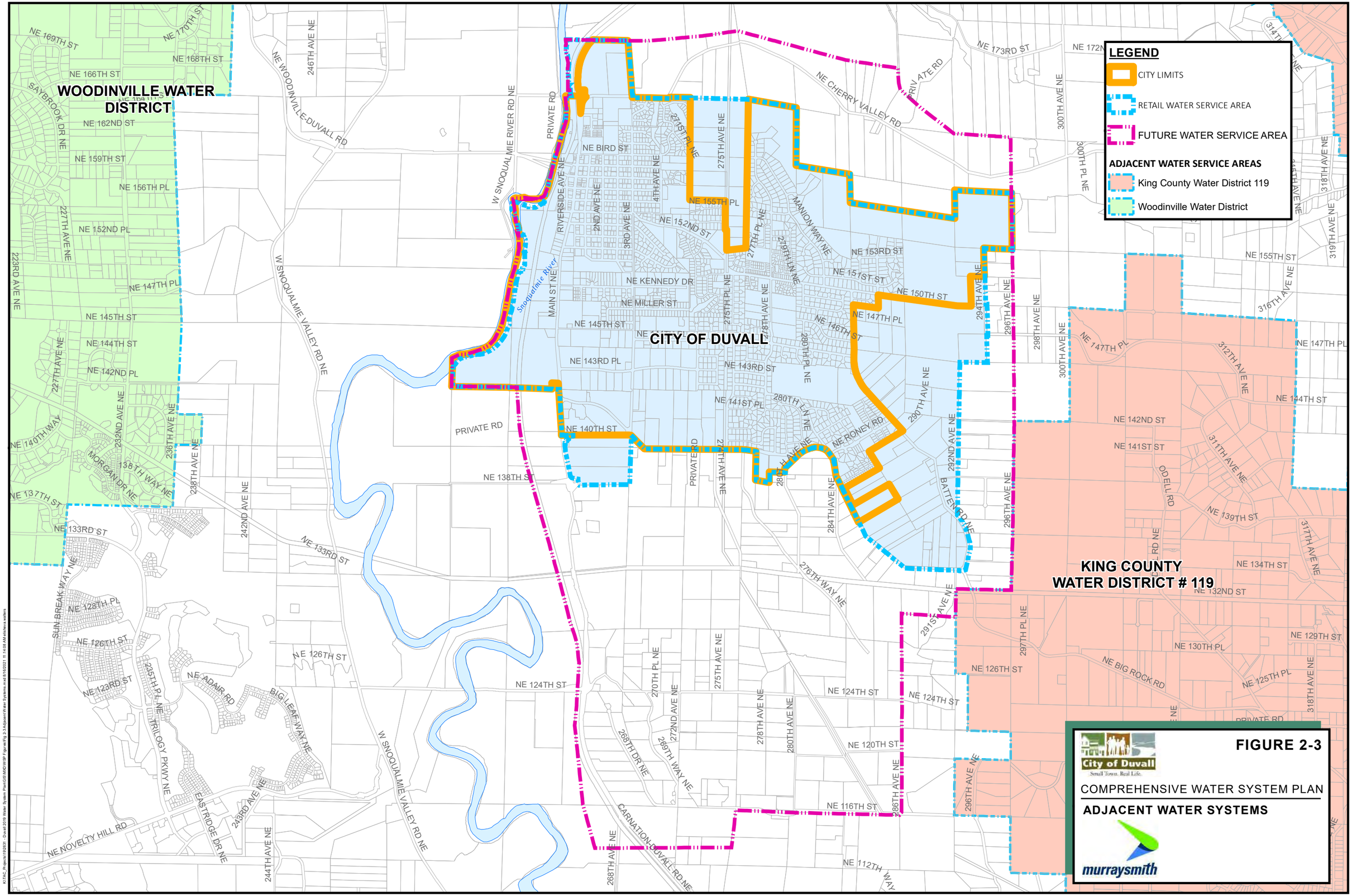
**Figure 2-2**

City of Duvall
Small Town. Real Life.

COMPREHENSIVE WATER SYSTEM PLAN
**EXISTING WATER SYSTEM HYDRAULIC PROFILE**

murraysmith

K:\TAC_Projects\19\2631 - Duvall 2019 Water System Plan\CAD\Figures\19-2631-300-WA-FIG 2-2.dwg Figure 2-2 8/16/2021 11:20 AM ELISHEVA.WALTERS 23.0s (LMS Tech)

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murraysmith

# Section **3**

Chapter 3

# Land Use and Population

## 3.1 Introduction

This chapter demonstrates the compatibility of this Plan with the City's Comprehensive Plan and other plans, identifies current land use designations, and presents population data. The City's Overall Comprehensive Plan was completed in May 2005 and was last updated in 2015 and amended in 2019. It was developed to meet the requirements of the State of Washington Growth Management Act (GMA). The GMA requires, among other things, consistency between land use and utility plans and their implementation.

## 3.2 Compatibility with Other Plans

The following planning documents were examined to ensure this Comprehensive Water System Plan is consistent with the City's land use policies and other related plans.

- Growth Management Act
- City of Duvall Comprehensive Plan
- King County Countywide Planning Policies
- East King County Coordinated Water System Plan
- Seattle Public Utilities Water System Plan
- Puget Sound Regional Council (PSRC) VISION 2040

### 3.2.1 Growth Management Act

The State of Washington Growth Management Act (GMA), was passed in 1990 and amended as required over the years. It defines four goals relevant to water system planning:

1. Focus growth in urban areas and reduce sprawl
2. Ensure consistency between land use and utility plans
3. Ensure adequate public facilities and services, concurrent with growth
4. Designate and protect critical areas

Through the GMA all counties, cities and towns were required to develop comprehensive plans, which address issues of land use, transportation, housing, capital facilities, utilities, and rural lands.

#### *3.2.1.1 Urban Growth Area*

The GMA requires that King County (County) and the City cooperate in designating an Urban Growth Area (UGA). As part of the development of its Comprehensive Plan, the City designated UGAs that would accommodate the City's projected population growth and facilitate resource conservation.

#### *3.2.1.2 Consistency*

The plans and policies of the City and County must be consistent in accordance with GMA, per RCW 36.70A.100. All comprehensive plans for communities within the PSRC planning area are also required to be consistent with its multi-county plan. The GMA also requires consistency with the implementation of water system plans and comprehensive plans, per RCW 36.70A.120.

The Municipal Water Law, which became effective in 2003, also requires consistency of water system plans with local plans and regulations. Confirmation of consistency under this law is achieved by means of completing the Consistency Statement Checklist, which must be included with all water system plans. A signed copy of this checklist is included in Appendix E.

#### *3.2.1.3 Concurrency*

Concurrency means that adequate public facilities and services are provided at the time growth occurs. For example, growth should not occur where schools, roads and other public facilities are overloaded. Concurrency ensures that public dollars are used efficiently, and that quality of life is preserved. To achieve this objective, the GMA directs growth to areas already served or readily served by public facilities and services (RCW 36.70A.10). It also requires that, when public facilities and services cannot be maintained at an acceptable level of service, new development should be prohibited (RCW 36.70A.100).

#### *3.2.1.4 Critical Areas*

The GMA requires that critical areas be designated and protected. Critical areas include areas at high risk for erosion, landslides, earthquakes or flooding; coal mines; wetlands or lands adjoining streams, rivers and other water bodies. Appendix F contains a SEPA checklist that was prepared for this Comprehensive Water System Plan that addresses environmental issues.

### 3.2.2 City of Duvall Comprehensive Plan

The City's most recent Comprehensive Plan was published in 2015, adopted in June of 2016, and amended in December of 2017. The Land Use Element of this Comprehensive Plan states the City's vision of how growth and development should occur over a 20-year horizon and includes goals and policies to achieve this vision. The Future Land Use Map, which is included as Figure 3-1, shows the different types of land uses that are planned throughout the City.

The Land Use Element of the Comprehensive Plan articulates many of the same goals and concerns of the GMA. Like the GMA, the Land Use Element seeks to accommodate growth while maintaining the City's residential but rural character and protecting environmentally sensitive areas. It seeks

to promote a strong local economy and vital commercial and industrial districts by focusing economic development within them and establishing development guidelines. The Transportation and Capital Facilities Elements ensure that new development will be adequately serviced without compromising existing levels of service, similar to the principal of concurrency as defined in the GMA.

The Comprehensive Plan also states its City Limits and updates its UGA and UGA Reserve (UGAR) boundaries. The City limits encompass an area of approximately 1,590 acres (2.5 square miles), with a UGA of approximately 137 acres and UGAR of approximately 327acres (0.73 square miles). Some undeveloped lots still exist within the City and infilling is expected and encouraged. The City will also consider annexing some of its UGA in order to accommodate future growth and development.

### 3.2.3 King County Countywide Planning Policies

The King County Council adopted the 2012 King County Countywide Planning Policies (CPPs) in 2013. Since this time, the plan has been amended several times with the last amendment occurring June of 2016. The CPPs serve as the comprehensive plan framework for the County and cities within the County, including the City of Duvall. Consistent with the GMA's goals, it establishes an UGA within the County to encourage growth in urban areas and to reduce urban sprawl. The CPPs also guide development in rural, unincorporated King County. Similar to the City's Comprehensive Plan, the County's policy goals seek to reduce urban sprawl, protect rural areas, provide affordable housing throughout the County, and coordinate protection of environmentally sensitive areas.

The Growth Management Planning Council (GMPC) is in the process of updating the CPPs. The intent of the update process is threefold: 1) to ensure consistency with current state law, state agency guidance and recent hearings board decisions; 2) to align the CPPs with the newly adopted regional growth strategy found in VISION 2040; and 3) to modernize the CPP narrative to reflect the ongoing and evolving implementation of the GMA and countywide policies.

### 3.2.4 East King County Coordinated Water System Plan

The East King County Coordinated Water System Plan (EKCCWSP) was prepared in 1989 and updated in 1996. The EKCCWSP was prepared under the direction of the King County Council and the East King County Regional Water Association (RWA). The RWA is a group of water purveyors that provide service within the Critical Water Supply Service Area (CWSSA) that was designated by the King County Council on December 15, 1985 for purposes of the EKCCWSP. Most of the water purveyors within the RWA obtain their water supply from Seattle Public Utilities (SPU).

The purpose of the EKCCWSP is to assist the area's water utilities in establishing an effective process for planning and development of public water systems and restricting the proliferation of small public water systems. The plan accomplishes this by establishing service area boundaries; minimum design standards; service review procedures; appeals procedures; long-term regional water supply strategy; water conservation program and goals; and the satellite system

management program. The City has established policies, design criteria and goals that meet or exceed the requirements and goals of the EKCCWSP.

### 3.2.5 Seattle Public Utilities Water System Plan

SPU provides water to approximately 1.4 million people throughout King County and portions of southern Snohomish County. In 2019, SPU updated its Water System Plan, including a yield estimate and a water demand forecast for its distribution system customers and wholesale customers. These forecasts found that SPU is not projected to exceed its current firm yield until well beyond 2060, ensuring the City has a reliable source of water well beyond the existing 20-year planning period.

### 3.2.6 Puget Sound Regional Council

The Puget Sound Regional Council (PSRC) provides data and long-term forecasts for transportation, population, jobs, and housing to help the Puget Sound area plan for the future. PSRC is directed by local elected leaders of King, Pierce, Snohomish, and Kitsap counties, the region's cities and towns, ports districts, transit agencies, and tribes. All these local jurisdictions work together to create a cohesive plan for the future of the Puget Sound region.

The PSRC's multi-county planning document, Vision 2040, is a policy-based growth projection that provides a planning vision for the area including King, Snohomish, Kitsap, and Pierce Counties. Vision 2040 has several goals and policies with regards to domestic water systems, such as the City of Duvall. These policies and goals include:

- Ensuring residents of the region have access to high quality drinking water that meets or is better than federal and state requirements.
- Identifying and developing additional water supply sources to meet the region's long-term water needs, recognizing the potential impacts on water supply from climate change and fisheries protection.
- Promoting coordination among local and tribal governments and water providers and suppliers to meet long-term water needs in the region in a manner that supports the region's growth strategy
- Reducing the per capita rate of water consumption through conservation, efficiency, reclamation, and reuse.

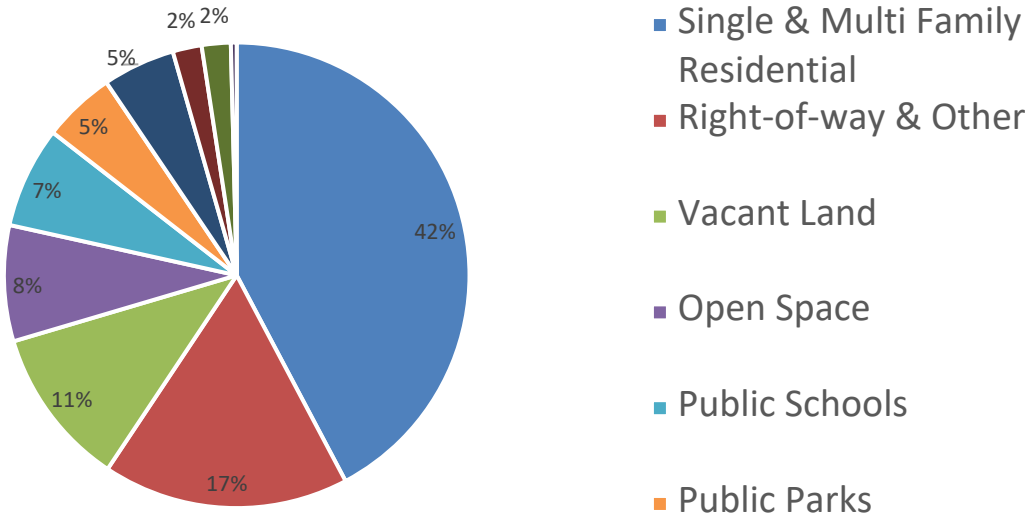
Vision 2040 was initially adopted by the PSRC General Assembly in 2008 before being amended by the PSRC executive board in 2009.

## 3.3 LAND USE

The city limits currently encompass an area of approximately 1,590 acres. The City's UGA and UGAR encompasses an additional 470 acres outside of the current city limits. This UGA includes an approximately 330-acre urban reserve area just east of the city limits. The City's land use

designations, as shown in the Future Land Use Map on **Figure 3-1**, guide development in Duvall. Land use outside of the city limits is designated by King County.

The area served by the City is primarily residential, comprised largely of single-family residents. Currently single- and multi-family residential make up about 42 percent of the land use. A variety of other uses make up the remaining 58 percent, as summarized in **Figure 3-2**.




## Figure 3-2 Existing Land Use in Duvall City Limits

Multi-family residential, commercial and industrial development is concentrated along the major traffic corridor of SR 203, or Main Street, through the area known as Old Town. The Upland Plateau on the east side of the City is designated solely for single family residential and public facility use, as shown on **Figure 3-1**.

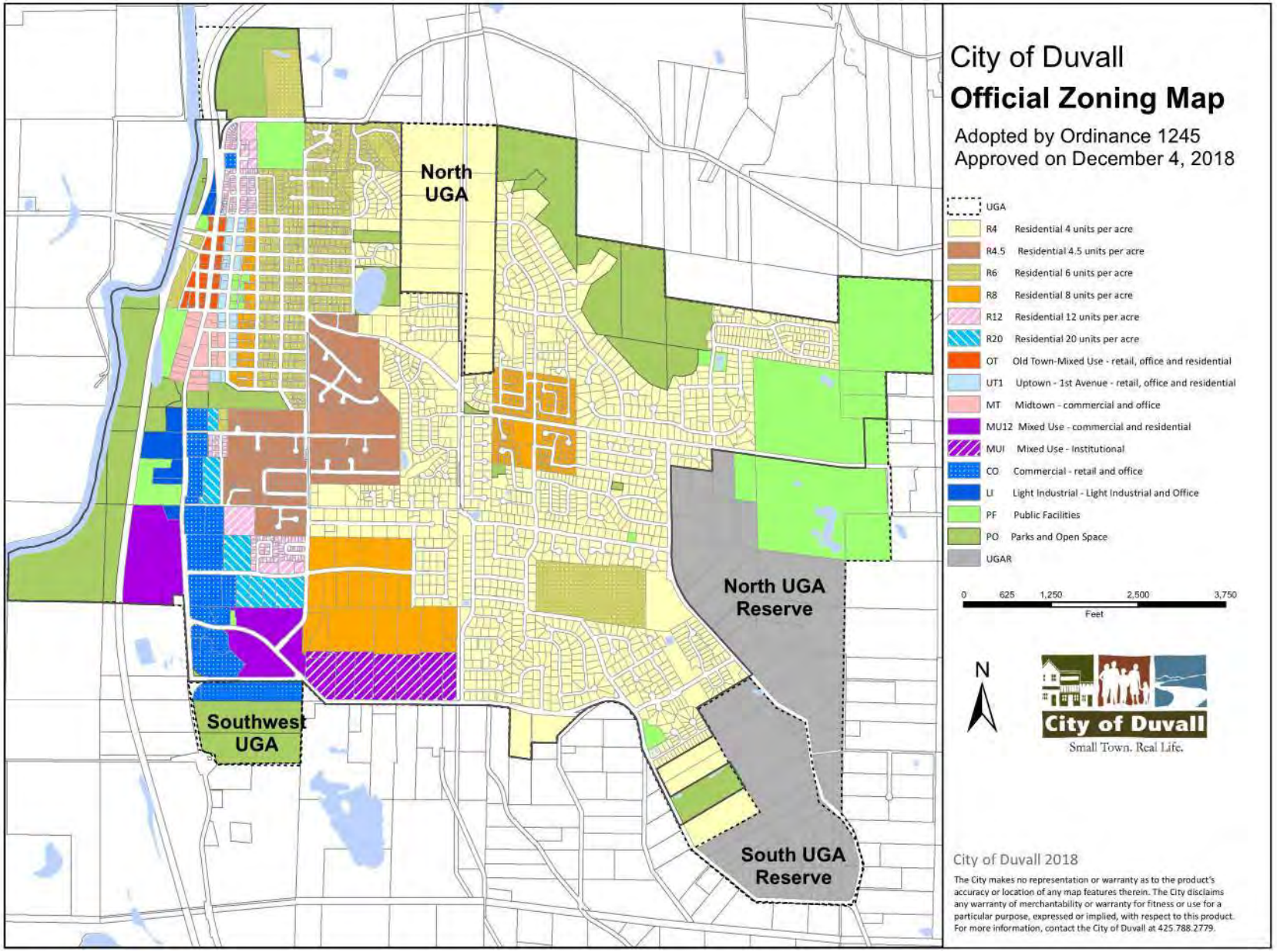



Figure 3-1 City of Duvall Future Land Use Map

# 3.4 POPULATION

Population projections for the City's water system review historical population trends and make projections for the 20-year planning period (2020 – 2040). Because the City's water system mostly serves customers within the city limits, the historical trends and population projections presented here are consistent with the City's 2015 Comprehensive Plan.

## 3.4.1 Household Trends & Historical Population

The City is primarily a residential community comprised largely of single-family residences with most of the population commuting to nearby suburban cities for employment. There were approximately 2,684 residential units within Duvall in 2019. Of the residential units, approximately 86 percent of these residences were single family, 7 percent were multi-family and 7 percent were mobile homes. Since 1980, Duvall has experienced a slow trend towards providing an increasing number of multi-family housing units and it is expected that this trend will continue.

According to Washington State's Office of Financial Management (OFM) population estimate (April 1st 2020), Duvall has a population of approximately 7,950, which equates to a calculated average of 2.92 residents per household. Historically, the City has seen the average household size hover around three people for the last decade, and this trend is expected to continue per the City's 2015 Comprehensive Plan. This average household size is higher than what is seen in the County as a whole and reflects the City's higher percentage of single-family home base compared to the County as a whole.

The City was settled in the late 1800's, originally as a small lumber and farming based community. It was later incorporated as a city in 1913 and in the late 1970's the City began transforming into a suburban bedroom community with a rapidly growing population. This rapid growth lasted through to today, with only a slight decrease in the rate of growth between 2005 and 2010. **Figure 3-3** illustrates the City's historical growth pattern since 1980.

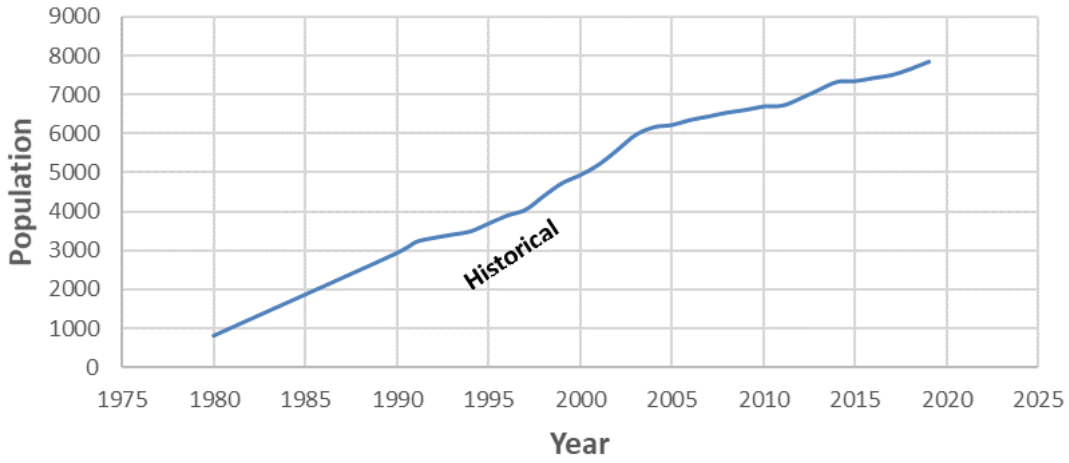



Figure 3-3 Historical Population (1980 – 2019)

The City's Comprehensive Plan, written in 2015, provided a population projection consistent with PSRC's VISION 2040's population projections. This projection estimated an average annual growth of approximately 1.25 percent.

In the last few years, the City has seen a development boom. Currently the City has about 710 housing units in the planning phases. **Table 3-1** shows the number of housing units currently in various stages of development within the City along with an estimated number of years until full build out.

## Table 3-1 2020 Planned Development

| Stage of Development | Number of Housing Units | Years until Full Build Out |
|---|---|---|
| Final Plat Approval[1] | 198 | 1 to 3 |
| Construction Management[1] | 143 | 3 to 5 |
| Engineering Review[1] | 206 | 4 to 6 |
| Preliminary Plat Approval[1] | 163 | 6 to 10 |
| **TOTAL PLANNED DEVELOPMENT** | **710** | |

[1]These are approved stages of development within the City. These unit counts are based on development plat estimates, as presented to Council at the January 21st, 2020 meeting.

The planned developments in **Table 3-1** show the expected development within the city limits. This Plan must also consider the area outside of the city limits but inside the water system's retail water service area (RSA) and future RSA that may be developed during the planning period. **Table 3-2** shows other potential development within the water service RSA and future RSA.

## Table 3-2 Potential Water System Growth

| Stage of Development | Number of Housing Units | Years until Full Build Out |
|---|---|---|
| City UGA[1] | 210 | 10 to 20 |
| Water System RSA & Future RSA | 690 | 10 to 20 |
| **TOTAL POTENTIAL GROWTH** | **900** | |

[1] UGA proposed number of units based on Zoning of R-4 (4 dwelling units per acre) per the City's 2015 Comprehensive Plan.

A population projection for the water system was prepared using the number of housing units shown in **Tables 3-1** and **3-2**, and assuming an average of 3 persons per household for use throughout this Plan.

**Figure 3-4** illustrates how the population projection used for this Plan compares to the City's historic growth. As the figure shows, the rate of growth for the water system over the next twenty years is expected to increase from recent trends.

These population projections, along with the historical per capita water use data presented in **Chapter 4**, form the basis for determining the future water demands of the City's water system.

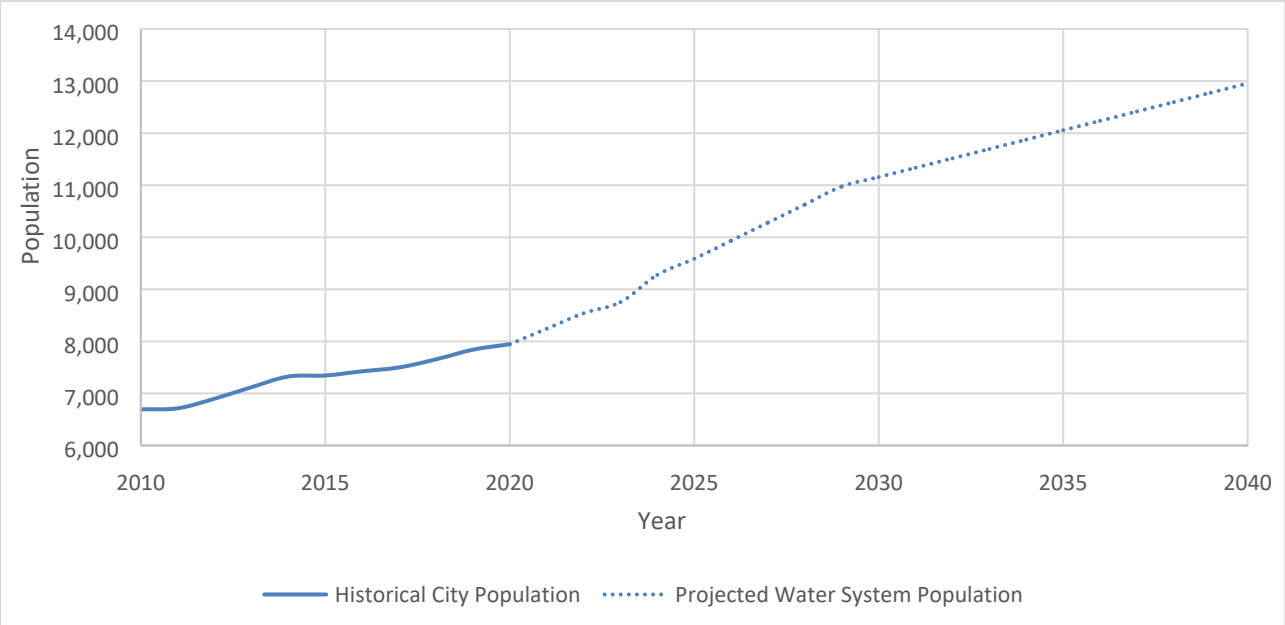



Figure 3-4 Historical Population and Future Projections

## 3.5 SUMMARY

This chapter reviewed relevant planning documents for the area as well as the existing land use and current planned development for the area. A population projection was created for the City's water system RSA based on planned developments within the City and expected growth within the current and future RSA. This population projection will be used to estimate future water demands in Chapter 4.

murraysmith

# Section **4**

Chapter 4

# Water Demands

## 4.1 Introduction

The planning efforts of the City rely on a thorough analysis of its system's water demands. This analysis reviewed the historical water supply and demand data from 2012 to 2019. Using this data, the City's demand per equivalent residential unit (ERU), average day demand (ADD), and the maximum day demand (MDD) were calculated for each year. The analysis then looked at the historical trends of these values and determined "planning" values to use in forecasting the system's future water demand.

These planning values, along with the population projections presented in Chapter 3, were used to forecast the future water supply and demand needs for the system for the next ten- and twenty-year planning periods. The future water supply and demands determined by this analysis will be used in Chapter 8 to analyze the water system facilities and form the basis for sizing future water system improvements described in Chapter 9.

## 4.2 Historical Water Demands

This section summarizes the City's historical water consumption and supply trends between 2012 and 2019. Using this data, the average ERU and ADD values were calculated for the last seven years.

### 4.2.1 Historical Water Consumption

Water consumption is the amount of water that customers use as measured by their water meters. For planning purposes, all water customers have been combined into six groups: single-family residential, multi-family residential, commercial and industrial, government and education, irrigation (only available for some years), and non-retail. The consumption analysis that follows in Table 4-1 will summarize the water use patterns of these six customer groups:

- Single Family Residential (SFR) - includes data for "residential" customer class
- Multi-Family (MF) Residential - includes data for "multi-unit residential" customer classes
- Commercial & Industrial - includes data for "commercial" and "industrial" customer classes
- Government & Education - includes data for "schools," "parks," and "school swimming pools" customer classes
- Irrigation - includes data for "irrigation only" meters. Data is only available for 2013-2019
- Non-retail - includes five SFR connections that are within Water District (WD) 119's service area as well as water sold at hydrants.

Table 4-1 shows the average number of connections, average annual consumption, and average daily consumption per connection for each customer group between 2012 and 2019.

## Table 4-1 Average Annual Metered Consumption and Service Connections

| Year | Customer Group | | | | | | Totals |
|---|---|---|---|---|---|---|---|
| | SFR | MF | Commercial & Industrial | Government & Education | Irrigation | Non-retail* | |
| **Number of Connections** | | | | | | | |
| 2012 | 2,281 | 37 | 103 | 43 | -- | 5 | 2,469 |
| 2013 | 2,281 | 37 | 79 | 20 | 45 | 5 | 2,467 |
| 2014 | 2,281 | 37 | 79 | 20 | 45 | 5 | 2,467 |
| 2015 | 2,398 | 35 | 79 | 20 | 45 | 5 | 2,582 |
| 2016 | 2,422 | 35 | 78 | 20 | 46 | 5 | 2,606 |
| 2017 | 2,450 | 35 | 77 | 20 | 45 | 5 | 2,632 |
| 2018 | 2,520 | 35 | 77 | 21 | 36 | 5 | 2,694 |
| 2019 | 2,570 | 35 | 79 | 21 | 48 | 5 | 2,758 |
| **Year** | **Annual Consumption (1,000 gallons)** | | | | | | |
| 2012 | 124,856 | 7,051 | 23,041 | 6,748 | -- | 266 | 161,962 |
| 2013 | 130,551 | 6,279 | 9,778 | 4,202 | 8,681 | 275 | 159,767 |
| 2014 | 141,205 | 6,879 | 10,042 | 4,164 | 9,282 | 257 | 171,829 |
| 2015 | 141,059 | 6,508 | 11,113 | 3,701 | 8,281 | 993 | 171,655 |
| 2016 | 142,828 | 6,516 | 11,647 | 3,227 | 8,001 | 1,153 | 173,371 |
| 2017 | 149,242 | 6,583 | 10,871 | 4,404 | 9,082 | 574 | 180,757 |
| 2018 | 139,189 | 6,763 | 10,532 | 4,375 | 8,167 | 13,432 | 182,458 |
| 2019 | 136,877 | 6,824 | 9,786 | 3,841 | 11,419 | 11,604 | 180,352 |
| **Year** | **Average Daily Consumption per Connection (gal/day/connection)** | | | | | | |
| 2012 | 150 | 521 | 611 | 429 | -- | -- | -- |
| 2013 | 157 | 465 | 339 | 576 | 529 | -- | -- |
| 2014 | 169 | 508 | 347 | 569 | 564 | -- | -- |
| 2015 | 161 | 509 | 385 | 507 | 504 | -- | -- |
| 2016 | 161 | 509 | 408 | 441 | 475 | -- | -- |
| 2017 | 167 | 515 | 387 | 603 | 553 | -- | -- |
| 2018 | 151 | 528 | 374 | 569 | 620 | -- | -- |
| 2019 | 146 | 534 | 339 | 501 | 652 | -- | -- |
| **Average** | 159 | 508 | 407 | 528 | 463 | **--** | **--** |

* Non-retail connections accounts for five customers within WD 119's water service area. Other non-retail water sold at hydrants could not be attributed to connections. Because the annual consumption is for both the customers within WD 119's service area and water sold at hydrants, the average daily consumption per connection is not applicable and is left blank.

Most of the water consumption is from single-family residential customers. Single-family residential accounts for approximately 93 percent of the City's customers. They also have the lowest average daily consumption per connection. Multi-family connections have a higher consumption per connection than residential because each connection serves multiple living spaces. Commercial, Industrial, and Irrigation typically have the highest consumption per connection because this customer class serves the system's largest water users.

Consumption attributed to the Non-retail customer class includes a relatively small amount of residential consumption from five WD 119 customers served directly by the City as well as water

sold at hydrants for construction and other temporary uses. The volume of water sold through hydrants is much greater than the total consumption for the five residential customers in this billing category. Due to the data recorded, separating the consumption between uses in this category is not possible, but due to the relatively small amount of permanent, residential consumption in this category (less than 0.1% of total consumption), demand projections and planning decisions are not anticipated to be impacted by this limitation.

### 4.2.2 Largest Water Users

Table 4-2 shows the City's top 20 highest demand water customers in 2019. The total water consumption of these customers represents approximately 9.4 percent of the total consumption in 2019. The list comprises City facilities, businesses, schools, multi-family complexes or single-family communities with one connection, and irrigation.

#### Table 4-2 2019 Largest Water Users

| Name | Service Address | Consumption (gal) |
|---|---|---|
| Riverview School Dist. | 29000 NE 150th St | 1,825,868 |
| Duvall Riverside Village Co-Op | 26220 NE Stella St | 1,658,316 |
| City of Duvall | 4-14525 Main St NE | 1,202,784 |
| Safeway Inc. | 14020 Main St NE | 1,199,044 |
| City of Duvall | 2-28430 NE Big Rock Rd | 1,158,652 |
| Cherry Valley Dairy | 26900 NE Cherry Valley Rd | 1,021,020 |
| Safeway Inc. | Safeway Irrigation | 899,844 |
| North Hill HOA-Tract 985 M-1 | Tract 985 M-1 | 874,412 |
| North Hill HOA-Tract 995 M-2 | Tract 995 M-2 | 746,504 |
| Copperhill Square | Irrigation-Copperhill Square | 657,492 |
| Ixtapa Restaurant | 15329 Brown Ave NE | 614,856 |
| Riverview School District | Cherry Valley Sprinkler | 581,944 |
| Toll Bros Inc. | Tract 989-Irrigation | 498,916 |
| 28000 Associates, LLC | 15321 Main St NE | 463,012 |
| Kassa & Woldemichael Rental Prop. LLC | 15420 Main St NE | 460,020 |
| Pickering Water Line | 28014 NE 124th St | 430,848 |
| City of Duvall | 3-SR 203 300' South of 145th | 413,644 |
| Copperhill Square | 14505 1st Lane NE | 400,928 |
| Copperhill Square | 14525 1st Lane NE | 382,976 |
| Randy Lundeen | 27315 NE 151st Pl | 360,536 |
| **Total (gal)** | | **15,851,616** |
| **% of Total Usage** | | **9.4%** |

### 4.2.3 Factors Affecting Water Demands

There are both long-term and short-term factors that affect water demands in a system. Long term factors include items such as changes in population, population density, types of customers, and water use efficiency efforts. These factors will affect the system's average day demand. Short-term factors include factors such as temperature and precipitation. These factors influence the system's peaking factors.

**Figure 4-1** shows the relationship between the average monthly temperature in the City and the average system demand between 2012 and 2019. In general, as temperature increases, so does water demand.

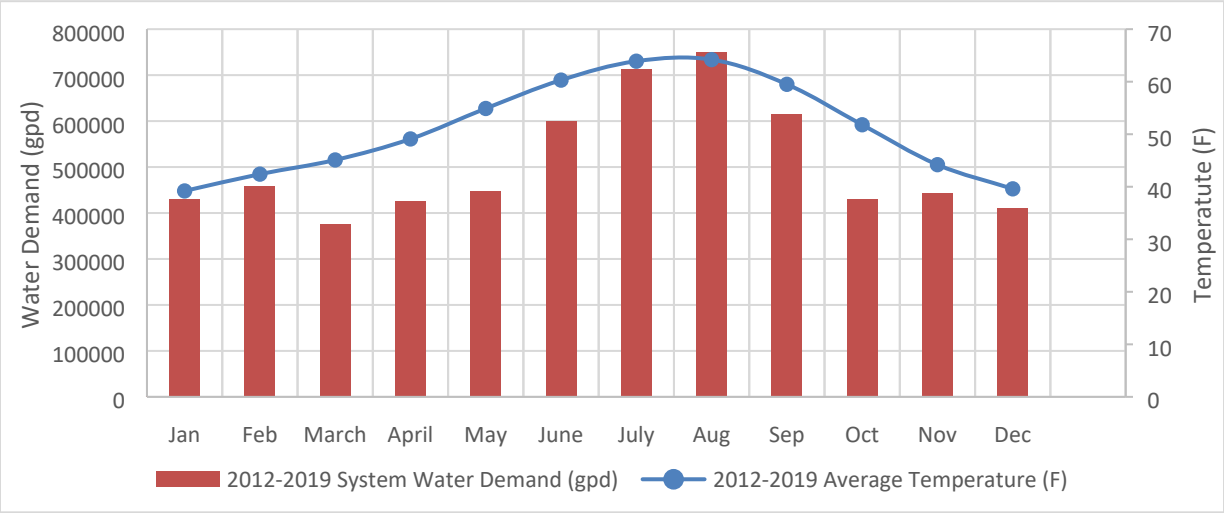



Figure 4-1 Temperature's Effect on Water Demand

## 4.2.4 Equivalent Residential Unit

The demand of each customer class can be expressed in terms of ERUs for demand forecasting and planning purposes. Rather than expressing water demand in terms of use per connection, the data is normalized by ERU which represents a typical single-family residence.

**Table 4-3** uses the annual demand and number of single-family residential connection as well as the annual distribution system leakage to calculate the system's ERU value from 2012 through 2019. The average annual demand (AAD) is scaled up by system's annual distribution system leakage, to account for water loss in the system, and then divided by the total number of connections.

### Table 4-3 System Equivalent Residential Unit (ERUs) Summary

| Year | Number of SFR Connections | AAD (gallons per day, gpd) | Demand ERU (gpd/ERU) | Annual Distribution System Leakage[1] | Supply ERU (gpd/ERU)[2] |
|---|---|---|---|---|---|
| 2012 | 2,281 | 341,137 | 150 | 5.6% | 158 |
| 2013 | 2,281 | 357,675 | 157 | 7.1% | 168 |
| 2014 | 2,281 | 385,807 | 169 | 2.9% | 174 |
| 2015 | 2,398 | 386,462 | 161 | 3.1% | 166 |
| 2016 | 2,422 | 390,239 | 161 | 6.2% | 171 |
| 2017 | 2,450 | 408,883 | 167 | 6.8% | 178 |
| 2018 | 2,520 | 380,299 | 151 | 6.2% | 160 |
| 2019 | 2,570 | 375,006 | 146 | 7.7% | 157 |
| | | | | **2012 – 2019 Average** | **167** |

1. Annual Distribution System Leakage is described in further detail in **Section 4.3**
2. Supply ERU includes the demand ERU plus distribution system leakage and is used in the system capacity analysis described in **Chapter 8**.

Table 4-4 shows the number of ERUs per customer class, which is calculated by dividing the average water demand per connection (Table 4-1), by the system's demand per ERU (Table 4-3).

### Table 4-4 Number of Equivalent Residential Unit (ERUs) per Customer Class

| Year | Supply/ ERU[1] | SFR | MF | Commercial & Industrial | Government & Education | Irrigation | Non-Retail | Non-Billed Authorized Consumption[2] | Total System ERUs |
|---|---|---|---|---|---|---|---|---|---|
| 2012 | 158 | 2,160 | 122 | 399 | 117 | 0 | 5 | 43 | 2,844 |
| 2013 | 168 | 2,130 | 102 | 160 | 69 | 142 | 4 | 63 | 2,670 |
| 2014 | 174 | 2,216 | 108 | 158 | 65 | 146 | 4 | 77 | 2,773 |
| 2015 | 166 | 2,325 | 107 | 183 | 61 | 136 | 16 | 276 | 3,105 |
| 2016 | 171 | 2,281 | 104 | 186 | 52 | 128 | 18 | 32 | 2,793 |
| 2017 | 178 | 2,293 | 101 | 167 | 68 | 140 | 9 | 15 | 2,793 |
| 2018 | 160 | 2,372 | 115 | 179 | 75 | 139 | 229 | 18 | 3,128 |
| 2019 | 157 | 2,386 | 119 | 171 | 67 | 199 | 202 | 55 | 3,199 |
| | | | | | | | | **2012 – 2019 Average** | **2,914** |

1. These values come from the "Supply ERU" column in Table 4-3.
2. Non-Billed Authorized Consumption is described in further detail in Section 4.3.

## 4.2.5 Average Day Demand

Average day demand (ADD) is calculated based on water supply rather than water consumption. Water supply is measured through meters located at the City's two supply connection facilities. Water supply is different than water consumption in that water supply is the amount of water delivered to the system and water consumption is the amount of water taken out of the system. For any given year, the water supply is greater than the water consumption due to system leaks and non-metered uses, which will be further described in the next section.

Table 4-5 summarizes the total amount of water supplied to the City's system from 2012 through 2019, average population within the City's retail water service area, and the computed per capita demand for each year. The ADD is determined from historical water use patterns of the system and can be used to project future demand within the system. Average day demand data is typically used to determine standby storage and other requirements for water systems.

### Table 4-5 Average Annual System Demand

| Year | Metered Retail Supply (gal/day)[1] | City Population | ADD (gpd/capita) |
|---|---|---|---|
| 2012 | 475,352 | 6,900 | 68.9 |
| 2013 | 480,561 | 7,120 | 67.5 |
| 2014 | 496,770 | 7,325 | 67.8 |
| 2015 | 528,681 | 7,345 | 72.0 |
| 2016 | 507,637 | 7,425 | 68.4 |
| 2017 | 531,370 | 7,500 | 70.8 |
| 2018 | 498,172 | 7,655 | 65.1 |
| 2019 | 511,667 | 7,840 | 65.3 |
| | | **Average** | **68.2** |
| | | **75th Percentile** | **69.4** |

1. Total supply purchased from SPU minus the non-retail demand.

As shown in **Table 4-5**, average demand per capita fluctuates from year to year, but an overall trend shows per capita water demand has been slowly decreasing, which is most likely the result of water use efficiency efforts. Monthly supply from both Tolt Supply Stations is included in **Appendix D**.

## 4.3 Water Use Efficiency

The Water Use Efficiency (WUE) Rule, which became effective in January 2007, established a distribution system leakage standard that all public water systems were required to meet by July 1, 2010. To comply with the WUE Rule, the City implemented its first WUE Program in 2007 and has continued to update it at least every six years and will be updated again as part of this Plan. The City's WUE Program aligns closely with the SPU's WUE Program and has adopted SPU's WUE goal to keep the total average annual retail water use of Saving Water Partnership members under 110 mgd through 2028 despite forecasted population growth by reducing per capita water use. In order to meet this goal, the City will reduce per capita water by 0.75% per year. A copy of the City's current WUE Program is included in **Appendix G**.

The City's WUE Program focuses on reducing distribution system leakage (DSL) and encourage water conservation. DSL is defined as the difference between authorized consumption and total water supply. DSL may include water system leaks, inaccurate supply metering, inaccurate customer metering, unknown fire hydrant usage, illegal water service connections, and unknown reservoir overflows. According to the WUE Rule, DSL must not be more than 10 percent of supply, based on a 3-year rolling average, or a water loss control action plan must be prepared and implemented.

Authorized consumption is the amount of water authorized for use. There are two types of authorized consumption, billed and non-billed. Billed authorized consumption generally includes consumption tracked by customer meters. Non-billed authorized consumption is consumption that is tracked or estimated, but not billed. Some examples of non-billed authorized consumption include firefighting activities, water main flushing, cleaning tanks and reservoirs, and street cleaning. Non-billed authorized consumption makes up a small part of the total authorized consumption.

The difference between the amount of water supplied to the City and the amount of metered water consumption from 2012 through 2019 is shown below in **Table 4-6**.

### Table 4-6 Water Use Efficiency Analysis (1,000 gallons)

| Year | Total Supply | Authorized Consumption | | | DSL (gal) | DSL (%) | 3-Year Rolling Average |
|---|---|---|---|---|---|---|---|
| | | Billed (gal) | Non-billed (gal) | TOTAL (gal) | | | |
| 2012 | 174,244,356 | 161,962,196 | 2,480,368 | 164,442,564 | 9,801,792 | 5.6% | 6.0% |
| 2013 | 176,159,984 | 159,766,816 | 3,880,212 | 163,647,028 | 12,512,956 | 7.1% | 6.2% |
| 2014 | 182,075,168 | 171,829,064 | 4,884,388 | 176,713,452 | 5,361,716 | 2.9% | 5.2% |
| 2015 | 194,490,472 | 170,985,320 | 17,406,960 | 188,392,280 | 6,098,192 | 3.1% | 4.4% |
| 2016 | 186,948,388 | 172,588,284 | 2,802,008 | 175,390,292 | 11,558,096 | 6.2% | 4.1% |
| 2017 | 195,055,212 | 180,757,192 | 976,888 | 181,734,080 | 13,321,132 | 6.8% | 5.4% |
| 2018 | 195,762,820 | 169,414,520 | 14,118,500 | 183,533,020 | 12,229,800 | 6.2% | 6.4% |
| 2019 | 198,874,500 | 169,205,454 | 14,327,566 | 183,533,020 | 15,341,480 | 7.7% | 6.9% |

The 2019 3-year rolling average of distribution system leakage is 6.9 percent, which is less than 10 percent of total supply. Therefore, the City does not need to implement a water loss control action plan. The City will continue to collect data, monitor all uses of water, and report annually the amount of distribution system leakage.

## 4.4 Peaking Factors

Peaking factors are used to estimate a maximum day demand (MDD) and a peak hour demand (PHD) for a water system. For the City MDD and PHD peaking factors were estimated using DOH recommendations as discussed below.

### 4.4.1 Maximum Day Demand

MDD is the largest amount of water consumed and used throughout the system during a 24-hour period of a given year. MDD typically occurs on a hot summer day when outdoor water use for lawn watering and other purposes is occurring throughout much of the system. MDD is used in fire flow availability testing (WAC 246-290 states that a distribution system shall provide fire flow at a minimum pressure of 20 psi during MDD conditions) and supply facilities (e.g., supply stations, booster pump stations, interties) capacity analyses.

Water supply records and reservoir telemetry reports are typically used to determine a system's MDD. However, daily telemetry records of supply, reservoir, and demand data were not available to compute the MDD of the system. WAC 246-290-221(4) states that the recommended minimum Maximum Day ERU ($ERU_{MDD}$) for a system is 350 gpd/ERU. Using the City's average ERU value of 167 gpd/ERU from Table 4-3, and the minimum recommended value of 350 gpd/ERU, an MDD peaking factor of 2.1 was estimated and used for planning purposes.

### 4.4.2 Peak Hour Demand

PHD is the amount of water used (excluding fire flow) during the largest use hour of the year. In accordance with WAC 246-290-230, new public water systems or additions to existing systems shall be designed to provide domestic water at a minimum pressure of 30 psi during PHD conditions. Low pressure analysis and equalizing storage are typically based on PHD data.

The system's PHD was estimated based on Equation 3-1 in the DOH Water Design Manual, which is largely based on population size. The resulting PHD:MDD factor for the system is 1.75.

## 4.5 Future Water Demands

This section uses the projected population data from **Chapter 3** and the historical water supply and demand data discussed in **Section 4.2** of this chapter to estimate the City's future water demands. The peaking factors discussed in **Section 4.4** were used to estimate future maximum day and peak hour demands.

### 4.5.1 Projected Demands

The projected water demands for the system were calculated from the population projections in **Chapter 3** and the planning values shown in **Table 4-7**, below. Future demand projections are shown with and without a further reduction in demand from water use efficiency efforts, assuming the City meets its current WUE goal. To be conservative, the City decided to use the 75$^{th}$ percentile average day demand from 2012 through 2019 for its future projection.

#### Table 4-7 Planning Values for Water Demand Projections

| Type | Planning Value | Reference Section |
|---|---|---|
| Average Day Demand | 69.4 gpd/capita | Table 4-5 |
| Maximum Day Demand Factor (MDD/ADD) | 2.1 | Section 4.2.5 |
| Peak Hour Demand Factor (PHD/MDD) | 1.75 | Section 4.2.6 |
| Water Use Efficiency | 0.75% reduction per yr | Section 4.3 |

**Table 4-8, at the end of this chapter,** presents the estimated water demands of the system each year for the next 20 years. The actual 2019 demand and the estimated 2020 demand are also shown in the table for comparison purposes.

The future average day demands were projected based on the estimated per capita demand and population estimates for the given years. As noted in **Section 3.4.1**, the population projections are based currently anticipated development with the City and expected growth withing the water system's RSA. The future MDD and PHD were computed from the projected average day demands and the existing system peaking factors shown in **Table 4-7**.

The 20-year (2040) projected demand data without conservation reductions were used for the evaluation of the planned improvements presented in **Chapter 9** to ensure that the future system

will be sized properly to meet all requirements, whether or not additional water use reductions from conservation are achieved. However, the City will pursue further reductions in per capita water use by implementing the Water Use Efficiency Program elements (see Appendix G).

## 4.6 Summary

The water consumption and use data presented in this chapter includes historical water production and consumption, distribution system leakage, and demand projections. This data will be used in Chapter 8 to analyze the effectiveness of water system facilities and procedures. In addition, this data will be used in Chapter 9 to decide the future improvements needed to meet the design criteria presented in Chapter 5.

## Table 4-8
## Future Retail Water Demand Projections (gallons per day)

| Description | Base Year[1] | Planning Year[2] | Ten-Year Planning Period | | | | | | | | | | 20-Yr Period |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2040 |
| Population in Water Service Area | 7,840 | 7,946 | 8,243 | 8,540 | 8,755 | 9,278 | 9,587 | 9,935 | 10,282 | 10,629 | 10,976 | 11,156 | 12,956 |
| Average Day Demand Projections (gpd) | 513,068 | 551,471 | 572,083 | 592,695 | 607,581 | 643,912 | 665,357 | 689,456 | 713,555 | 737,654 | 761,753 | 774,245 | 899,165 |
| w/ WUE Efforts | -- | 547,335 | 563,534 | 579,459 | 589,558 | 620,125 | 635,971 | 654,064 | 671,849 | 689,330 | 706,512 | 712,712 | 777,376 |
| Maximum Day Demand Projections (gpd) | 1,077,444 | 1,158,089 | 1,201,374 | 1,244,659 | 1,275,920 | 1,352,215 | 1,397,249 | 1,447,857 | 1,498,465 | 1,549,073 | 1,599,682 | 1,625,915 | 1,888,247 |
| w/ WUE Efforts | -- | 1,149,404 | 1,183,421 | 1,216,864 | 1,238,071 | 1,302,262 | 1,335,540 | 1,373,534 | 1,410,882 | 1,447,594 | 1,483,675 | 1,496,696 | 1,632,490 |
| Peak Hour Demand Projections (gpm) | 1,309 | 1,407 | 1,460 | 1,513 | 1,551 | 1,643 | 1,698 | 1,760 | 1,821 | 1,883 | 1,944 | 1,976 | 2,295 |
| w/ WUE Efforts | -- | 1,397 | 1,438 | 1,479 | 1,505 | 1,583 | 1,623 | 1,669 | 1,715 | 1,759 | 1,803 | 1,819 | 1,984 |
| Annual Demand Projections (1,000 gal) | 187,270 | 201,287 | 208,810 | 216,334 | 221,767 | 235,028 | 242,855 | 251,651 | 260,448 | 269,244 | 278,040 | 282,599 | 328,195 |
| w/ WUE Efforts | -- | 199,777 | 205,690 | 211,502 | 215,189 | 226,346 | 232,130 | 238,733 | 245,225 | 251,606 | 257,877 | 260,140 | 283,742 |

1. Based Year data shows historical retail supply for that year. Maximum day and peak hour demands are estimated using the peaking factors discussed in Section 4.4. Water use efficiency (WUE) projections are not relevant for historical data, and therefore, not included.
2. Planning Year data represents the projected information for the current planning year.

murraysmith

# Section **5**

Chapter 5

# Policies and Design Criteria

## 5.1 Introduction

The City provides potable water service for its customers according to the laws, policies, and design criteria that originate from seven Regulatory Agencies as summarized in Table 5-1. The listed agencies are in descending order from those with the broadest authority in setting the laws, policies, and design criteria that guide the development of this Plan to the narrowest authority.

### Table 5-1 Regulatory Agency Summary

| Agency | Origin and Type of Design Criteria, Laws, and/or Policies |
|---|---|
| U.S. Department of Health & Human Services | Federal Regulations |
| U.S. Environmental Protection Agency | Federal Regulations |
| Washington State Department of Health | State Regulations |
| Washington State Department of Ecology | State Regulations |
| King County Council | County Regulations |
| Duvall City Council | Administrative Policies |
| American Water Works Association | Design Criteria |

These laws, policies, and design criteria guide the City's operation and maintenance of the water system daily, and in planning for meeting future growth needs and required improvements. The overall objective is to ensure the City provides high quality water service at a minimum cost to its customers, while also setting standards that the City must meet to ensure the water supply is adequate to meet existing and future water demands of the system. The system's ability to meet these demands is detailed in Chapter 8 and recommended improvements are identified in Chapter 9.

The highest three governmental entities establishing policies and laws – U.S. Government, Washington State and King County Council – establish requirements in statutes, regulations or ordinances. The Duvall City Council and Mayor adopt policies that cannot be less stringent or in conflict with those established by governments above them. The City's policies take the form of ordinances, memoranda and operation procedures, many of which are summarized in this chapter.

Policies associated with the following categories are presented in this chapter:

- Water Service
- Water Supply

- Facilities
- Finance
- Organization

## 5.2 Water Service Policies

The City has created water service policies to maintain quality water supply for existing and future customers. These policies reference new water services, Annexations, temporary services, emergency services and planning boundaries.

### 5.2.1 New Water Service

In order to provide safe, reliable drinking water within the City's retail water service area, the City has adopted the following policies:

1. The City will provide potable water service to all people within city limits and designated water service area, provided all policies related to service can be met.
2. All proposed developments within city limits and designated water service area will connect directly to the City's existing water system, unless deemed infeasible by the City at the time of the request.
3. Water system improvements required to provide water service to proposed developments must be approved by the Public Works Department and conform to the City's adopted design criteria, and construction standards and specifications, as shown in the City of Duvall Development Design Standards (DDS) contained in Appendix H. The Applicant shall install new water main to the limits of the property as required by the DDS. All costs of the permits and water system improvements will be paid by the Applicant. Recovery contracts (latecomers fees) may be recorded against adjacent frontage as described in the DDS.
4. Requests for new water service will be processed by the City's permit coordinator in accordance with Section 9.02.020, Duvall Municipal Code (DMC). Applications must be received at least one week prior to connection of water service. Once applications are received by the permit coordinator, the location of the proposed service will be reviewed to ensure it is within the City's retail water service area and will be evaluated to determine fire flow availability, meter size and other associated improvements necessary for adequate water pressure, fire flow, looping or extensions. The adequacy of water system capacity to serve the applicant's property will also be evaluated at that time. New water service applications will be processed within one week of receipt of application and associated fees.
5. The City will determine whether adequate water system capacity is available to serve the applicant's property, based on available capacity from supply, storage and transmission systems. This will be accomplished through the ongoing tracking of equivalent residential units served by the City in comparison to the maximum number of equivalent residential units that can be served by the system, as computed in Chapter 8 of this Plan.

6. Water service applications will expire at the time that the associated building permit expires or in the event that the water service is not made ready by the applicant for connection by the City within 120 days of the approval of the water service application.
7. Time extensions regarding water availability will be granted in accordance with the associated building permit requirements. When extensions are denied, a written notice of appeal, together with an appeal filing fee, may be submitted in person to the Permit Center. Appeals must be made within the time period specified under the requirements of the associated permit and in accordance with DMC Section 14.08.
8. Delays resulting from non-technical conditions that affect the City's ability to provide new water service will be the responsibility of the Applicant. These conditions include, but are not limited to, environmental assessments, local ordinances and Annexation procedures.
9. Water service can be extended outside of city limits and within the Urban Growth Area (UGA) as long as the project is in compliance with the City's adopted land use plan, zoning and development regulations and a statement of intention to annex to the City is signed by the property owner.
10. Water service can be extended outside of the City's UGA and within the City's future water service area, if the project is in compliance with King County's adopted land use plan, zoning and development regulations and a statement of intention to annex to the City is signed by the owner of the property requesting water service.
11. Water service requests outside of the City's future water service area boundary will be coordinated with adjacent water purveyors, the Department of Health (DOH) and evaluated on a case by case basis by the City Council. Water service to these areas shall be in compliance with King County's adopted land use plan, zoning and development regulations.

### 5.2.2 Annexations

In the case of an Annexation, the City has adopted the following policies:

1. Areas annexed without existing municipal supply will be served by the City.
2. Requirements for areas annexed with existing municipal supply shall be determined at the time of Annexation Agreement or Utility Developer Extension Agreement (UDEA).

### 5.2.3 Temporary Service

No temporary service is allowed, unless there are approved plans for permanent water service that meet all City standards.

### 5.2.4 Emergency Service

The City has adopted the following policies regarding emergency water service:

1. Compliance with standards may be deferred for emergency water service.

2. Policy criteria may be waived for emergency service.

### 5.2.5 Planning Boundaries

For planning purposes, the City will use water service boundaries established by agreement as a result of the regional coordinated water system plan (East King County Coordinated Water System Plan) and as has been modified or further described by the City.

## 5.3 Water Supply Policies

The City follows water supply policies to protect water quality and sustainability in order to meet the needs of all its customers.

### 5.3.1 Water Quality

1. The City will strive to provide high quality water while complying with all water quality regulatory requirements.
2. The City will take all reasonable measures to protect its system and customers and will promptly respond to situations that may adversely affect water quality.

### 5.3.2 Water Quantity

The City has adopted the following policies to ensure that adequate water quantity is available to its customers:

1. The City purchases all water supply from Seattle Public Utilities (SPU) to serve all customers within the City's service area.
2. The City will supply a sufficient quantity of drinking water to existing customers and plan for at least 20 years into the future for meeting the needs of the water system.
3. The City will size new water system facilities and improvements to existing facilities to have sufficient capacity to meet all current and future needs of the water system.

### 5.3.3 Water Use Efficiency and Regional Participation

In order to promote the efficient use of water, the City has adopted the following policies:

1. The City will participate in regional supply management and planning activities to reduce the cost of service while improving reliability, water quality and quantity.
2. The City will promote the efficient and responsible use of water and will conserve water during a water shortage.
3. The City has a Water Use Efficiency Program and participates in regional water conservation efforts. Documentation from the City's Water Use Efficiency Program is contained in Appendix G.

### 5.3.4 Cross-Connection Control

Protecting the water system is of the utmost importance to the City, to help protect the water system from potential pollutants or contaminants which may be introduced from cross-connections, the City has adopted the following policies:

1. The City strives to protect its water system from contamination due to cross-connections and has developed a Cross-Connection Control Program for eliminating cross-connections. Documentation from the City's Cross-Connection Control Program is contained in Appendix I.
2. The City will comply with the backflow prevention assembly installation and testing requirements as indicated in Washington Administrative Code (WAC) 246-290-490 and as published in the *Cross-Connection Control Manual Accepted Procedure and Practice Manual*, Pacific Northwest Section (PNWS), American Water Works Association (AWWA).
3. The City has staff that is certified as Cross-Connection Control Specialists.

## 5.4 Facility Policies and Design Criteria

This section describes the planning policies and design criteria used to establish an acceptable hydraulic behavior level and a standard of quality for the water system. Additional criteria are contained in the DDS contained in Appendix H.

### 5.4.1 Minimum Standards

Minimum design standards ensure the City can provide a uniform and reliable water service.

1. All proposed developments within the City's existing and future service areas shall conform to the City's adopted design criteria, DMC, construction standards and standard specifications.
2. All projects within unincorporated King County right-of-way must be designed and constructed in accordance with DDS and applicable King County Road Standards and shall be inspected and approved by City and King County Utility Inspection.
3. In accordance with WAC 246-290-200 - Design Standards. (1) Purveyors shall ensure that good engineering criteria and practices are used in the design and construction of all public water systems, such as those set out in:
    a. The most recent published edition of the DOH's Water System Design Manual, International Building Code (IBC), Uniform Plumbing Code (UPC), and other national model codes adopted in Washington State;
    b. The most recent published edition of *Recommended Standards for Water Works, A Committee Report of the Great Lakes - Upper Mississippi River Board of State Public Health and Environmental Managers*;

c. Standard specifications of the American Public Works Association, the American Society of Civil Engineers, AWWA, or the American Society for Testing and Materials;

d. Design criteria, such as contained in current college texts and professional journal articles, acceptable to the City's Public Works Department;

e. Chapter 173-160 WAC *Minimum Standards for Construction and Maintenance of Wells*;

f. The latest edition of the PNWS-AWWA Cross-Connection Control Manual, or the University of Southern California (USC) Manual of Cross-Connection Control.

(2) In addition, purveyors of new or expanding public water systems shall consider and use, as appropriate, the following design factors:

a. Historical water use;

b. Community versus recreational uses of water;

c. Local conditions and/or regulations;

d. Community expectations;

e. Public Water System Coordination Act considerations where appropriate;

f. Provisions for systems and component reliability in accordance with WAC 246-290-420;

g. Wind pressures, seismic risk, snow loads, and flooding;

h. Other risks from potential disasters, as feasible; and

i. Other information as required by the Public Works Department.

4. In accordance with WAC 246-290-220 - Drinking water materials and additives. (1) all materials shall conform to the ANSI/NSF Standard 61 if in substantial contact with potable water supplies.

5. In accordance with WAC 246-290-451 - Disinfection of drinking water. (1) No portion of a public water system containing potable water shall be put into service, nor shall service be resumed until the facility has been effectively disinfected.

a. In cases of new construction, drinking water shall not be furnished to the consumer until satisfactory bacteriological samples have been analyzed by a laboratory certified by the State.

b. In cases of existing water mains, when the integrity of the main is lost resulting in a significant loss of pressure that places the main at risk to contamination, the purveyor shall use standard industry practices to ensure adequate and safe water quality prior to the return of the line to service, including at least one of the following:

i. Flushing;

ii. Disinfection; or

iii. Bacteriological sampling.

(2) The procedure used for disinfection shall conform to the City of Duvall Development Design Standards which include reference to the American Water Works Association, or other industry standards acceptable to the Public Works Department and as noted in AWWA C651-14.

## 5.4.2 Water Pressure

Pressure criteria at service connections are summarized below. These pressure criteria are based on current City standard practices, which are based in part on industry standards, Washington State DOH and UPC requirements.

1. The City will supply water to all customers at a minimum pressure of 30 pounds per square inch (psi) during all demand conditions, except when providing fire flow or during emergency situations.
2. During fire flow situations, the City will maintain a minimum pressure of at least 20 psi at all customer meters and throughout the system.
3. The City will provide pressure reducing stations to control pressures in the distribution system and avoid high pressures. It is the customer's responsibility to install and maintain a pressure reducing valve on their side of the water meter to reduce pressures to 80 psi or less.
4. The City will endeavor to limit the maximum pressure to 120 psi in the water mains during normal demand conditions, excluding pressure surges.

## 5.4.3 Pipeline Velocities

Policies regarding velocity of water flow have been created to maintain system reliability for all customers in emergency and non-emergency conditions.

1. Under normal demand conditions, all new distribution system water mains will be designed to deliver the required amount of flow at a velocity of 8 feet per second or less. Velocities greater than 8 feet per second are acceptable within short lengths of pipe and within water system facilities.
2. Under normal demand conditions, all new transmission mains will be designed to deliver the required amount of flow at a maximum velocity of 5 feet per second. Transmission mains designed with velocities greater than 5 feet per second will be evaluated for hydraulic surges (transient conditions) using a hydraulic model capable of surge analyses.
3. Under emergency conditions, such as a fire, all distribution and transmission system water mains will be designed to deliver the required fire flow and simultaneous maximum day demand at a velocity of 10 feet per second or less.

## 5.4.4 Storage Facilities

The City must plan for multiple types of water storage to maintain reliable service for all customers during all seasons and conditions. The following is a list of policies regarding water storage:

1. Storage within the distribution system must be of sufficient capacity to supplement supply when system demands are greater than the supply capacity (equalizing storage) and still maintain sufficient storage for proper pump operation (operational storage), fire suppression (fire flow storage), and other emergency conditions (standby storage).
2. Standby storage must be stored above the elevation that yields a 20-psi service pressure to all services in the zone that it directly serves under peak hour demand conditions.
3. Fire flow storage must be stored above the elevation that yields a 20-psi service pressure to all services in the zone that it directly serves under maximum day demand conditions.
4. The City will provide sufficient standby storage for an emergency condition in which a major supply source is out of service. The volume of storage will be sufficient to maintain uninterrupted supply to the system for at least two days during the emergency condition.
5. The City will provide sufficient storage for a fire condition equal to the system's maximum fire protection water demand and the required duration.
6. The City will have high-water level and low-water level alarms for all storage facilities at the Public Works or Engineering office.
7. Water level data will be transmitted to the Public Works or Engineering office.
8. Storage facilities will be located in areas where they will satisfy the following requirements:
    a. Minimize fluctuations in system pressure during normal demands.
    b. Maximize use of the storage facilities during fires and peak demand periods.
    c. Improve the reliability of supply to the water system.

## 5.4.5 Transmission and Distribution Mains

The policies regulating transmission and distribution of water are essential to the quality of water, reliability of service and fire flow capacity. Consistency in policy allows for more ease in system maintenance and installation. The following is a list of policies regarding water transmission and distribution:

1. All new transmission and distribution mains will be looped to improve water quality, increase reliability and increase fire flow capacity, unless the City determines that looping is not practical.
2. All new water mains will be designed under the direction of a professional engineer licensed in the State of Washington and will comply with the water quality testing and construction completion requirements of the DOH.
3. All new construction will be in accordance with the DDS.

4. All new water mains will be sized by a hydraulic analysis.
5. All new mains providing fire flow will be sized to provide the required fire flow at a minimum residual pressure of 20 psi and maximum pipeline velocity as dictated in Section 5.4.3 of this Plan.
6. The minimum diameter of distribution mains shall be 8 inches and may be reduced to 6 inches or less as long as fire flow requirements can be met.
7. Valve installation on water mains shall be designed based on the following:
    a. Isolation valves shall be installed at locations along the water main to allow sections to be shut down for repair or installing services. The maximum distance between isolation valves shall not exceed 1,000 feet. A minimum of four valves shall be provided per cross, and three valves per tee.
    b. Zone valves shall be located at all pressure zone boundaries when a water main crosses a pressure zone boundary without a pressure reducing station.
    c. Combination air and vacuum release valves shall be placed at all high points of water main installations.
    d. Blow-off assemblies shall be located at water main dead ends where there is not a fire hydrant. If a water main extension is expected in the future, the blow-off assembly shall have a valve the same size as the main with concrete thrust blocking.
    e. Individual service pressure reducing, or check valves must be installed on all new customer service lines in the City. The UPC requires pressure reducing valves on customer service lines if pressures are greater than 80 psi. Pressure reducing valves protect customers from high pressures in case a mainline pressure reducing station fails. Check valves prevent hot water tanks from emptying into the water system when the water main is empty or when the pressure in the main is less than the pressure in the tank, and prevent contamination of the water system mains caused by possible cross-connections in the customer's pipes or fixtures.
8. Fire hydrant installations will satisfy the following criteria:
    a. Fire hydrants serving detached single-family dwellings or duplex dwellings on individual lots will be located not more than 600 feet on center with a maximum 300-foot frontage length from any lot to a hydrant.
    b. The number of fire hydrants shall be determined on an average spacing of 300 feet computed on an imaginary line parallel to and not less than 50 feet from the structure.
    c. All hydrants are to be accessible to fire department pumpers over roads capable of supporting such fire apparatus. The City Engineer shall approve the location of the fire hydrants depending on utility, topography, and building location.
    d. Hydrants shall be a minimum of 50 feet out from the building, minor deviations may be granted.
    e. Hydrants located in dead-end areas or cul-de-sacs shall service an area of no more than 120,000 square feet.

f. A minimum of one fire hydrant shall be installed at each street intersection.

g. The Public Works Department will consult with the Duvall-King County Fire District to review all proposed fire hydrant installations to ensure the correct number, location, and spacing of fire hydrants for each project.

### 5.4.6 Supply and Booster Pump Stations

Well and pump station facilities are vital to the efficient and reliable operation of a water system. The City has adopted the following policies regarding well and pump station facilities:

1. Improvements to existing and all new supply and booster pump stations will be designed to comply with the following minimum standards.
    a. All structures will be non-combustible, where practical;
    b. All buildings will have adequate heating, cooling, ventilation, insulation, lighting, and workspaces necessary for on-site operation and repair;
    c. All sites will be fenced to reduce vandalism and City liability, where appropriate;
    d. Each station will be equipped with a flow meter and all necessary instrumentation to assist personnel in operating and troubleshooting the facility;
    e. Backup emergency power capability will be provided to at least one booster pump station supplying each pressure zone and sized to meet the firm capacity of that pump station.
2. Pumps will be operated automatically with flexibility in pump start/stop settings.
3. Stations will be operated with the provision for at least two methods of control to minimize system vulnerability.
4. Manual override of stations will be provided for and located at the Public Works Engineering building using the City's telemetry and supervisory control system.
5. Stations will be monitored with alarms for the following conditions:
    a. Pump started automatically or manually;
    b. Power phase failure;
    c. Communication failure;
    d. Flooding and fire;
    e. Intrusion by unauthorized personnel;
    f. Low suction pressure; and
    g. High discharge pressure.
6. Stations will have the following indicators:
    a. Local flow indication and totalizing;
    b. Flow indication and totalizing at the Public Works Engineering buildings; and
    c. Recording of combined supply to the system.

7. Stations will be placed wherever necessary to fulfill the following criteria:
    a. Provide supply redundancy to a pressure zone;
    b. Improve the hydraulic characteristics of a pressure zone;
    c. Maximize storage availability and transmission capacity; and
    d. Improve water quality (i.e., increase circulation) and quantity.

## 5.4.7 Pressure Reducing Stations

The City has adopted the following policies regarding pressure reducing stations in order to provide facilities which are reliable and easy to maintain:

1. All pressure reducing valves will be placed in vaults that are large enough to provide ample workspace for field inspection and valve repair.
2. Vaults will drain to daylight or be equipped with sump pumps to prevent vault flooding.
3. Pressure relief valves will be provided on the low-pressure side of the pressure reducing valves to prevent system over-pressurizing in case of a pressure reducing valve failure and will be sized by hydraulic analysis.

## 5.4.8 Water System Control

The City's control system must be capable of efficiently operating the water system's components in accordance with this Plan and in response to reservoir levels, system pressures, abnormal system conditions, electrical power rate structure, and water costs. The system must be reliable and kept up to date to avoid disruption of customer water service and maintain efficient use of water supplies.

## 5.4.9 Maintenance

The City has adopted the following policies regarding maintenance of equipment and facilities within its water system:

1. Facility and equipment breakdown are given highest maintenance priority. Emergency repairs will be made even if overtime labor is involved.
2. Equipment will be scheduled for replacement when it becomes obsolete (equipment is no longer supported by the manufacturer) and as funding is available.
3. Worn parts will be repaired, replaced, or rebuilt before they represent a high failure probability.
4. Spare parts will be stocked for all equipment items whose failure will impact the ability to meet other policy standards.
5. Equipment that is out of service will be returned to service as soon as possible.
6. A preventive maintenance schedule will be established for all facilities, equipment, and processes.

7. Tools will be obtained and maintained to repair all items whose failure will impact the ability to meet other policy standards.
8. Dry, heated shop space will be available for maintenance personnel to maintain facilities.
9. All maintenance personnel will be trained to efficiently perform their job descriptions.
10. Maintenance will be performed by the water maintenance staff and supervised by the City Engineer.
11. Written records and reports will be maintained on each facility and item of equipment showing operation and maintenance history.

## 5.5 Financial Policies

In order to maintain financial viability and a high quality, safe and reliable water system, the City has adopted the following financial policies:

1. The City will set rates that comply with standards established by the AWWA.
2. Rates and additional charges established for the City should be:
    a. Cost-based rates that recover current, historical, and future costs associated with the City's water system services, and support facilities;
    b. Equitable charges to recover costs from customers, commensurate with the benefits they receive; and
    c. Adequate and stable source of funds to cover the current and future cash needs of the City Public Works Department.
3. Existing customers of the City will pay the direct and indirect costs of operating and maintaining the facilities through user rates. In addition, the user rates will include debt service incurred to finance the water capital assets of the City.
4. New customers seeking to connect to the water system will be required to pay a connection charge for an equitable share of the historical cost of the system and for the system's Capital Improvement Program (CIP). Connection charge revenues will be used to fund the water CIP project list in conjunction with rate revenue.
5. New and existing customers will be charged for extra services through separate ancillary charges.
6. The City will maintain information systems that provide sufficient financial and statistical information to ensure conformance with rate-setting policies and objectives.
7. User charges must be sufficient to provide cash for the expenses of operating and maintaining the system. To ensure the fiscal and physical integrity of the utility, each year an amount should also be set aside and retained for capital expenditures, which will cover some portion of the depreciation of the physical infrastructure. The amount may be transferred between the Water Fund to the Capital Fund for general or specific purposes.
8. A Working Capital Reserve will be maintained to cover unanticipated emergencies and fluctuations in cash flow. The City will maintain a cash reserve for the Water Fund.

9. Water rates will be based on either the Base-Extra Capacity Method or the Commodity-Demand Method. Both methods strive to equitably charge customers with different service requirements based on the cost of providing the water service. Service requirements relate to the total volume of water used, peak rates of use, and other factors.
10. Fees and charges are calculated for the service area as a whole. Rates vary depending on whether the residence is in-city or out of city. Any area annexed into city limits becomes a part of the City and therefore residents in this area would be charged in-city rates.

### 5.5.1 Connection Charges

In order to have an equitable method of paying for water system improvements, the City has adopted the following connection charge policies:

1. Owners of properties that have not been assessed, charged, or borne an equitable share of the cost of the water system will pay one or more of the following connection charges prior to connection to a water main.
    a. Recovery Contracts (Latecomers Fees): Recovery contracts are negotiated with developers and property owners to provide for the reimbursement of a pro rata portion of the original cost of water system extensions and facilities.
    b. Capital Improvement Charge (CIC): The connection charge will be assessed against any property that has not participated in the development of the water system. Meter charges, SPU, or other hookup fees, are additional in order to recover the cost of meter and service line installation.

## 5.6 Organizational Policies

Appropriate organizational policies are key to the continued successful operation of the City. To promote a healthy organization, the City has adopted the policies in this section regarding the City's structure and staffing.

### 5.6.1 Staffing

The City recognizes the paramount importance of having highly qualified staff and has adopted the following policies:

1. Personnel certification will comply with State standards.
2. The Public Works Department will promote staff training.

### 5.6.2 Relationship with Other Departments

The City has adopted the following policies regarding the City's Public Works Department in coordination with other City departments:

1. The Finance Department is responsible for customer billing, payment collection, project cost accounting, fund activity reporting, employee records, union labor negotiations and salary schedules.
2. The Police Department is responsible for enforcing violations of City water ordinances.
3. The Fire Department uses water utility facilities for fire protection and establishes fire flow requirements.
4. The Fire Department is responsible for emergency responses to hazardous events at water system facilities.

## 5.7 Summary

This chapter summarizes the City's policies on several areas of the City's operations and long-term viability. These policies are in accordance with all federal, state, and county regulations as well as City policies and AWWA design recommendations. These policies are in place to ensure the City continues to meet all applicable requirements and provides high quality water to all customers. Other chapters in this Plan analyze different aspects of the water system infrastructure, demands, financial and organizational elements against these policies.

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# Section 6

Chapter 6

# Water Source and Quality

## 6.1 Introduction

The two basic objectives of a water system are to provide a sufficient quantity of water to meet demands and to meet or exceed all applicable water quality standards. This chapter discusses the City's existing water sources, water rights, drinking water regulations, and water quality monitoring. This chapter also uses demand projections from Chapter 4 to determine if the current water rights meet the existing and projected demands for City customers. Chapter 8 discusses the City's ability to supply a sufficient quantity of water in more detail.

## 6.2 Existing Water Sources

The City has received its water from Seattle Public Utilities (SPU) since 1962. The City also owns a well at Taylors Landing Park, 16201 Main Street NE. The City stopped using this well for municipal water supply in the 1960's, but still maintains water rights for the well and may utilize the well for non-potable purposes.

### 6.2.1 SPU Source Description

SPU supplies water to its direct retail service customers, 19 neighboring municipalities, special purpose districts and Cascade Water Alliance, who in turn provide the water to their own retail customers. SPU's primary sources of water for its regional supply system are from the Cedar River and Tolt River. The Cedar River source provides approximately two-thirds of the total water supply for SPU's regional supply system and originates from the 1,680-acre Chester Morse Lake located in the upper portion of the Cedar River Watershed in southeast King County. The Tolt River source provides approximately one-third of the total water supply for SPU's regional supply system and includes a 19-square-mile watershed that drains into the 60,000-acre-foot South Fork Tolt Reservoir. SPU's regional water supply system is shown in Figure 6-1.

SPU provides water to the City under the terms of the 1981 Water Purveyor Contract and subsequent amendments. The latest long-term contract with SPU was signed in May 2011 and will remain in effect until January 1, 2062. A copy of this water supply contract is in Appendix B.

The City is primarily supplied by the Tolt River System, but it can receive water from the Cedar River System during routine maintenance or emergency periods. The City's transmission mains connect to the Tolt Pipeline No. 1 at two locations. The east connection, named "Tolt 1 Supply Station" by the City, is approximately 3,000 feet southeast of the city limits, near the intersection of 292nd Ave NE and NE Big Rock Road. The west connection, named "Tolt 2 Supply Station" by the City, is located on 274th Avenue NE approximately 2,800 feet south of the city limits.


Figure 6-1 SPU's Regional Water Supply System

### 6.2.2 Taylors Landing Well

Taylors Landing Well is an artesian well located in Taylors Landing Park, 16201 Main Street NE. Historically, water was pumped from the well to storage tanks on 4th Avenue which the gravity fed the City until 1962 when a connection to SPU was established as the City's main water supply and the tanks were abandoned. Water was then hauled from the well to augment low or dry private wells in the unincorporated areas north of the City. In 2000, the City capped the well and closed it to public use for liability reasons. Public Works improved the well head area in 2018 including improvements to the cap, clearing of debris and vegetation, and enclosing the wellhead area with fencing. The well is now only used periodically in the summer by the Public Works Department to fill water trucks for irrigation purposes. However, the City is leaving the option open that the well may be used, with proper treatment, in the future as an emergency backup source for the water system.

## 6.3 Water Rights & Supply Overview

A water right is a legal authorization to use a specified amount of public water for specific beneficial purposes. Throughout this section water right withdrawal amounts are referenced in two ways; as instantaneous rights ($Q_i$) or as annual rights ($Q_a$). Instantaneous rights are typically referred to in terms of gallons per minute (gpm) and represent the maximum flow rate that can be withdrawn at a given time. Annual water rights represent the volume of water withdrawal allowed per year and are typically referred to in terms of acre-feet (acre-ft).

Washington State law requires users of public water to receive approval from the Washington State Department of Ecology (Ecology) prior to actual use of the water. This approval is granted in the form of a water right permit or certificate.

The City's municipal water rights are summarized in Table 6-1 and its intertie supply agreements are summarized in Table 6-2. Copies of the municipal water right certificates, permits, and the City's Water Rights Self-Assessment are included in Appendix K.

### Table 6-1 Existing Water Rights

| Source Name | Purveyor | Claim No. | Max Instant. (Qi), gpm | Max Annual (Qa), acre-feet |
|---|---|---|---|---|
| Taylor's Landing Well | Duvall | 674 D | 65 gpm | 35 acre-feet |

### Table 6-2 Intertie Agreements

| Source Name | Purveyor | Contract No. | Max Instant. Flow, gpm | Max Annual Volume, gallons |
|---|---|---|---|---|
| Tolt 1 Supply | SPU | N/A | Not restricted | Not restricted |
| Tolt 2 Supply | SPU | N/A | Not restricted | Not restricted |

The City receives its water from SPU, and the supply flow rate and volume are not restricted at its SPU interties. At the Taylors Landing Well, the City has a Qi of 65 gpm and a Qa of 35 acre-feet. Because the SPU interties provide an unrestricted amount of water, the City does not have supply limitations at this time.

## 6.4 Drinking Water Regulations

The quality of drinking water in the United States is regulated by the Environmental Protection Agency (EPA). Under provisions of the Safe Drinking Water Act (SDWA), the EPA is allowed to delegate primary enforcement responsibility for water quality control to each state. In the State of Washington, DOH is the agency responsible for implementing and enforcing the drinking water regulations. For the State of Washington to maintain the authority to implement requirements under the SDWA, the State must adopt drinking water regulations that are at least as stringent as federal regulations. In meeting these requirements, the State has published drinking water regulations that are contained in Chapter 246-290 of the Washington Administrative Code (WAC).

### 6.4.1 Safe Drinking Water Act

The SDWA, enacted in 1974, sets standards for the quality of drinking water and requires water treatment if these standards are not met. The SDWA also sets water testing schedules and methods that water systems must follow. In 1986 the SDWA was amended to include the regulation of a total of 83 contaminants.

In response to the 1986 SDWA Amendments, EPA established six rules, known as the Phase I Rule, Phase II & IIb Rules, Phase V Rule, Surface Water Treatment Rule, Total Coliform Rule, and Lead & Copper Rule. After these rules were established some were also amended. EPA regulates most chemical contaminants through the Phase I, II, IIb, and V Rules.

The SDWA was amended again and re-authorized in August of 1996. As part of this amendment and re-authorization, more recognition was given to source water protection, public information, water system improvement funding and operator training in the SDWA. In response to the 1996 SDWA amendments, EPA developed several rules including Stage 1 and Stage 2 Disinfectants and Disinfectant By-Products Rules, and the Interim, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules.

EPA set two limits for each contaminant that is regulated under these rules. The first limit is a health goal, referred to as the Maximum Contaminant Level Goal (MCLG). The MCLG is zero for many contaminants; especially known cancer-causing agents, or carcinogens. The second limit is a legal limit, referred to as the Maximum Contaminant Level (MCL). The MCLs are equal to or higher than the MCLGs.

## 6.5 Water Quality Monitoring

SPU provides source water treatment; the City does not provide additional water treatment. A detailed description of SPU's source monitoring plan and procedures is provided in SPU's *Comprehensive Water Quality Monitoring Summary*, which is included on SPU's website.

The City is responsible for the water quality within the distribution system. The City must comply with the monitoring requirements contained in WAC 246-290-300. These monitoring requirements include coliform monitoring, residual disinfectant concentration monitoring, disinfection byproduct concentration monitoring, and lead and copper monitoring. A description of each of these monitoring requirements are contained in the following sections and summarized in Table 6-3.

### Table 6-3
### City of Duvall Water Quality Monitoring Requirements

| Test | Location | Schedule | SPU's Responsibilities | City's Responsibilities |
|---|---|---|---|---|
| Routine Coliform | Distribution System | Monthly | SPU collects and tests samples. | City to provide follow-up samples if required (WAC 246-290-320). |
| Chlorine Residual | Distribution System | Daily | None | City tests chlorine daily in accordance with DOH requirements. |
| Lead and Copper | Customer Taps | Every 3 years (last in 2018) | SPU tests samples. | City collects samples. |
| Disinfection By-Products | Distribution System | Every 90 days | Stage 1 DBPR monitoring. | Stage 2 DBPR monitoring. |
| Asbestos | Distribution System | NA | None | Not required due to less than 10% asbestos pipe in system, waiver in place through 2028. |
| General Disinfection | Distribution System | As needed | None | Laboratory water quality suite testing. |

### 6.5.1 Coliform Monitoring

DOH, in accordance with the EPA, replaced its Total Coliform Rule (TCR) with the Revised Total Coliform Rule (RTCR) in April 2016. The RTCR formalizes the process of protecting public water systems from contamination by requiring systems vulnerable to contamination to find and fix problems and pathways that could allow pathogens to enter the distribution system.

SPU provides coliform monitoring of the City's water system as part of its regional monitoring program. The City is responsible for follow-up or repeat sampling if samples collected by SPU test positive for coliform in accordance with WAC 246-290-320.

SPU currently collects a minimum of ten samples each month from water quality monitoring sample stands at six different locations in the City's distribution system. SPU uses its own certified laboratory for the water quality analysis work. The results of coliform tests from the last seven years have all been in compliance. The City's Water Quality Monitoring Plan, which presents a more detailed discussion of the coliform monitoring activities, is contained in **Appendix L**.

### 6.5.2 Residual Disinfectant Monitoring

SPU adds chlorine to its water supply for the purpose of disinfection. In compliance with WAC 246-290-662, SPU provides water with a chlorine residual of at least 0.2 mg/L at points of supply to the City's distribution system.

The City is responsible for ensuring that water within its distribution system has a detectable residual disinfectant concentration at all times. The residual disinfectant concentration, measured as total chlorine, free chlorine, combined chlorine, or chlorine dioxide, must be detectable in at least 95 percent of the samples taken each calendar month. Residual disinfectant concentrations are measured daily throughout the system. The results of the residual disinfectant concentration monitoring are reported to the Department of Health (DOH) using DOH approved forms within ten days after the end of each month, unless otherwise directed by DOH.

The results of the chlorine residual tests from the last seven years have all been in compliance with a 2015-2019 average monthly minimum of 0.62 mg/L, maximum of 1.06 mg/L, and overall average of 0.87 mg/L.

### 6.5.3 Disinfection Byproducts Monitoring

Chlorine, added by SPU to disinfect the water, may react with naturally occurring organic matter to form unintended disinfection byproducts that pose health risks. The EPA regulates these disinfection byproducts under the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR).

Stage 1 DBPR reduces drinking water exposure to disinfection products. Since SPU adds chlorine to the water supply prior to selling it to the City, SPU is responsible for Stage 1 DBPR monitoring.

Stage 2 DBPR strengthens public health protection by tightening compliance monitoring requirements for total trihalomethanes (TTHM) and five haloacetic acids (HAA5). The City collects TTHM and HAA5 data quarterly at two sites: sample stands at 27620 NE 158$^{th}$ Place and 16406 270$^{th}$ Place NE. SPU provides disinfection by-products sampling and testing as part of its regional monitoring program. Since 2012, the City's samples have consistently been under the MCL.

## 6.5.4 Lead and Copper Monitoring

DOH, under the Lead and Copper Rule Short-Term Revisions (LCR-STR), requires public water systems to monitor lead and copper levels in their water. Unlike other contaminants, lead and copper are not usually present in source water, and therefore, are not regulated by an MCL. Instead, corroding building plumbing, faucets and water fixtures leach lead and copper into the drinking water. This monitoring uses an "action level" to determines if the City is distributing corrosive water that has the potential to cause lead and/or copper leaching into the drinking water, and if so, helps find the best way to control the corrosion.

The action levels for lead and copper are greater than 0.015 mg/L and 1.3 mg/L, respectively. An exceedance occurs when the concentration of lead or copper in more than 10 percent of the tap water samples exceeds an action level. If an exceedance occurs, a corrosion control study must be undertaken to evaluate strategies and make recommendations for reducing the lead or copper concentration to below the action levels. Both federal and state regulations require monitoring for lead and copper every three years.

The City participates in SPU's regional lead and copper monitoring program. As part of the program, a total of 51 lead and copper samples are collected every three years, including five samples from the City's service area. These samples are collected between June and September. The City collects the samples from homes that are most vulnerable to lead and copper corrosion. SPU then analyzes the samples at the SPU Water Quality Laboratory and submits the sampling results and the calculated 90th percentile lead and copper levels to DOH.

In 2020 the City obtained samples from three locations within the water service as part of the SPU program and all samples were below action levels. The next monitoring period of the SPU program will be completed in 2023.

### *6.5.4.1 Proposed Revisions to the Lead and Copper Rule*

In October 2019 the EPA published proposed changes to the Lead and Copper Rule. These proposed changes include identifying the most impacted areas, strengthening treatment requirements, replacing lead service lines, increasing drinking water sampling reliability and improving risk communication to customers.

Since the City purchases its water already treated from SPU, the impact of this rule revision on the City will be limited. The revision may require additional sampling and reporting by the City.

The City has been proactive in minimizing the amount of lead in its system. The City only purchases lead free products and has for years prior to the Lead Law going into effect. Its system does not have any lead pipe, though the brass fittings used in the system may contain small amounts of lead. These proactive measures reduce the City's risk of having lead in its water.

## 6.5.5 Asbestos Monitoring

Asbestos monitoring is required in accordance with 40 CFR 141.23(b) if the sources are vulnerable to asbestos contamination or if more than 10 percent of the distribution system contains asbestos

cement pipe. Asbestos cement pipe is present in the City's water system but constitutes only three percent of the City's distribution system. The City was originally granted an asbestos monitoring waiver from DOH in 2002 and was extended in 2011 and 2020. The latest waiver will cover the period between 2020-2028 period and is expected to continue for future nine-year monitoring periods.

### 6.5.6 Disinfection of Water System

The City disinfects the components of its water system that impacts through construction, connection, repair, or loss of integrity in accordance with WAC 246-290-451 and the standards published by the American Water Works Association:

1. In cases of new construction, drinking water from new water system components shall not be furnished to the consumer until satisfactory bacteriological samples have been analyzed by a laboratory certified by the State.
2. In cases of existing water mains, when repair/replacement is completed or the integrity of the main is lost resulting in a significant loss of pressure that places the main at risk to cross-connection contamination, the City implements standard industry practices such as flushing, disinfection, and/or bacteriological sampling to ensure adequate and safe water quality prior to the return of the water main to service.

If unsatisfactory samples from the above monitoring are detected, the procedures in WAC 246-290-320 must be followed for repeat sampling, DOH notification, and customer notification.

## 6.6 Water Quality Programs

In addition to the above listed water quality requirements, the City follows several water-quality programs that are used to report and protect the City's water quality.

### 6.6.1 Consumer Confidence Report

The Consumer Confidence Report is a report on the quality of water that was delivered to the system during the previous 12 months in accordance with WAC 246-290-72001. The annual report must be updated and re-issued to all customers by July 1st of each year. The report must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. The report may also contain other information that the purveyor deems appropriate for public education. Some, but not all, of the information that is required in the report include the source and type of the drinking water, type of treatment, contaminants that have been detected in the water, potential health effects of the contaminants, identification of the likely source of contamination, violations of monitoring and reporting, and variances or exemptions to the drinking water regulations. A copy of City's latest Consumer Confidence Report at the time of this writing is included in Appendix M.

### 6.6.2 Public Notification Rule

The Public Notification Rule (PNR) directs water systems in notifying customers of acute violations. The PNR was last revised on May 4, 2000 and outlines public notification requirements for a water system when it violates a national primary drinking water regulation or has a situation posing a risk to public health. Notices must be provided to persons served, not just billing customers. The public notification requirements are separated into three tiers depending on the type of violation and its associated risk to the public, as described in **Table 6-2, below**.

#### Table 6-4 Public Notification Tiers

| Tier Type | Description & Requirement |
|---|---|
| Tier 1 | Acute health concerns require notification within 24 hours. |
| Tier 2 | Chronic health concerns require notification within 30 days.<br>Repeat notice every 3 months until violation or situation is resolved. |
| Tier 3 | Reporting and monitoring violations require notification within 12 months.<br>Repeat annually for unresolved violations. |

### 6.6.3 Wellhead Protection Program

Section 1428 of the 1986 SDWA Amendments mandates that each state develops a wellhead protection program. The Washington State mandate for wellhead protection and the required elements of a wellhead protection program are contained in WAC 246-290-135 Source Water Protection, which became effective in 1994. In Washington State, DOH is the lead agency for the development and administration of the State's wellhead protection program.

A wellhead protection program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination of the groundwater that it supplies for drinking water. All federally defined Group A public water systems that use groundwater as their source are required to develop and implement a wellhead protection program. All required elements of a local wellhead protection program must be documented and included in either the Comprehensive Water System Plan (applicable to the City) or Small Water System Management Program document (not applicable to the City). A copy of the City's Wellhead Protection Program is contained in **Appendix J** of this plan. As mentioned earlier in this chapter, the City does not currently use the Taylor's Landing Well for potable water but may intend to do so in the future.

## 6.7 Summary

The City is currently in compliance with all applicable water quality regulations and is performing the necessary regulated water quality testing. The City currently receives all of its water from SPU through a Full Water Requirements contract, and therefore does not anticipate needed additional water rights for the 20-year planning period.

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# Section 7

Chapter 7

# Operations and Maintenance

## 7.1 Introduction

The City's operations and maintenance program has been developed in accordance with Washington Administrative Code (WAC) *246-290-415*. This chapter consists of the following elements: Water System Management and Personnel, Routine System Operations, Recordkeeping and Reporting, and Emergency Operations.

## 7.2 Water System Management and Personnel

The Public Works Department is responsible for various projects within the City, ranging from City promotions and events to maintaining the City's water, sewer, and stormwater utilities. This section reviews the management structure, personnel responsibilities, and personnel certifications of the Public Works Department as they relate to the water system.

### 7.2.1 Management Structure

Figure 7-1 shows City's management structure, as it relates to the water system. The Public Works Director also oversees the City's Sewer Department as well as Parks and Recreation. Due to its size, the City's operations are not "departmentalized"; meaning that each staff member is split between utility departments, Parks, and streets to serve multiple functions. A maintenance worker could be mowing parks one day and maintaining the water system the next.

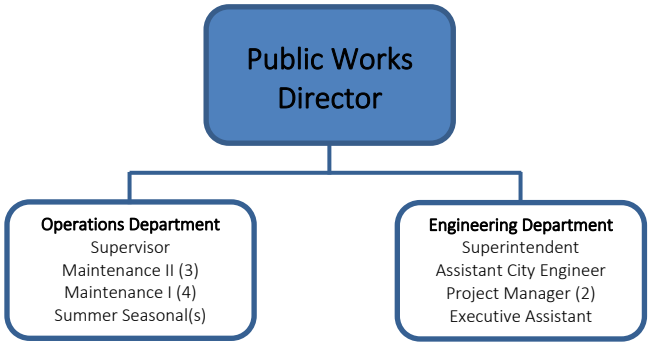


Figure 7-1 Organization Chart

## 7.2.2 Personnel Responsibilities

The key responsibilities of the water operations and maintenance staff are summarized below.

***Public Works Director:*** Ultimate responsibility and legal authority for the water system. Directs the activities of all divisions of the Public Works Department. Represents the City at regional activities.

***Public Works Superintendent:*** Responsible for the day-to-day operation of the water system including water quality testing or adjusting the water system supply and storage facilities to meet daily demands. Assists in planning the construction, maintenance and operations activities of the water system.

***Assistant City Engineer***: Assists in planning construction, maintenance and operations activities of the water system. Involved in the decision-making process during system troubleshooting, emergency response situations, implementation of system upgrades, and is part of the budget process for system improvements.

***Project Manager:*** Manages significant projects and programs within the City, including the planning, design, and construction of new water system facilities.

***Executive Assistant:*** Assists Public Works Director and Engineering staff as needed.

***Public Works Supervisor:*** Assists the Public Works Superintendent in operation and maintenance activities in the water system and directs Maintenance Staff.

***Maintenance Staff:*** Assists the Public Works Supervisor in in operation and maintenance activities, including on-call and emergency duties. These activities also include water system inspection, water quality testing, repairs, hydrant exercising, and valve exercising.

## 7.2.3 Personnel Certifications

WAC 246-292 requires the City's water system to be operated by one or more certified Operators. In addition, a specialty certification is required for backflow device testing. Table 7-1 shows the current certifications of the City's operations and maintenance staff.

It is City policy to maintain a well-qualified, technically trained staff. The City annually allocates funds for personnel training, certification, and membership in professional organizations, such as the American Water Works Association (AWWA). The City believes that time and money invested in training, certification, and professional organizations provide a valuable return in improved safety, skills, and confidence.

### Table 7-1 Personnel Certification

| Name | Position | Certification |
|---|---|---|
| Steven Leniszewski, PE | Public Works Director | WDM2, CCS, PE |
| Mike Fisher | Public Works Superintendent | WDM2, CCS |
| Mike Marty | Operations Manager | WDM2 |
| Joe Chriest | Public Works Supervisor | WDM2, CCS |
| Mike Zylinsky | Maintenance Lead | WDM2 |
| Gavin Harrold | Maintenance Lead | WDM2 |
| Various | Maintenance I and II Workers | |

Certificate Definitions:
WDM2 – Water Distribution Manager
CCS – Cross-Connection Control Specialist

## 7.3 Routine System Operations

As described in Chapter 2, the City's system includes two supply stations, approximately 42 miles of mostly ductile iron and PVC water mains, five pressure zones, two storage reservoirs, and one booster pump station. Routine operations include visually checking all systems facilities, monitoring flows and reservoir levels, responding to customer inquiries and complaints, and performing customer meter readings.

### 7.3.1 Supplies and Equipment

Spare parts and repair equipment are stored at the Public Works Maintenance Operations Center for water system operation and maintenance. The following list summarizes the City's status and protocol regarding supplies and equipment:

- Spare parts, such as valves, pipe, fittings, electrical and electronic parts, are kept in good supply. Most critical systems can be repaired from in-house stores.
- Common tools and equipment, such as hand tools, power tools, pumps, and shoring, are kept in the inventory. Accounts are maintained with vendors so that tools and equipment not on hand can be quickly purchased.
- Heavy equipment, such as backhoes, dump trucks, graders, and bulldozers, are either owned by the City or leased from local suppliers. Supervisors keep a list of supplier telephone numbers in the event that a special piece of heavy equipment is required.

## 7.3.2 Preventative Maintenance

Routine preventive maintenance is conducted throughout the water system including the storage facilities, water mains, Pressure Reducing Valves (PRVs), and hydrants. Maintenance schedules that meet or exceed manufacturer's recommendations have been established for all critical components in the water system. **Table 7-2** shows the schedule used for preventive maintenance:

### Table 7-2 Preventative Maintenance

| Preventative Maintenance (type and description) | |
|---|---|
| **Storage Facilities** | |
| Daily | Visual exterior inspection and audio (listening) inspection for anomalous flow. |
| Weekly | Check security and inspect facilities for proper operation. |
| 3-Year Intervals | Detailed inspection of interior and exterior of reservoirs. Clean exterior of reservoirs as required. |
| As Needed | Repaint and repair interior and exterior as needed on tanks. |
| **Water Mains** | |
| Annually, or As Needed | Leak survey. |
| Annually | Directional Flush. |
| **Pump Stations** | |
| Weekly during times of pump operation | Observe and record motor current draw (three phases); check packing; log and record volume delivered and pump motor hours; check motor oil level; measure and record discharge pressure; check motor noise, temperature, vibration. |
| Weekly | Check security. |
| Monthly when pump system is not utilized | Complete pump start-up check including supply shutdown and pump start-up and operation. |
| Annually | Take inventory of parts, pumps and motors. |
| Annually | Change motor oil. |
| As Needed | Calibrate flow meter; maintain electrical and mechanical equipment; paint structures and piping. |
| **Engine Generator Sets** | |
| Weekly | Operate to achieve normal operating temperatures; observe output. |
| As Needed | Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on amount of use). |
| As Needed | Perform tune-up; replace parts as necessary. |
| **Pressure Reducing Stations** | |
| Annually | Flush and check all valves and screens; check pressure settings; rebuild and paint every three years, or as necessary. |
| **Isolation Valves** | |
| Annually | Operate full open/closed; uncover where buried; clean out valve boxes and repair as necessary. |
| **Hydrants** | |
| Annually | Check for leakage and visual damage. Operate and flush; check drain rate; lubricate as necessary; measure and record pressure; paint as necessary. Check nozzle and cap threads, clean and lubricate per manufacturer's recommendations. Replace lost and damaged gaskets. Check and operate auxiliary valve in accordance with the valve maintenance schedule. Leave in open position. Inspect drain system to ensure proper drainage and protection from freezing. |

| Preventative Maintenance (type and description) | |
|---|---|
| **Meters** | |
| 2-10 Year Intervals | Time and measure volume of meter-delivered flow; dismantle, clean, and inspect all parts, replace worn or defective parts; retest meter for accuracy. Frequency varies based on meter size. |
| **Air and Vacuum Release Valve Assemblies** | |
| Annually | Flush and inspect. |
| **Blow-off Assemblies** | |
| Annually | Flush and inspect. |
| **Backflow Prevention Devices** | |
| Annually | Inspect, record, and report status. |
| **Telemetry and Control System (when operational)** | |
| Monthly | Visually inspect cabinets and panels for damage, dust, and debris. |
| Semi-Annually | Inspect inside of cabinets and panels for damage, dust, and debris. |
| Semi-Annually | Vacuum clean all modules. |
| Semi-Annually | Test alarm indicator units. |
| Semi-Annually | Clean and flush all pressure sensitive devices. |
| Semi-Annually | Visually inspect all meters to coordinate remote stations. |
| Annually | Check master and RTU's for proper operation; repair as necessary. |

### 7.3.3 Safety Procedures

To maintain the highest level of safety, the City has taken steps toward educating its staff and providing resources to ensure a safe working environment. All employees of the Public Works Department are provided opportunities for a variety of skills such as – basic first aid training, CPR training, defensive driving certification, Commercial Driver's License certification (Maintenance Worker II), traffic safety and flagging, air testing, confined space entry and equipment calibration. The City also has a copy of the AWWA manual entitled, *Safety Practices for Water Utilities (M3)* available to all department personnel. This manual describes safety programs and provides guidelines for safe work practices and techniques for a variety of water utility work situations.

The Public Works Department follows all appropriate OSHA and WISHA regulations in its day-to-day operations and complies with the following State requirements:

- *WAC 296-62-145* to *14529 Part M* - Entry into confined spaces.
- *WAC 296-155-650 to 66411 Part N* - Shoring of open ditches.
- *WAC 296-155-429* - Lockout-tagout for work on energized or de-energized equipment or circuits.
- *WAC 296-155 Part C1* - Fall restraint for access to the top of the City's water reservoirs.
- MUTCD - Traffic control for work in the public right-of-way.

Table 7-3 describes the standard procedures to be followed for operations and maintenance tasks that involve the most common potential workplace hazards in the water system.

### Table 7-3 Safety Procedures

| Category | Safety Procedures |
|---|---|
| Use of Chlorine or Chlorine Products | Handle with care, provide adequate ventilation, wear safety glasses, rubber gloves and a self-contained breathing apparatus (SCBA) |
| Working in Confined Spaces | Follow state requirements for confined space entry. |
| Working in Trenches | Obtain proper training and follow all safety procedures for working in trenches. |
| Working Around Heavy Equipment | Obtain proper training and follow all safety procedures |
| Working in Traffic Areas | Wear proper clothing and provide adequate signage and flagging for work area. |
| Working on or Around Water Reservoirs | Follow proper safety harness procedures for working on tall structures. |
| Working in or Around Pump Stations | Obtain proper training and follow all safety procedures for working on pumps and electrical equipment. |
| Working on Asbestos Cement (AC) Water Main | Obtain proper training and follow all safety procedures for working with asbestos materials. |
| Working on Pressurized Water Main | Obtain proper training and follow all safety procedures for working with pressurized water mains. |

Safety and first aid equipment is available to all Public Works Department staff to conduct safety procedures for operations and maintenance tasks. First aid and spill kits are in each vehicle, workshop, and lab. Eye wash stations are in each facility. Self-contained breathing apparatus (SCBA) equipment are available for confined spaces. Trench shoring equipment, air tester for confined spaces, traffic safety equipment, and gas monitoring equipment are available, if needed. The City provides communication equipment, such as radios and cell phones, to all maintenance staff.

## 7.3.4 Routine Water Quality Sampling

The Washington State Department of Health (DOH) has adopted federal regulations that specify minimum monitoring requirements for water systems. The sampling requirements depend on the population served, source type, and treatment provided. The specific requirements are contained in *WAC 246-290-300* and the City's practices are described in Chapter 6.

## 7.3.5 Environmental Awareness Practices

Protecting the environment is a high priority of the City. The operations and maintenance staff have been made aware of the City's commitment to protecting the environment through education and field training. The City recognizes that it can play a major role in protecting the environment, due to its proximity to the Snoqualmie River and other natural features.

Chinook salmon and bull trout were listed as a threatened species under the federal Endangered Species Act (ESA) in 1999. The City has established practices to operate, maintain, repair, improve, and expand the water system in a manner that does not adversely affect the environment. For

example, the City does not allow chlorinated water to enter surface water bodies or storm drainage systems that discharge to surface water bodies.

### 7.3.6 Staffing Analysis

The hours of labor and supervisory activity required to effectively conduct the work of these on-going operations and maintenance procedures described above form the basis for determining adequate staffing levels. There are currently seven employees on the Public Works maintenance and operations crew that assist with water system activities. Since these employees also support other City utilities, only a portion of their time is allocated to the water utility. The City currently has approximately five (5.4) (2019-2020 Biennial Budget) full-time equivalents (FTE) to support the water utility; with 2.6 of those FTE's in Operations, and the remaining spread into Admin, Engineering, Finance, and support functions. One FTE is assumed to work 1,533 hours per year, based on the calculations shown in Table 7-4.

The staffing analysis prepared for this planning document is relative to the technology and processes of the day. Future advances in technology or system efficiencies implemented may influence the current & future staffing needs of the system and shall be evaluated periodically.

#### Table 7-4 Annual Hours Worked Per FTE for Operations and Maintenance Tasks

| Description | Hours |
|---|---|
| Total Available Working Hours in a Year | 2,080 |
| Less average vacation (3 weeks per year) | -120 |
| Less average sick leave (2 weeks per year) | -80 |
| Less holidays of 11 days per year | -88 |
| Less average training of 40 hours per year | -40 |
| Less average small tasks other than above of 1 hour per day | -219 |
| **Net Total Available Hours Per Year Per Person** | **1,533** |

The estimated hours of work required to achieve optimum operation and maintenance of the water system (excluding time required for clerical tasks) is shown in Table 7-5. The upper section identifies the staffing time for operations and maintenance tasks and the lower section identifies the staffing time for Administration, Engineering, Finance, and support tasks.

Table 7-5a shows that approximately 4.3 FTEs are recommended primarily for the Operations of the water system alone; therefore, the City's current staff of 2.6 (proposed 3.6 in 21-22 budget) full-time water system operations personnel. Though the City is capable of adequately operating the water system and complying with DOH requirements, this staffing level may not allow the utility to operate at an optimum level of operation and preventative maintenance.

For planning purposes, this analysis was repeated for the projected water system in 2040, as shown in Table 7-5b. This analysis estimates that approximately 8.3 FTEs will be required to operate the water system in 2040. As the system grows and budget allows, the City will add to optimize preventive maintenance and meet additional requirements from system expansion.

## Table 7-5a Existing (2020) Operational Staffing Requirements

| Description | Total Units In System | Maintenance Period | Frequency (Times/Yr) | Time/Unit (Hrs) | No. Staff | Time/Yr (Hrs) |
|---|---|---|---|---|---|---|
| **Operations Staff** | | | | | | |
| Hydrants | 375 | Annual | 1 | 0.25 | 2 | 188 |
| Isolation Valves, Hydrant Valves PM | 1,288 | Annual | 1 | 0.25 | 1 | 322 |
| Air and Vacuum Release Valves | 34 | Annual | 1 | 0.5 | 1 | 17 |
| Blowoff Assemblies | 105 | Annual | 1 | 0.25 | 1 | 26 |
| Scheduled Meter Replacement | 150 | Annual | 1 | 1 | 2 | 300 |
| Leak Survey of Water Mains | 42 miles | Annual | 1 | 0.25 | 2 | 21 |
| Flushing Water Mains | 42 miles | Annual | 1 | 2 | 2 | 168 |
| Booster Pump Stations | 1 | Bi-Annual | 2 | 6 | 2 | 24 |
| Pressure Reducing Stations | 15 | Annual | 1 | 2 | 2 | 60 |
| Supply Stations | 2 | Bi-Annual | 2 | 2 | 2 | 16 |
| Reservoirs | 2 | Annual | 1 | 8 | 2 | 32 |
| Telemetry and Control System | 1 | As Needed | 2 | 4 | 2 | 16 |
| Monitor System | 1 | Weekly | 52 | 8 | 2 | 832 |
| Meter Reading | 3,059 | Monthly | 12 | 0.1 | 1 | 3,671 |
| Groundskeeping | 2 | Monthly | 12 | 6 | 1 | 144 |
| Inventory/Stocking/Parts | 1 | Annually | 1 | 40 | 1 | 40 |
| Meter Repair/Replace | 20 | As Needed | 1 | 2 | 1 | 40 |
| Main Breaks | 1 | As Needed | 2 | 4 | 2 | 16 |
| System Failures | 1 | As Needed | 4 | 8 | 2 | 64 |
| Hydrant Repairs | 5 | As Needed | 1 | 4 | 2 | 40 |
| Service Connections Repair | 3 | As Needed | 1 | 4 | 2 | 24 |
| New Service Connections | 12 | As Needed | 1 | 1 | 2 | 24 |
| Main Connections | 5 | As Needed | 1 | 8 | 2 | 80 |
| Backflow Device Inspection | 171 | Monthly | 1 | 0.5 | 1 | 86 |
| Water Quality Testing | 2 | Monthly | 12 | 1 | 1 | 24 |
| Telemetry and Control System | 1 | Daily | 260 | 1 | 1 | 260 |
| Backflow Tracking/Management | 1 | Monthly | 12 | 4 | 2 | 96 |
| **Total Hours Required** | | | | | | **6,630** |
| **Total Full Time Operations Employees Required (based on 1,533 hours per year per person)** | | | | | | **4.3** |
| **Admin, Engineering, Finance, and Management Staff** | | | | | | |
| Public Works Director | 1 | Daily | 183 | 2 | 1 | 366 |
| Finance Director | 1 | Daily | 183 | 1.5 | 1 | 275 |
| Community Development Director | 1 | Daily | 183 | 0.25 | 1 | 46 |
| Permit Specialist | 1 | Daily | 183 | 0.75 | 1 | 137 |
| Permit Specialist B | 1 | Daily | 183 | 0.5 | 1 | 92 |
| Admin Assistant | 1 | Daily | 183 | 2 | 1 | 366 |
| Admin Assistant I | 1 | Daily | 183 | 2 | 1 | 366 |
| City Clerk | 1 | Daily | 183 | 1.25 | 1 | 229 |
| Accountant | 1 | Daily | 183 | 1.5 | 1 | 275 |
| Accountant Associate 1 | 1 | Daily | 183 | 2.25 | 1 | 412 |

| Description | Total Units In System | Maintenance Period | Frequency (Times/Yr) | Time/Unit (Hrs) | No. Staff | Time/Yr (Hrs) |
|---|---|---|---|---|---|---|
| Accountant Associate 2 | 1 | Daily | 183 | 0.75 | 1 | 137 |
| Project Manager A | 1 | Daily | 183 | 2 | 1 | 366 |
| Assistant City Engineer | 1 | Daily | 183 | 2.75 | 1 | 503 |
| Executive Assistant to PW Director | 1 | Daily | 183 | 1.5 | 1 | 275 |
| Project Manager B | 1 | Daily | 183 | 2.25 | 1 | 412 |
| **Total Hours Required** | | | | | | **4,255** |
| **Total Full Time Admin, Engineering, Finance, and Management Employees Required** | | | | | | **2.8** |

## Table 7-5b Future (2040) Operational Staffing Requirements

| Description | Total Units In System | Maintenance Period | Frequency (Times/Yr) | Time/Unit (Hrs) | No. Staff | Time/Yr (Hrs) |
|---|---|---|---|---|---|---|
| Operations Staff | | | | | | |
| Hydrants | 461 | Annual | 1 | 0.25 | 2 | 230 |
| Isolation Valves, Hydrant Valves PM | 1,475 | Annual | 1 | 0.25 | 1 | 369 |
| Air and Vacuum Release Valves | 39 | Annual | 1 | 0.5 | 1 | 19 |
| Blowoff Assemblies | 121 | Annual | 1 | 0.25 | 1 | 30 |
| Scheduled Meter Replacement | 250 | Annual | 1 | 1 | 2 | 500 |
| Leak Survey of Water Mains | 48 miles | Annual | 1 | 0.25 | 2 | 24 |
| Flushing Water Mains | 48 miles | Annual | 1 | 2 | 2 | 192 |
| Booster Pump Stations | 1 | Bi-Annual | 2 | 6 | 2 | 24 |
| Pressure Reducing Stations | 13 | Annual | 1 | 2 | 2 | 52 |
| Supply Stations | 2 | Bi-Annual | 2 | 2 | 2 | 16 |
| Reservoirs | 2 | Annual | 1 | 8 | 2 | 32 |
| Telemetry and Control System | 1 | As Needed | 2 | 4 | 2 | 16 |
| Monitor System | 1 | Weekly | 52 | 8 | 2 | 832 |
| Meter Reading | 5,000 | Monthly | 12 | 0.1 | 1 | 6,000 |
| Groundskeeping | 2 | Monthly | 12 | 6 | 1 | 144 |
| Inventory/Stocking/Parts | 1 | Annually | 1 | 40 | 1 | 40 |
| Meter Repair/Replace | 50 | As Needed | 1 | 2 | 1 | 100 |
| Main Breaks | 1 | As Needed | 2 | 4 | 2 | 16 |
| System Failures | 1 | As Needed | 4 | 8 | 2 | 64 |
| Hydrant Repairs | 5 | As Needed | 1 | 4 | 2 | 40 |
| Service Connections Repair | 5 | As Needed | 1 | 4 | 2 | 40 |
| New Service Connections | 20 | As Needed | 1 | 1 | 2 | 40 |
| Main Connections | 10 | As Needed | 1 | 8 | 2 | 160 |
| Backflow Device Inspection | 285 | Monthly | 1 | 0.5 | 1 | 143 |
| Water Quality Testing | 2 | Monthly | 12 | 1 | 1 | 24 |
| Telemetry and Control System | 1 | Daily | 260 | 1 | 1 | 260 |
| Backflow Tracking/Management | 1 | Monthly | 12 | 4 | 2 | 96 |
| **Total Hours Required** | | | | | | **9,503** |
| **Total Full Time Operations Employees Required (based on 1,533 hours per year per person)** | | | | | | **6.2** |

| Description | Total Units In System | Maintenance Period | Frequency (Times/Yr) | Time/Unit (Hrs) | No. Staff | Time/Yr (Hrs) |
|---|---|---|---|---|---|---|
| Admin, Engineering, Finance, and Management Staff | | | | | | |
| Public Works Director | 1 | Daily | 183 | 2.25 | 1 | 412 |
| Finance Director | 1 | Daily | 183 | 1.75 | 1 | 320 |
| Community Development Director | 1 | Daily | 183 | 0.25 | 1 | 46 |
| Permit Specialist | 1 | Daily | 183 | 1 | 1 | 183 |
| Permit Specialist B | 1 | Daily | 183 | 0.5 | 1 | 92 |
| Admin Assistant | 1 | Daily | 183 | 2 | 1 | 366 |
| Admin Assistant I | 1 | Daily | 183 | 2 | 1 | 366 |
| City Clerk | 1 | Daily | 183 | 1.5 | 1 | 275 |
| Accountant | 1 | Daily | 183 | 1.75 | 1 | 320 |
| Accountant Associate 1 | 1 | Daily | 183 | 2.5 | 1 | 458 |
| Accountant Associate 2 | 1 | Daily | 183 | 0.75 | 1 | 137 |
| Project Manager A | 1 | Daily | 183 | 2.25 | 1 | 412 |
| Assistant City Engineer | 1 | Daily | 183 | 3 | 1 | 549 |
| Executive Assistant to PW Director | 1 | Daily | 183 | 1.75 | 1 | 320 |
| Project Manager B | 1 | Daily | 183 | 2.5 | 1 | 458 |
| **Total Hours Required** | | | | | | **4,712** |
| **Total Full Time Admin, Engineering, Finance, and Management Employees Required** | | | | | | **3.1** |

## 7.4 Recordkeeping and Reporting

The City must comply with all recordkeeping and report requirements stated in *WAC 246-290-480.* Per these requirements, the City submits the following reports to DOH.

- Any reports or communications related to monitoring waivers.
- Daily source meter readings and total annual source meter readings, as requested.
- Any significant changes to the Water facilities inventory form (WFI).
- Bacteriological test results.
- Disinfection byproducts information.
- Certification that the system complied with public notification regulations when a public notification is required.

In addition to these reports, the City reports to DOH on the status on its various programs, as described below.

- Cross-connection control program summary is reported annually. The City must notify DOH as soon as possible, but no later than the end of the next business day, when a backflow incident is known by the City to have contaminated the public water system or occurred within the premises of a consumer served by the City.

- Water Use Efficiency (WUE) report is submitted by July 1st of each year. This report calculates the annual and three-year rolling average distribution system loss for the water system and describes progress made on WUE goals.
- Consumer confidence report is delivered to customers and DOH by July 1st of each year. This report provides information on the system's water source and water quality. The City's 2018 Consumer Confidence Report is provided in **Appendix M**.

Several other reports are required for state agencies, including the Department of Revenue, Department of Labor and Industries, Department of Social and Health Services, Department of Ecology, and the Employment Security Department. All these reports are completed according to their instructions. If the City is unable to satisfactorily address departmental concerns or consumer complaints regarding the level of reliability associated with normal or abnormal operating conditions, the purveyor may be required to prepare a project report pursuant to *WAC 246-290-110*.

*WAC 246-290-480* also requires the City to retain critical records dealing with facilities and water quality issues. **Table 7-6** provides a summary of these records and their required retention periods.

## Table 7-6
## Recordkeeping Summary

| Record Type | Required Retention |
|---|---|
| Bacteriological analysis results | 5 years |
| Chemical analysis results | As long as the system is in operation |
| Daily source meter readings | 10 years |
| Other records of operation and analyses as may be required by DOH | 3 years |
| Chlorine residual analysis results | 3 years |
| Documentation of actions to correct violations or primary drinking water standards | 3 years after last corrective action |
| Records of sanitary surveys | 10 years |
| Project reports, construction documents and drawings, inspection reports, and approvals | Life of the facility |
| Public Notices and Certifications associated with the water system | 3 years |
| Cross-Connection Control program | |
| Records pertaining to the master list of service connections and/or consumer's premises | As long as the premises pose a cross-connection hazard |
| Records regarding inventory information | 5 years or life of backflow preventer, whichever is shorter |
| Records regarding backflow incidents and annual summary reports | 5 years |
| Other records, including fluoride levels, treatment plant performance, and other source characteristics are maintained in accordance with DOH by SPU. | Varies |

### 7.4.1 Recordkeeping Procedures

The City's recordkeeping procedures are as follows:

- All records include the date, place, time of sample, and name of person collecting the sample. Electronic data with these attributes are retained as opposed to signature as required in WAC 246-290-480.1.a.
- All sample analysis records include the identification of sample type, date of analysis, laboratory and person responsible for performing the analysis, analytical method used, and results of the analysis.
- All water quality and quantity data, collected in-house and provided by SPU, is recorded and managed by the Engineer Aide/Public Works Director Assistant. The data is kept in spreadsheet format saved on the City computer server and back-up data tapes.
- Maintenance workers, inspectors, or other staff provides information to the Public Works Superintendent, who must review the information prior to it being filed.
- Project reports, construction documents and drawings, inspection reports, and approvals are saved both in electronic format and Mylar or paper format.

### 7.4.2 Operations and Maintenance Records

Operations and maintenance manuals are available for staff members' reference. They are stored in the equipment maintenance file at the Public Works Facility. The City requires complete operation and maintenance manuals for all new equipment.

### 7.4.3 Mapping and As-Built Drawing Records

The City maintains a comprehensive mapping and drawing record of the water system. This record is comprised of physical maps, historical data books, and computer-generated maps in AutoCAD and GIS formats. Mapping is continuously updated using new data from surveys, sketches, digital pictures, and Global Positioning System (GPS) techniques. Drawing records are stored at the Public Works Facility and are maintained by the Public Works Department.

### 7.4.4 Customer Service Request Records

Customer service requests are made by either contacting City Hall to initiate a maintenance request or going online to the City's website to report a concern. All service requests are dealt with in a timely manner. Records of these requests are maintained by the City Clerk.

## 7.5 Emergency Operations

The City has a reliable system with adequate emergency response and operations capabilities in accordance with *WAC 246-290-420*. The City system is designed to provide reliable service under normal operating conditions and is also well equipped to accommodate short-term system failures and abnormalities. Its capabilities are summarized in the following sections.

## 7.5.1 Water Service Reliability

As a municipality, the City has the structure, stability, authority, and responsibility to assure that water service will be continuous. It has developed a resilient system in order to provide a reliable water service. These resiliencies are described below.

*Multiple Supply Stations:* Should the City lose the operation of one Tolt Supply Station, water could be routed throughout the City from the other Tolt Supply Station. Such a failure would not adversely affect the City's ability to meet the water demands of its customers.

*Multiple Reservoirs:* Water storage is provided by two active reservoirs that are located at different sites. The duplication of reservoirs in separate pressure zones, coupled with the water system's ability to transfer water between zones through a series of pressure reducing stations and a booster pump station, provides sufficient redundancy to prevent service disruption when one of the reservoirs is out of service for cleaning, painting, or repairs.

*Distribution System:* The City has attempted to loop water mains, wherever possible, to improve water circulation (i.e. water quality) and minimize impacts to the system in the event that a portion of the distribution system must be taken out of service for maintenance or repairs.

*Security Measures:* The City maintains security measures at all City water system facilities. These measures include fencing and located gates surrounding all water storage reservoir tanks and pumping facilities, screening of all reservoir tank vents and openings, locking of all reservoir tank hatches, and locking of all water system vaults.

*Emergency Power:* The City provides backup power for critical facilities. The pump station has a backup generator, controls have backup batteries, the 0.5 MG tank is controlled by valves that operate without power, the Tolt stations and larger tank are battery operated, and the engineering building SCADA server host has backup power. The City has a gravity-based system telemetry upgrades planned by December 2021.

## *7.5.2* Water Shortage Plan

In the case of a water shortage, the City will follow SPU's water shortage guides per their wholesale contract with SPU. SPU's Water Shortage Contingency Plan was last updated and revised in 2019. The Water Shortage Plan addresses both progressive situations, such as those that are weather-related, and more drastic and immediate situations such as facility emergencies (for example, a major pipeline break). According to this plan, the City would respond to a potential or actual shortage using a phased approach. A copy of SPU's Water Shortage Contingency Plan can be found on SPU's website.

## 7.5.3 Emergency Response Plan

The City of Duvall's Comprehensive Emergency Management Plan (CEMP) is an "all-hazards" plan and covers all natural, technological, and human caused hazards. The plan builds on the City and County Hazard Identification and Vulnerability Assessment(s). It describes functions and activities

necessary to implement the four phases of emergency management: mitigation, preparedness, response, and recovery. It also identifies the responsibilities of the City of Duvall staff as well as other emergency services and public organizations with which the City will interact with during an emergency or disaster response.

## 7.6 Cross-Connection Control Program

The City has adopted a cross-connection control program to comply with *WAC 246-290-490* pertaining to contamination of potable water due to cross-connections. The City's cross-connection control program commences at the Tolt 1 and 2 supply stations and includes the downstream distribution and storage system. Backflow prevention devices are required at service connections where a potential for contamination exists. Appendix I includes a copy of the City's Cross-Connection Control Plan. As shown in Table 7-2, the City employs several certified Cross-Connection Control Specialists.

## 7.7 Sanitary Survey Findings

The City's most recent sanitary survey was performed by DOH on January 21, 2020. The City promptly responded to DOH's findings, making changes to its system were recommended. Key changes include installing #24 screening material over reservoir overflow drains and updating water quality monitoring equipment. The City added the retrofit of the Crestview Estate's below grade drain to an above ground drain with an air gapped discharge to the storm system to its Capital Improvement List and is in the process of updating its Coliform Monitoring Plan.

## 7.8 Operations and Maintenance Improvements

The City has plans to invest in the operation and maintenance of its water system to increase system efficiency and reliability. The City's currently developing a SCADA Master Plan, which will give the City a plan to develop a reliable telemetry system. From that plan, the City will update and expand its telemetry system. The City's existing telemetry and supervisory control system was installed in approximately 1997 and has not been upgraded since that time. The proposed updates will facilitate real-time data collection, alarm notification at all facilities, and increased system functionality and operational efficiency. A reliable telemetry system will allow the City to remotely monitor its system, increasing the reliability of its operation and reducing the number of manhours required to operate and maintain its growing system.

Per America's Water Infrastructure Act of 2018, the City is working on a Risk and Resilience Assessment as well as an Emergency Response Plan update. This assessment and update will help the City improve its reliability and emergency readiness. The City is also participating in King County's update of its Regional Hazard Mitigation Plan.

The City is looking into ways to improve its flushing, valve operating, and leak detection programs through new methodologies and equipment. It is working on a GIS based Asset Management system that will incorporate work order management. The City is constantly striving to improve its operational and maintenance practices; thereby, improving the City's ability to operate and

maintain its system. Other proposed improvements not mentioned above are addressed in Chapter 9 and included in the City's Capital Improvement Program.

## 7.9 Summary

The City has procedures and policies in place to operate and maintain its water system. It has an organizational structure that ensures each component of the system is managed and overseen by those with the appropriate certification. Routine operation items include things like making daily rounds to visually check system facilities, monitoring flow and reservoir level recordings, and respond to customer inquiries and complaints. Preventive maintenance consists of regularly servicing pumps and motors, exercising valves, cleaning, and painting reservoirs, and flushing dead-end pipelines. The City has performed a staffing analysis to assure that it has enough staff to properly operate and maintain its existing system.

The City has system reliability and emergency management plans in place to address circumstances that could require increased levels of management under emergency conditions. It maintains a cross-connection control program through municipal code and reports on its status annually. Finally, the City has projects identified to maintain the system and address areas requiring improvements as identified through system operations and as discussed in further detail in Chapter 9.

murraysmith

# Section 8

Chapter 8

# Water System Analyses

## 8.1 Introduction

This chapter presents an analysis of the City's existing water system and evaluates its ability to meet the design criteria and policies established by City Standards or State Requirements. The City's policies and design criteria are presented in Chapter 5 and summarized in the table included in Section 8.2. The City's existing and future water demands are presented in Chapter 4. A description of the water system facilities and their current operation is presented in Chapter 2. Any deficiencies identified in this analysis will be addressed in the proposed improvements presented in Chapter 9.

## 8.2 Evaluation Criteria

Table 8-1 summarizes the Washington Department of Health (DOH) requirements and City standards used to evaluate the water system in this analysis.

## Table 8-1 Evaluation Criteria

| System Element | Evaluation Criteria | Evalulation Criteria | Agency's Standard* |
|---|---|---|---|
| Water Supply | Firm Supply Capacity | 2+ supply sources with a capability to replenish FSS within 72-hrs while supplying MDD | DOH |
| | Reliable Capacity | ADD with largest source out of service | DOH |
| Storage Facilities | Total Storage Capacity | Sum of operational, equalization, emergency storage (nested fire suppression and standby), and dead. | DOH |
| | Operational (OS) | The volume of water before sources turn on. (pump off elev. – pump on elev.) * gal/ft | DOH |
| | Equalizing (ES) | 11.3% of MDD (based on 2012 WSP)<br>Min of PHD – (supply capacity) x 150 min<br>*Min pressure 30 psi* | City |
| | Standby (SB) | 2 average days with Tolt 1 offline.<br>Min of 200 gallons per ERU<br>*Min pressure 20 psi* | City |
| | Fire Suppression (FSS) | = (Maximum fire flow) x (duration)<br>*Min pressure 20 psi* | DOH |
| | Dead (DS) | Volume that cannot provide minimum design pressure to all customers. | DOH |
| Pump Stations | Firm Capacity when pump to system (no storage) | PHD | DOH |
| | Reliable Capacity when pump to system (no storage) | MDD + Fire Flow with largest pump out of service | DOH |
| Service Pressure | Minimum during MDD plus fire flow | 20 psi | DOH |
| | Minimum during PHD | 30 psi | DOH |
| | Maximum | 120 psi, recommend individual PRVs on services with pressure over 80 psi. | City |

*All City Standards also meet DOH Standards.

# 8.3 Pressure Zones

Ideally, distribution static pressures should fall between 40 and 80 psi to provide adequate water pressures while avoiding over-pressurized lines. A water service area consists of different pressure zones that maintain a design hydraulic grade line (HGL) that can reasonably keep distribution pressures within this range; therefore, pressure zone boundaries are determined according to topography, tank overflow elevations, and pressure reducing valve settings. Pressures within each zone may reach or exceed 120 psi in locations. The City requires individual Pressure Reducing Valves (PRV's) to be installed on all individual residential services (DMC 9.02.040). The PRV limits pressure supplied into the residence, preventing damage to household plumbing and appliances.

Table 8-2 summarizes the highest and lowest water meter elevations served by each of the pressure zones, and the resulting static pressures. The City is currently providing water at sufficient

pressures throughout the water system, as shown in the table. The highest pressures in the system occur at the lowest elevations of each pressure zone.

### Table 8-2
### Minimum and Maximum Distribution System Pressures

| Pressure Zone | Highest Elevation Served | | Lowest Elevation Served | |
|---|---|---|---|---|
| | Elevation (ft) | Static Pressure (psi) | Elevation (ft) | Static Pressure (psi) |
| 615 | 497 | 51 | 380 | 102 |
| 555 | 442 | 49 | 293 | 114 |
| 485 | 372 | 49 | 305 | 78 |
| 450 | 335 | 50 | 180 | 117 |
| 330 | 235 | 41 | 46 | 123 |

## 8.4 Supply Capacity Evaluation: Supply Stations

This section evaluates the City's Tolt 1 & 2 Supply Stations to determine if they have sufficient capacity to provide water supply to the system at a rate that meets the existing and future demands of the system.

### 8.4.1 Analysis Criteria

Supply facilities must be reliable and must provide a sufficient quantity of water at pressures that meet the requirements of WAC 246-290-230. The capacity of supply facilities in a pressure zone that has adequate storage must be sufficient to provide water at a rate that is equal to or greater than the MDD of the zone being served. This approach assumes that demands more than the MDD will be supplied using equalizing storage.

### 8.4.2 Analysis Results

The Tolt 1 Supply Station is the lead supply facility for the City's water system: it delivers water directly to the 615 Zone, fills the Big Rock Road and Crestview Estates reservoirs, and indirectly supplies all other zones through pressure reducing stations. The Tolt 2 Supply Station operates on standby, delivering water directly to the 450 Zone and indirectly to other zones when system demands exceed the supply rate of the Tolt 1 Supply Station.

Murraysmith evaluated the combined supply facilities against the demand of the system in **Table 8-3**. According to Section 3.10.5 and Section 5.4 of the 2019 DOH Water System Design Manual, water system sources must be capable of supplying MDD and replenishing depleted fire suppression storage within 72 hours and provide ADD with the largest source out of order. The fire storage flow rate is based on the system fire storage calculation in **Section 8.6.** The current supply capacities of the facilities are compared to system demands for 2020, and projected system

demands for 2030 and 2040. Table 8-3 indicates that the City's Tolt Supply Stations have sufficient capacity to meet the existing and future supply requirements of the system through the year 2040.

### Table 8-3
### Supply Station Capacity Evaluation

| Description | Plan Yr 2020 | 10-Yr 2030 | 20-Yr 2040 |
|---|---|---|---|
| **System Demand (gpm)** | | | |
| Fire Suppression Storage Replenished in 72 hours* | 146 | 146 | 146 |
| Maximum Day Demand | 804 | 1,129 | 1,311 |
| Average Day Demand | 383 | 538 | 624 |
| **Available Supply (gpm)** | | | |
| Tolt 1 Supply Station (Available) | 1,760 | 1,760 | 1,760 |
| Tolt 2 Supply Station (Available) | 1,200 | 1,200 | 1,200 |
| **Firm Supply Capacity (ADD with Tolt 1 out of order)** | | | |
| Surplus / (Deficit) of Supply | 817 | 662 | 576 |
| **Total Capacity (MDD + replenish FSS in 72-hours)** | | | |
| Surplus / (Deficit) of Supply | 2,010 | 1,685 | 1,503 |

*Based on replenishing a fire event equal to 3,500 gpm for 3 hours over a 72-hour period

The configuration of the existing system provides the City with the ability to supply all customers from one supply station if the other supply station is out of service. Currently, each supply station can provide adequate supply to individually meet the demand requirements of the existing system. For 2030 and 2040 demand projections, the Tolt 1 Supply Station is adequate to meet the total required capacity (MDD plus the ability to replenish fire suppression storage in 72-hours) with the Tolt 2 Supply Station offline. Additionally, the Tolt 2 Supply Station can meet the total capacity requirement for future demands at its current capacity.

## 8.5 Supply Capacity Evaluation: 615 Zone Booster Pump Station

This section evaluates the 615-zone booster pump station to determine if it has sufficient capacity to meet the existing and future demands of the system.

### 8.5.1 Analysis Criteria

The primary purpose of the 615 Zone Booster Pump Station (BPS) is to supply the 615 Zone during times when the Tolt 1 Supply Station cannot supply that zone through gravity feed alone. During normal operations, the Tolt 1 Supply Station directly supplies the 615 Zone. However, if the HGL at the Tolt 1 Supply Station drops below 615 feet, the 615 Zone demand exceeds the Tolt 1 Supply Station capacity, or the Tolt 1 Supply Station is offline, then the 615 Zone Booster Pump Station will pump stored water from the 2.2 MG Big Rock Road Reservoir into the 615 zone to maintain pressure and meet water demands.

If Tolt 1's HGL drops below 615 or the 615 Zone demand exceeds the Tolt 1 Supply Station capacity, then the 615 Zone BPS supplies only the 615 Zone and the Tolt 1 can supply the remaining system. If the Tolt 1 Supply Station is offline, then the 615 Zone BPS needs to supply the 615, 555, and 485 Zones. In this scenario, the remaining 450 and 330 Zones will be served by the Tolt 2 Supply Station. To be conservative, this analysis reviews the scenario when Tolt 1 is offline and the 615 BPS is needed pump water to the 615, 555, and 485 Zones. In this scenario, the Crestview Tank can supply fire flow to the 555 and 485 Zones, so only the 615 Zone's fire flow requirement is considered. Although the Tolt 1 Supply Station normally leads supply into the 615 Zone, this conservative analysis assumes that no supply to the 615 Zone is directly available from the Tolt 1 Supply Station.

## 8.5.2 Analysis Results

Table 8-4 evaluates the total supply capacity of the 615 Zone Booster Pump Station against existing and projected 2040 demands. Improvements to resolve the projected supply deficiency at the 615 Zone Booster Pump Station are described in Chapter 9.

### Table 8-4
### 615 Zone Booster Pump Station Capacity Evaluation

| Description | Plan Yr 2020 | 10-Yr 2030 | 20-Yr 2040 |
|---|---|---|---|
| **Required Supply (gpm)** | | | |
| 615 Zone Max Fire Flow | 1,000 | 1,000 | 1,000 |
| 615 Zone Maximum Day Demand | 249 | 253 | 313 |
| 555 Zone Maximum Day Demand | 186 | 336 | 477 |
| 485 Zone Maximum Day Demand | 6 | 6 | 6 |
| 615 Zone Peak Hour Demand | 437 | 443 | 548 |
| 555 Zone Peak Hour Demand | 326 | 588 | 834 |
| 485 Zone Peak Hour Demand | 10 | 10 | 10 |
| **Available Supply (gpm)** | | | |
| Largest Pump (QL) (GPM) | 1,000 | 1,000 | 1,000 |
| Total Pumping Capacity (Qs) (gpm) | 2,350 | 2,350 | 2,350 |
| **Firm Supply Capacity (no storage) (PHD)** | | | |
| Surplus / (Deficit) of Supply | 1,577 | 1,309 | 958 |
| **Reliable Capacity (no storage) (MDD + Fire Flow with largest pump out of service)** | | | |
| Surplus / (Deficit) of Supply | (92) | (245) | (446) |

[1]The school located in the 615 zone supplies its own fire flow, so the max fire flow requirement for the 615 zone is 1,000 gpm.

### 8.5.3 Supply Reliability

The 615 Zone Booster Pump Station houses three pumps and serves as a redundant supply facility for the system providing pressure to areas typically served through gravity by the Tolt 1 Supply Station. The pump station is also equipped with a stationary engine generator set equipped with an automatic transfer switch to enable operation of the station in the event of a power outage or emergency situation. Based on these features, the pump station is considered a reliable supply source to the 615 Zone.

## 8.6 Storage Facilities

This section evaluates the City's two existing water storage facilities to determine if they have sufficient capacity to meet the existing and future storage requirements of the system.

### 8.6.1 Analysis Criteria

Water storage requirements are typically defined by the following components: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage (see Table 8-1). A description of each storage component and the criteria used to evaluate the capacity of the City's reservoirs is provided below.

Operational Storage: Operational storage is used to supply the water system under normal demand conditions. The operational storage in all the City's reservoirs is the volume of storage between the average water level of the reservoirs which signal a supply source to operate and the maximum water level (i.e., overflow elevation) of the reservoirs. The operational storage volume shown in Table 8-4 is based on an operating range of 9.5 feet for the 0.5 MG Crestview tank and an operating range of 5 feet for the 2.2 MG Big Rock Road tank.

Equalizing Storage: When the source pumping capacity cannot meet the periodic daily (or longer) peak demands placed on the water system, equalizing storage must be provided as a part of the total storage for the system, and must be available at 30 psi to all service connections. The criteria for determining the equalizing storage requirements for the City's system is based on the equalizing calculation in the 2012 plan, which was derived from City diurnal patterns. The equalizing storage is equal to 11.3% of MDD for one day; this is more conservative than the DOH equalizing storage equation shown in Table 8-1.

Standby Storage: Standby storage is the portion of the reservoir used to supply the water system under emergency conditions when supply facilities are out of service. As shown in Table 8-1, DOH allows water systems with multiple sources to require that standby volume supply with the largest supply source out of service but recommends a minimum standby storage of 200 gallons per ERU in the system. Table 8-4 calculates standby as the maximum of either the volume required to supply ADD for two days with the Tolt Supply Station 1 out of service or the volume required to supply all ERUs at least 200 gallons.

Fire Flow Storage: Fire flow storage is the portion of the reservoir with sufficient volume to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The volume of the fire flow storage is the product of the fire flow rate and duration of the system's maximum fire flow requirement. The required volume of fire flow storage shown in Table 8-4 is the product of the maximum fire flow requirement of 3,500 gpm and its 3-hour duration.

Both standby storage and fire flow storage are considered emergency storage components. The City has elected to nest these two storage components, which results in only the larger of the two individual components being used in the required storage computation.

Dead Storage: Dead storage is the bottom portion of the reservoir that cannot be used because water is stored at an elevation that is too low to provide sufficient pressure (below 20 psi at the highest elevation served by the reservoir). This unusable storage occupies the lower portion of many ground-level standpipe-type reservoirs. No dead storage was calculated for the City's reservoirs, and the Tolt supply stations can maintain static system pressures above 30 psi when both tanks are empty.

## 8.6.2 Analysis Approach

Similar to the supply facility analysis, the storage analyses are based on an evaluation of the existing reservoirs providing water to the system as a whole, since water from either reservoir may be utilized by all zones in the system through pressure reducing stations or the 615 Zone Booster Pump Station.

## 8.6.3 Existing and Future Storage Analysis Results

The results of the storage analysis for the existing system indicate that the existing storage facilities have sufficient capacity to meet existing demands and approximately 0.75 MG of excess storage for the system. The future storage analysis was performed to determine the ability of the City's existing reservoirs to meet the future storage requirements, based on projected demands for years 2030 and 2040. The analysis results indicate that the existing storage facilities have sufficient capacity to meet the future demands of the system beyond the year 2040 based on the demand projections presented in Chapter 4. Table 8-5 summarizes the storage analysis.

Table 8-5
Storage Capacity Evaluation

| Description | Existing System (2019) | Future System (2030) | Future System (2040) |
|---|---|---|---|
| Usable Storage (MG) | | | |
| Maximum Storage Capacity | 2.7 | 2.7 | 2.7 |
| Dead (Non-usable) Storage | 0 | 0 | 0 |
| **Total Usable Storage** | **2.7** | **2.7** | **2.7** |
| Required Storage (MG) | | | |
| Operational Storage | 0.83 | 0.83 | 0.83 |
| Equalizing Storage | 0.13 | 0.18 | 0.21 |
| Standby Storage | 0.66 | 0.93 | 1.08 |
| Fire Suppression Storage | 0.63 | 0.63 | 0.63 |
| **Total Required Storage** | 1.63 | 1.95 | 2.13 |
| Surplus Storage (MG) | 1.07 | 0.75 | 0.57 |

# 8.7 Distribution and Transmission System Capacity Analysis

This section evaluates the City's existing distribution and transmission mains to determine if the water pipelines are sized and looped adequately to provide the necessary flow rates and pressures to meet the existing and future requirements of the system.

## 8.7.1 Hydraulic Model

The evaluation used an updated version of the City's existing computerized hydraulic model of the City's water system and the InfoWater version 12.4, a GIS-based modeling software developed by Innovyze. As part of this project, the model was updated to accurately reflect the City's existing water system and calibrated to field flow test data. Results from the model were used to evaluate the existing system and identify proposed improvements to resolve deficiencies. A description of the hydraulic model and settings used for the analyses are defined below.

### *8.7.1.1 Demand Data*

The hydraulic model includes average day demands of the existing system, based on 2019 demand data. 2019 water use billing data was geocoded by address and allocated to the closest model node, and a factor was applied to all demand nodes to account for water losses in the system or water use not included in billing records. Water use from hydrants for construction use was not included in the model demand allocation since this water is typically collected during off-peak times and the location of the water use varies according to where construction is occurring. Future demands were added to the model according to key locations where development is expected

according to developer plans. Demand peaking factors from Chapter 4 were used to adjust demands to MDD for the fire flow analyses and PHD for the pressure analysis.

#### *8.7.1.2 Facilities Data*

The hydraulic model was updated with current pressure reducing station settings, and initial elevations in tanks were modeled according to DOH recommendations for each demand scenario. Because the pump station is operated as back-up for the Tolt Supply Stations, the pumps are turned off for each demand scenario. The pump station was used for select analyses in the model; see below for boundary condition descriptions for each analysis.

As noted in Section 8.6, both system tanks can serve any zone in the system through the 615-Booster Pump Station and system PRV stations. Therefore, the Crestview Estates Reservoir was modeled without fire flow or standby storage (operational and equalizing tank levels only); all fire flow and standby storage was assumed to come from the Big Rock Road Reservoir.

#### *8.7.1.3 Calibration*

Hydraulic model calibration is the process of comparing field pressure and flow data with model simulation pressure and flow results and adjusting the model until results and field data match, as much as possible. A well-calibrated model gives the user confidence that the model simulation represents the water system well enough to use model analyses for planning future improvements to the system. Pressure and flow data were collected from representative hydrants in each pressure zone. Facility configurations, piping configurations, roughness coefficients, and minor losses were adjusted in the model to match field data with model results. Detailed calibration data and information is available in Appendix D of this plan.

### 8.7.2 Analysis Criteria

Distribution and transmission water mains must be capable of adequately and reliably conveying water throughout the system at acceptable flow velocities and maintaining acceptable pressures. The pressure analysis criteria defined in WAC 246-290-230 Distribution Systems states that the distribution system "…shall be designed with the capacity to deliver the design PHD quantity of water at 30 psi under PHD flow conditions measured at all existing and proposed service water meters". If fire flow is to be provided, "… the distribution system shall also provide MDD plus the required fire flow at a pressure of at least 20 psi at all points throughout the distribution system".

For the low-pressure analysis, the hydraulic model simulation was run on all active existing system facilities with settings that correspond to PHD conditions. The Tolt supply stations were modeled at the setpoints determined during model calibration. The 615 Zone Booster Pump Station was modeled with one large pump operating. Water levels in reservoirs were set at the bottom of operational storage and equalizing storage. All active pressure reducing stations were modeled with the pressure set points provided by the City.

A fire flow simulation was conducted using the hydraulic model for each hydrant in the City's water system. Murraysmith created a separate fire flow scenario for each pressure zone. For all fire flow scenarios, water levels in reservoirs were set at the bottom of fire flow storage (top of dead storage for Crestview Estates Reservoir), the Tolt Supply Station 2 PRVs were set at the pressure settings provided by the City, and the Tolt Supply Station 1 PRVs were set at the pressure settings determined during the model calibration. The 615 Zone Booster Pump Station was modeled with one of the large pumps out of service (i.e. firm capacity) for the 615 Zone fire flow simulation.

The hydraulic model scenario of the 2040 proposed water system contains all active existing system facilities and planned fire flow improvements identified in Chapter 9. This future scenario was modeled with projected 2040 demand and future tank levels.

## 8.7.3 Hydraulic Analyses Results

The low-pressure analysis was performed in the hydraulic model to evaluate pressures throughout the system under 2019 PHD. The results of this analysis were used to identify locations of low pressure. To satisfy the minimum pressure requirements, the pressure at all water service locations must be at least 30 psi during these demand conditions. The results of this analysis indicated that all areas of the system have pressures greater than 30 psi under PHD conditions, as shown in Figure 8-1.

An individual fire flow analysis was performed for each hydrant node in the hydraulic model to determine the available fire flow while maintaining a minimum residual pressure of 20 psi throughout the system. For each node analyzed, the resulting fire flow was compared to its target fire flow requirement, which was determined using the land use zoning classification of the neighboring parcel. A summary of the fire flow requirements by land use zoning classification is shown in Table 8-6, and the results of the fire flow analysis are shown in Figure 8-2. All fire hydrants in the system meet the required minimum flow for both the existing and future conditions.

### Table 8-6
### Fire Flow Requirements by Zoning Classification

| Land Use Category | Fire Flow Requirement (gpm) | Flow Duration (hrs) | Zoning Classification |
|---|---|---|---|
| Low Density Residential | 1,000 | 2 | R4.5, R6, R8, PO |
| Medium Density Residential | 1,750 | 2 | R4 |
| High Density Residential | 2,500 | 3 | R12, R20 |
| Commercial/Business Park | 3,000 | 3 | OT, UT1, MT, MU12, MUI, CO, PF (non-school) |
| Light Industrial | 3,500 | 3 | LI |
| Schools | 3,500 | 3 | PF (school) |

Upon completion of the existing system fire flow analyses, the fire flow analysis was rerun at hydrants using projected future 2040 demands. The results of the future fire flow analysis shown that no CIP projects are required to meet fire flow requirements in 2040.

## 8.8 Pressure Reducing Stations

Since 2012, the City has abandoned both the 272nd and 143rd PRV station and the 143rd and 268th PRV station as part of water main looping projects. The City's pressure reducing stations are maintained per the manufacturer's recommendations and are in good condition. The two existing pressure reducing stations that serve the 485 Zone will be removed in the future as part of the planned project to convert this small zone to the 555 Zone, as described in Chapter 9.

## 8.9 System Capacity

System capacity analyses were performed to determine the maximum number of equivalent residential units (ERUs) that the system can serve, based on an independent evaluation of each component of the City's water system (supply, storage, transmission). A separate analysis was performed for the existing system with 2019 demand levels and the future system with the year 2040 maximum projection demand levels. The results of these analyses provide the City with information to ensure sufficient capacity is available when reviewing applications for new connections to the water system and to assist in the scheduling of planned improvements that will increase supply, storage, or transmission capacity.

### 8.9.1 Analysis Criteria

The physical capacity of the City's water system and ability to serve additional customers is based on the limiting capacity of supply, storage, or distribution, whichever facility has the least capacity. The capacity analysis for supply was computed from the Tolt Supply Stations capacity and the system's MDD per ERU. The capacity analysis for storage was computed from the total usable capacity of the storage facilities and the storage requirement per ERU. The storage requirement per ERU was determined from the existing storage requirement presented in this chapter and existing ERUs presented in Chapter 4. The capacity analysis for distribution was computed from the total capacity of the transmission mains at the two supply stations and the system's MDD per ERU. The ERU-based demand data was derived from the average day demand of the system and demand peaking factors from Chapter 4.

### 8.9.2 System Capacity Analysis Results

The results of the system capacity analysis, as shown in Table 8-7, indicate that the existing system has sufficient capacity to serve an additional 4,841 ERUs; and the future system in the year 2040, with maximum demand projections, will have sufficient capacity to serve an additional 441 ERUs. Storage capacity is the limiting factor of the system for existing and future conditions, as shown in the table.

## Table 8-7
## System Capacity Analysis

| Description of Capacity Parameter | Year | |
|---|---|---|
| **Demands per ERU Basis[1]** | **2020** | **2040** |
| ADD per ERU (gpd/ERU) | 157 | 157 |
| MDD per ERU (gpd/ERU) | 330 | 330 |
| PHD per ERU (gpd/ERU) | 578 | 578 |
| Projected ERUs (ERUs) | 3,309 | 5,396 |
| **Source Capacity** | | |
| Tolt Station Supply Capacity (Total, gpd) | 4,262,400 | 4,262,400 |
| MDD per ERU (gpd/ERU) | 330 | 330 |
| **Maximum Supply Capacity (ERUs)** | **12,914** | **12,914** |
| **Storage Capacity** | | |
| Maximum Usable Storage Capacity (MG) | 2.7 | 2.7 |
| Available Standby and Equalization Storage Capacity (MG) | 1.9 | 1.9 |
| Standby Storage Requirement per ERU (gal/ERU) | 200 | 200 |
| Equalizing Storage Requirement per ERU (gal/ERU) | 40 | 40 |
| **Maximum Storage Capacity (ERUs)** | **7,787** | **7,787** |
| **Distribution System Capacity** | | |
| MDD (gpm) | 759 | 1,237 |
| Maximum Fire Flow Requirement (gpm) | 3,500 | 3,500 |
| Capacity of 12" Tolt-1 Main @ Velocity of 10 fps (gpm) | 3,500 | 3,500 |
| Capacity of 10" Tolt-2 Main @ Velocity of 10 fps (gpm) | 2,450 | 2,450 |
| Remaining System Capacity (gpm) | 1,691 | 1,213 |
| **Maximum Distribution Capacity (ERUs)** | **18,068** | **15,982** |
| **Maximum System Capacity** | | |
| Based on Limiting Facility (ERUs) | 7,787 | 7,787 |
| **Available System Capacity** | | |
| Maximum System Capacity (ERUs) | 7,787 | 7,787 |
| Existing/Projected ERUs (ERUs) | 3,309 | 5,396 |
| **Remaining System Capacity (ERUs)** | **4,478** | **2,391** |

[1]Note that distribution system leakage is included in the demand estimates.

As shown in Table 8-7, storage is the limiting system capacity factor. The City has sufficient capacity to handle the proposed growth through 2040.

# 8.10 Asset Management

The City actively assesses and plans for the maintenance, repair, and replacement of all its major facilities by building the cost into their annual budget. The City's major facilities include watermains, storage facilities, and source and supply facilities.

The City tracks the age of all facilities through GIS by tagging the install date. The City assumes an expected lifespan of 50 to 75 years for water mains and 75 to 100 years for storage tanks, pump stations, and supply stations. The City has an annual repair and replacement program that replaces its watermains before the end of their expected life.

The City is actively improving its asset management program. As part of this project, Murraysmith conducted a review of the City's current asset management practices. This review, and recommended improvements, is summarized in a technical memorandum is included in Appendix U.

## 8.11 Summary

The City's water system is supplied by a reliable source and includes redundancy and storage which further improves reliability. Our analysis indicates that Duvall's water system has a significant capacity available to accommodate anticipated future growth into 2040 and beyond. The results of the water system analyses presented in this chapter indicate that the overall water system is in good operating condition and will require some improvements to ensure that a high level of service is maintained. Recommended improvements are presented in Chapter 9.

N
W E
S

Snoqualmie River

330 Zone
450 Zone
450 Zone
555 Zone
555 Zone
615 Zone
450 Zone

RIVERVIEW SCHOOL DISTRICT (PRIVATE SYSTEM)

CRESTVIEW ESTATES 0.5 MG RESERVOIR

BIG ROCK ROAD 2.2 MG RESERVOIR

615 ZONE PUMP STATION

TOLT 2 SUPPLY STATION

TOLT 1 SUPPLY STATION

NE WOODINVILLE-DUVALL RD
NE 165TH ST
NE 169TH ST
246TH AVE NE
W SNOQUALMIE RIVER RD NE
DUVALL-WOODINVILLE RD NE
NE CHERRY VALLEY RD
NE 173RD ST
284TH AVE NE
NE 163RD ST
NE ANDERSON ST
NE BERDONHALL ST
NE BIRD ST
NE VIRGINIA ST
NE STEWART ST
NE CHERRY ST
NE STELLA ST
NE STEPHENS ST
NE RING ST
NE RICHARDSON ST
NE VALLEY ST
NE PARK ST
NE TAYLOR ST
NE DOROTHY ST
NE KENNEDY ST
NE KENNEDY DR
NE MILLER ST
NE COMEGYS ST
NE 145TH ST
NE 144TH PL
NE 143RD CT
NE 143RD PL
NE 142ND CT
NE 141ST CT
NE 140TH ST
NE 138TH ST
NE 133RD ST
W SNOQUALMIE VALLEY RD NE
CARNATION-DUVALL RD NE
MAIN ST NE
RAILROAD AVE NE
RIVER RD NE
BROADWAY AVE NE
1ST AVE NE
2ND AVE NE
3RD AVE NE
4TH AVE NE
265TH CT NE
268TH AVE NE
271ST PL NE
272ND PL NE
273RD AVE NE
273RD DR NE
274TH AVE NE
275TH AVE NE
276TH AVE NE
276TH WAY NE
277TH AVE NE
277TH PL NE
280TH AVE NE
280TH PL NE
281ST PL NE
282ND PL NE
283RD PL NE
284TH AVE NE
284TH CIR NE
285TH AVE NE
287TH AVE NE
288TH AVE NE
291ST AVE NE
292ND AVE NE
294TH AVE NE
296TH AVE NE
298TH AVE NE
BATTEN RD NE
ODELL RD
NE BIG ROCK RD
NE RONEY RD
NE 164TH ST
NE 163RD ST
NE 158TH PL
NE 157TH PL
NE 156TH PL
NE 155TH PL
NE 153RD PL
NE 153RD ST
NE 152ND ST
NE 151ST ST
NE 150TH ST
NE 149TH PL
NE 148TH PL
NE 147TH PL
NE 146TH ST
NE 143RD ST
NE 142ND PL
NE 141ST PL
NE 140TH PL
NE 138TH PL
MANION WAY NE
PS

## Legend

- Retail Water Service Area
- Future Water Service Area
- City Urban Growth Area
- City Limits
- PRV
- Zone Valve (Normally Closed)
- Supply Station
- City Tank
- Private Tank
- City PS
- Private PS

Node Pressure

- <30 psi
- 30-50 psi
- 50-80 psi
- >80 psi
- Private Pipe

Pipe Diameter

- <4"
- 6"
- 8"
- 12"
- >=16"

City of Duvall
Small Town. Real Life.

**Figure 8-1**

COMPREHENSIVE WATER SYSTEM PLAN

**Pressure Analysis Results, 2020 PHD**

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N
W E
S

Snoqualmie River

330 Zone
450 Zone
450 Zone
555 Zone
555 Zone
450 Zone
615 Zone

RIVERVIEW SCHOOL DISTRICT (PRIVATE SYSTEM)

CRESTVIEW ESTATES 0.5 MG RESERVOIR

BIG ROCK ROAD 2.2 MG RESERVOIR

615 ZONE PUMP STATION

TOLT 2 SUPPLY STATION

TOLT 1 SUPPLY STATION

PS

NE 169TH ST
NE 165TH ST
NE WOODINVILLE-DUVALL RD
NE 163RD ST
NE ANDERSON ST
NE BERNDONHALL ST
NE BIRD ST
NE VIRGINIA ST
NE STEWART ST
NE CHERRY ST
NE STELLA ST
NE STEPHENS ST
NE RING ST
NE RICHARDSON ST
NE VALLEY ST
NE PARK ST
NE TAYLOR ST
NE DOROTHY ST
NE KENNEDY DR
NE MILLER ST
NE COMEGYS ST
NE 145TH ST
NE 144TH PL
NE 143RD CT
NE 143RD PL
NE 142ND CT
NE 141ST CT
NE 141ST PL
NE 140TH CT
NE 140TH PL
NE 140TH ST
NE 138TH ST
NE 133RD ST
NE 173RD ST
NE CHERRY VALLEY RD
NE 153RD PL
NE 152ND PL
NE 151ST
NE 151ST ST
NE 150TH PL
NE 149TH LN
NE 148TH PL
NE 147TH PL
NE 146TH PL
NE 145TH PL
NE 147TH
NE 147TH PL
NE 156TH PL
NE 157TH PL
NE 153RD LN
NE 153RD PL
NE 152ND ST
NE 151ST PL
NE 149TH PL
NE 148TH PL
NE 147TH CT
NE 146TH ST
NE 145TH CT
NE 143RD ST
NE 142ND PL
NE 141ST
NE 140TH PL
NE 138TH PL
NE ROMEO RD
284TH CIR NE
NE BIG ROCK RD
W SNOQUALMIE RIVER RD NE
NE WOODINVILLE-DUVALL RD
W SNOQUALMIE VALLEY RD NE
CARNATION-DUVALL RD NE
MAIN ST NE
1ST AVE NE
2ND AVE NE
3RD AVE NE
4TH AVE NE
BROADWAY AVE NE
RAILROAD AVE NE
RIVER DR NE
ALLEN ST NE
246TH AVE NE
247TH AVE NE
261ST AVE NE
263RD AVE NE
265TH AVE NE
268TH AVE NE
272ND AVE NE
273RD AVE NE
274TH AVE NE
275TH AVE NE
276TH AVE NE
276TH WAY NE
277TH AVE NE
280TH AVE NE
284TH AVE NE
285TH AVE NE
286TH AVE NE
287TH AVE NE
292ND AVE NE
294TH AVE NE
296TH AVE NE
298TH AVE NE
284TH AVE NE
BATTEN RD NE

## Legend

- Retail Water Service Area
- Future Water Service Area
- City Urban Growth Area
- City Limits
- PRV
- Zone Valve (Normally Closed)
- Supply Station
- City Tank
- Private Tank
- City PS
- Private PS

Available Fire Flow (gpm)

- <1,000
- 1000 - 1750
- 1750 - 2500
- 2500 - 3000
- 3000 - 3500
- >3,500
- Private Pipe

Pipe Diameter

- <4"
- 6"
- 8"
- 12"
- >=16"

City of Duvall
Small Town. Real Life.

**Figure 8-2**

COMPREHENSIVE WATER SYSTEM PLAN

**2020 Available Fire Flow, MDD**

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# Section 9

Chapter 9

# Water System Improvements

## 9.1 Introduction

This chapter presents water system improvements that the City plans to implement within the 20-year planning period to resolve existing system deficiencies and meet the future demands of the water system. The water system improvements recommended in this chapter consider system deficiencies described in Chapter 8 as well as the City's knowledge of what facilities need to be maintained, renovated, or replaced. Recommended improvements have been sized to accommodate the projected demands shown in Chapter 4 and to meet the design standards and policies described in Chapter 5.

This chapter compiles this list of improvements into a Capital Improvement Program (CIP) with planning-level project cost estimates and an implementation schedule. The CIP will help guide the City's project planning efforts and annual budgeting process.

## 9.2 Water System Improvements Completed Since 2012

Since the last Comprehensive Water System Plan was prepared in 2012, the City has spent considerable time and expense improving their water system. The City, and development within the City, added or replaced approximately 25,730 linear feet of water main in the system. This includes construction of seven new residential developments within its service area. The City conducted monitoring of its Taylor's Landing Well, conducted seismic evaluations of its Crestview and Big Rock Road reservoirs, and replaced mobile home park master meter with individual meters. The City also continued several programs including its conservation and leak detection program, water reclamation review, cross-connection control program, and updating its comprehensive water system plan.

A more detailed summary of the water system improvements completed since 2012 is presented in Table 9-1.

## Table 9-1
## Water System Improvements Completed Since 2012

| 2013 CWSP CIP No. | Project Description |
|---|---|
| R1 | Replaced existing Stella St main with 930 linear feet of 8-inch main |
| R2 | Replaced existing NE Stella St main with 700 linear feet of 8-inch main. |
| R3 | Replaced existing NE Kennedy Dr main with 680 linear feet of 8-inch main. |
| L1 | Constructed 1,600 linear feet of 8-inch piping to improve 450 zone looping. |
| L2 | Constructed 2,140 linear feet of 12-inch piping to loop 330 zone with 12-inch DI, abandoned associated PRV. |
| L4 | Installed 380 linear feet of 12-inch DI pipe to create looping on NE Stephens St. |
| 276th Pl NE Looping | Installed 350 linear feet of 8-inch DI pipe to create looping between NE 151st Pl and NE 153rd Ln on 276th Pl NE. |
| Cherry Valley Elementary Fire Service | Installed 6-inch DI main to provide fire service to Cherry Valley Elementary School. |
| D2 Included in Ridge at Big Rock Development | Installed 6,170 linear feet of 8 and 12-inch DI pipe to provide service and improve zone circulation as part of private development. Replaced 10" AC main in 450 zone. |
| D4 | Installed 5,450 linear feet of 6 and 8-inch DI pipe to provide service to North Hill Development |
| D6 | Installed 300 linear feet 12-inch DI pipe to create looping along Main St NE. |
| D7 | Installed 1,140 linear feet of 8-inch DI pipe to replace existing 6" AC main. |
| D8 | Installed 1,230 linear feet of 12-inch pipe as part of the replacement for the existing 10-inch AC main in the 450 zone. |
| Willow Ridge Development | Installed 1,660 linear feet of 8 and 12-inch DI pipe to provide service and improve looping at the Willow Ridge Development. |
| Sunset Court Development | Installed 710 linear feet of 8-inch DI pipe to provide service to Sunset Court Development. |
| F1 | Monitored the Taylor's Landing Well to ensure the well's water supply is properly protected. This task included ongoing monitoring, testing and additional wellhead protection efforts at the Taylor's Landing Well. |
| F2 | Conducted a seismic evaluation to determine the Crestview Reservoir's ability to withstand a seismic event and identified required seismic improvements. The reservoir was not recoated as part of this project, and the recoating will be carried over to the new CIP list. |
| F9 | Replaced bulk mobile home park meter with individual meters to improve billing data and increase available flow and water quality by allowing multi-directional flow through mobile home park main. |
| CW1 | Continued its water main replacement program to reduce the amount of older and potentially leaking water mains, while also implementing a comprehensive leak detection/water main repair program to reduce the amount of unaccounted-for water. The City performed other ongoing water use efficiency measures, including public education programs. |
| CW2 | Continued to review of the potential uses of the City's Wastewater Treatment Plant effluent for irrigation and other non-potable applications throughout the City. |
| CW3 | Continued the City's Cross Connection Control Program. Expanded of the program from high risk premises and to include low and medium premises based on potential risk to the water system and budget availability. Conduct other cross-connection control program requirements as outlined in the Cross-Connection Control Program. |
| CW4 | Updated the City's 2012 Water System Plan to meet all updated requirements. |

### 9.2.1 New Water System Improvements

The water system improvements identified from the results of the distribution and transmission system analyses in Chapter 8 are listed in Table 9-2. The table also includes a brief description of each improvement and the deficiency it resolves. Most of the improvements are necessary to resolve existing system deficiencies. The locations of improvements are shown in Figure 9-1 and schematically in Figure 9-2.

The water system improvements are grouped into the following project type categories: Water Main Replacements (CIP R1 – R3), Water Main Looping (CIP L1 – L2), Developer Improvements (CIP D1 – D6), Facility Improvements (CIP F1- F9), and City-wide Programs (CIP CW1 – CW7).

## Table 9-2
## Capital Improvement Program Projects

| ID Num | Project Location or Name | Project Limits | Existing Deficiency | Proposed Improvement | Est Length (ft) | Estimated Cost |
|---|---|---|---|---|---|---|
| WATERMAIN REPLACEMENT | | | | | 4,580 | $2,322,000 |
| R1 | Tolt 2 Supply Line | NE Big Rock Rd. to Tolt 2 Supply Station | The existing transmission main is constructed of aging 10-inch asbestos-cement pipe, is undersized to meet future system needs, and is located within an easement that is difficult to access for maintenance and repairs. | This project will replace the existing water main with a new 12-inch ductile iron, or High-Density Polyethylene (HDPE) water main along 274th Avenue NE from NE Big Rock Road to the Tolt 2 Supply Station. The new pipe will increase system capacity for future growth and improve the reliability of this vital transmission line. Horizontal Directional Drilling or other non-standard installation method may be required because of sensitive areas at the site. | 2,950 | $1,800,000 |
| R2 | Bruett Road | 3rd Ave NE to 3rd PL NE | Aged water main replacement | This project will replace the existing 8-inch piping with new 12-inch along Bruett Road and 8-inch DI water main from Stephens St to Stella St. This pipe is either AC or PVC pipe. Recommend potholing prior to starting project. | 800 | $193,000 |
| R3 | 1st Avenue NE | NE Stephens Street to NE Valley Street | Insufficient flow, looping, and water quality | This project will replace the existing undersized water main with a new 8-inch ductile iron, or HDPE water main along 1st Ave NE from NE Valley St to NE Ring St. The new pipe will improve flow and water quality in the area. | 830 | $329,000 |
| LOOPING | | | | | 4,980 | $2,183,000 |
| L1 | 1st Avenue NE | NE Virginia Street to NE Stephens Street | Dead ends with insufficient looping, flow, and water quality | This project will install 8-inch DI looping to improve flow and water quality to the area. | 280 | $111,000 |
| L3 | Batten Road NE | NE 140th PL to NE Big Rock Road | Dead ends with insufficient looping, flow, and water quality | This project will install 12-inch DI looping to improve flow and water quality to the area. | 4,700 | $2,072,000 |
| DEVELOPER IMPROVEMENTS | | | | | 11,500 | $3,388,000 |
| D1 | 272nd Place NE | NE Kennedy St. to NE Miller St. | Water line dead ends resulting in poor quality and circulation, and lack of service | Install 8-inch DI looping to provide service and improve zone circulation as part of private development. Decommission PRV at NE Miller St/272nd Ave NE | 1,000 | $231,000 |
| D2 | 1st Ave | NE 145th St. to NE 143rd PL | Water line dead ends resulting in poor quality and circulation, and lack of service | Install 8-inch DI looping to provide service and improve zone circulation as part of private development. | 3,500 | $800,000 |
| D3 | 275th Ave NE | NE 155th Ave, Manion Way NE, City Limits, 271st Ave NE | Water line dead ends resulting in poor quality and circulation, and lack of service | Install 12-inch DI looping to provide service and improve zone circulation as part of private development. Revise 555 Zone to extend to 271st Ave NE/NE Stewart Street. Install normally closed valves at 450 and 330 Zone connections. Separation between zones shall include closed valves, PRV's, or dead-end mains as determined by an evaluation of the existing system and proposed development to be completed prior to annexation and preliminary plat approval. | 5,300 | $1,661,000 |
| D4 | Main Street NE | NE Bird Street to NE Beadonhall Street | Water line dead ends resulting in poor quality and circulation, and lack of service | Install 12-inch DI looping to provide service and improve zone circulation as part of private development. | 400 | $161,877 |
| D5 | Duvall Highlands | NE 142nd PL at Duvall Highlands | Proposed developer improvements | Install 12-inch DI pipe for development. | 650 | $271,000 |
| D6 | Thayer Development | NE 146th Pl and 1st Ave NE | Proposed developer improvements | Install 12-inch DI pipe for development. | 650 | $277,000 |

## Table 9-2 (continued)
## Capital Improvement Program Projects

| ID Num | Project Location or Name | Project Limits | Existing Deficiency | Proposed Improvement | Proposed Improvement $7,711,000 |
|---|---|---|---|---|---|
| FACILITIES | | | | | |
| F1 | Decommission 485 Zone | 485 Zone | Insufficient looping and dead-end zone | This project will remove 555/485 PRV's on NE Big Rock Road and 275th Ave NE to convert 485 Zone to 555 Zone and reconfigure existing NE Big Rock Road/275th Ave NE pressure relief station to a 555/450 PRV. | $220,000 |
| F2 | Crestview Estates 0.5 MG Reservoir Improvements | 0.5 MG Reservoir | Based on the findings of the City's 2014 Reservoir Evaluations and Recommendations study, the Crestview Estates Reservoir will require extensive seismic and structural improvements as well as changes to its operations. It may be more beneficial for the City to rebuild the Crestview Reservoir. | This project assumes the replacement of the Crestview Estates Reservoir with a new 0.5 MG standpipe. Prior to implementation of this project, it is recommended that storage analyses be conducted to identify if a larger reservoir at this site is more beneficial to meet the City's overall long-term storage needs of the system. | $2,733,000 |
| F3 | Big Rock Road 2.2 MG Reservoir Improvements | 2.2 MG Reservoir | Based on the findings of the City's 2014 Reservoir Evaluations and Recommendations study, the Big Rock reservoir does not require any seismic improvements but will need to be recoated. Inlet / Outlet improvements will improve water turnover within the reservoir. | This task involves recoating the interior and exterior coating of the 2.2 MG reservoir and is anticipated to take place between 2021 and 2022. This project also contains inlet/outlet improvements. These improvements will improve water turnover within the reservoir, which would enable the City to operate it at higher levels and provide a larger volume of usable storage. Implementation of this improvement will increase the amount of available storage, which in turn enables the City to serve a larger number of new connections, since storage is the limiting facility in the City's water system, as shown in the capacity analysis in Chapter 8. | $1,661,000 |
| F4 | Pump Station Improvements | 615 Zone Booster Pump Station | The reservoir currently has a single inlet/outlet pipe for flow into and out of the reservoir, which prevents optimum turnover and water quality. The lack of turnover in the reservoir and potential for loss of chlorine residual, forces the reservoir to operate at a low level, which prevents full utilization of its available storage capacity. In addition, the reservoir may not have sufficient restraint to withstand seismic events. | As a result of revisions to DOH's definition of a pump station's "firm capacity," the City's 615 Zone Pump Station has of insufficient supply capacity to meet the demands. This project is anticipated to be completed by 2021. This project will increase the capacity of the pump station by adding a fourth pump in the available pump bay and replacing one or more of the other three pumps, as necessary; to optimize the operation of the pump station for meeting the future increased demand of the 615 Zone. The pump improvements will also require improvements to the electrical system and modifications to the telemetry and control system. The sizing of the pump and electrical improvements will be accomplished during the preliminary design phase of the project. The capacity of the pump station will need to be increased by as much as 1,200 gpm to meet the 615 Zone demands in the year 2040. However, since the need for the improvement depends on the timing and amount of development in the 615 Zone, it is prudent to evaluate the 615 Zone supply requirements every few years. | $238,000 |
| F5 | Supply Station Improvements | Tolt 1 | | This project would increase the tap diameter and metering at the SPU source. The project will also provide improvements to adequately drain the existing vaults. The sump pump in the existing vault would be replaced, if necessary, to reduce the frequency of standing water in the bottom of the vaults. The SPU tap and meter will be upsized, if required. | $291,000 |
| F6 | Supply Station Improvements | Tolt 2 | | This project would increase the tap diameter and metering at the SPU source. The project will also provide improvements to adequately drain the existing vaults. The sump pump in the existing vault would be replaced, if necessary, to reduce the frequency of standing water in the bottom of the vaults. The SPU tap and meter will be upsized, if required. | $279,000 |
| F7 | Telemetry and Control Improvements | System Wide | The existing system is difficult to operate, requires too much manual intervention, and is not optimized. The existing telemetry system is not fully operational and is not currently set up to provide data collection and alarm notification at all facilities. | This project will provide a new SCADA system to enable a more simplified, automated control of the water system facilities with reduced operations costs. The SCADA system will monitor the Tolt1 and Tolt 2 supply stations, the 0.5 MG and 2.2 MG reservoirs, the 615 Zone Booster Pump Station, the PRV sites, and the chlorine monitoring sites. It will also entail a new telemetry system to allow communication between sites. | $439,000 |
| F8 | Taylors Landing Well Arsenic Treatment | Taylors Landing Well | Arsenic in water supply, making it non-potable. | This project involves the installation of treatment equipment so that the City could use this well as potable water supply in the case of an emergency. | $650,000 |
| F9 | Water Department Building | Admin Building for Water Department | Provide an updated facility for water department employees. | This project would include a building remodel, followed by the construction of an updated office space for water department staff. This office space may be a standalone building or part of a larger building housing other City staff. | $1,200,000 |

## Table 9-2 (continued)
## Capital Improvement Program Projects

| ID Num | Project Location or Name | Project Limits | Existing Deficiency | Proposed Improvement | Proposed Improvement |
|---|---|---|---|---|---|
| CITYWIDE PROGRAM | | | | | $1,510,000 |
| CW1 | Conservation and Leak Detection | System Wide over 20-year plan | On-going required conservation and leak detection | This task involves the City continuing its water main replacement program to reduce the amount of older and potentially leaking water mains, while also implementing a comprehensive leak detection/water main repair program to reduce the amount of unaccounted-for water. The City will perform other ongoing conservation measures, including public education programs, as outlined in the Water Use Efficiency Plan included in **Appendix G**. Several water conservation measures must also be conducted on an ongoing basis to comply with State conservation requirements. | $210,000 |
| CW2 | Water Reclamation | System Wide over 20-year plan | On-going required water reclamation evaluation and improvements | This task involves the ongoing review of the potential uses of the City's Wastewater Treatment Plant effluent for irrigation and other non-potable applications throughout the City. Treated water produced at the City's Wastewater Treatment Plant may provide an opportunity for the City to use reclaimed water to supplement existing water supply from SPU for irrigation and other non-potable applications. | $105,000 |
| CW3 | Cross Connection Control | System Wide over 20-year plan | On-going required cross-connection evaluation and improvements | This task involves the expansion of the program from high risk premises and to include low and medium premises also. The City has an updated ordinance, facility risk inventory, and cross-connection control program that meets current Washington State requirements for potential high-risk cross-connections premises. The City will conduct other cross-connection control program requirements as outlined in the Cross-Connection Control Program. | $105,000 |
| CW4 | Comprehensive Plan | System Wide, every 10 years | On-going required comprehensive plan updates | This task involves the update of the Comprehensive Water System Plan every ten years to meet the requirements that are in effect at the time of the update. WAC 246-290-100 requires the City to update its Comprehensive Water System Plan every ten years and submit to the Department of Health for review and approval. Drinking water regulations are continuously changing and must be addressed in the City's Comprehensive Water System Plan. | $675,000 |
| CW5 | Risk and Resiliency Plan | System Wide, every 5 yeas | Need for emergency response planning and asset risk and resilience planning | This task involves the creation of a Risk and Resilience Assessment (RRA) per the Water Infrastructure Act of 2018 and an update to the City's existing Emergency Response Plan (ERP). Both the RRA and ERP are required to be reviewed and updated at least every 5 years. | $100,000 |
| CW6 | GIS Asset Management Program | System Wide over 20-year plan | On-going improvements to flushing, valve operating, and leak detection programs | This task involves the ongoing improvement of its Asset Management program, allowing the City to better plan for the repair and replacement of its facilities. The City will perform ongoing measures such as assessing its facilities and tracking their maintenance needs. Additional measures are discussed in the Asset Management Technical Memorandum included in **Appendix U.** | $210,000 |
| CW7 | Well Protection Program | Taylors Landing Well | On-going required groundwater protection program for groundwater wells. | The Taylor's Landing Well must be monitored to ensure the well's water supply is properly protected. This task includes ongoing monitoring, testing and additional wellhead protection efforts at the Taylor's Landing Well. | $105,000 |

## 9.3 Project Cost Estimates

Project costs were estimated for each of the planned improvements and are presented in 2020 dollars. The planning-level project cost estimates include the estimated construction cost and indirect costs. The construction cost estimate portion includes:

- All construction related costs,
- Sales tax
- Contingency (20 percent).

The indirect cost portion is estimated at 35 percent of the construction cost and is included to provide a budget amount for:

- Engineering (preliminary design, final design, and construction management services),
- Surveying,
- Permitting,
- Legal,
- Administrative services.

### 9.3.1 Water Main Cost Estimates

Construction costs for water main projects are based on estimates of all construction-related improvements, which include materials and labor for the water main installation, water services, fittings, valves, connections to the existing system, trench restoration, asphalt surface restoration, and other work for a complete installation. Appendix T includes a detailed summary of the methodology behind cost estimating for water main CIPs.

## 9.4 Prioritizing Improvements

The planned improvements were prioritized using established criteria to help guide the City with scheduling and budgeting water system improvement projects in future years.

A description of the prioritization criteria is provided below.

### 9.4.1 Prioritizing Water Main Improvements

Table 9-3 shows the criteria used for prioritizing the water main improvements. The criteria are based on the existing water main deficiencies, as determined by the categories shown in the table. Each category is assigned a weight factor that reflects the relative importance of each category compared to the others. The Existing Water Main Fire Flow Capability category ranks the water main improvements based on the ability of the existing water mains to provide the required fire flow, as determined from the results of the hydraulic analyses presented in Chapter 8. The Existing Water Main Year of Installation and Existing Water Main Material categories rank the water main improvements based on the existing pipe age and material. The Existing Water Main Benefit Area

category ranks the water main improvements based on the size of the area that will benefit from the water main improvements.

The water main priority ranking criteria was applied to each water main improvement project, which resulted in a total ranking score for each project. The results of the priority ranking are summarized in Table 9-4. Table 9-5 presents the results in an order that is sorted according to total ranking points.

## Table 9-3
## Water Main Improvements Priority Ranking Criteria

| Points | Category | Weight Factor | Weighted Points |
|---|---|---|---|
| Existing Water Main Year of Installation | | | |
| 3 | Before 1970 | 3 | 9 |
| 2 | 1970 - 1985 | 3 | 6 |
| 1 | 1985 & after | 3 | 3 |
| Existing Water Main Material | | | |
| 3 | Asbestos Cement | 2 | 6 |
| 2 | Galvanized Iron, Steel, or Cast Iron | 2 | 4 |
| 1 | PVC or Ductile Iron | 2 | 2 |
| Existing Water Main Benefit Area | | | |
| 3 | Large Benefit Area (i.e., Transmission Main) | 2 | 6 |
| 2 | Medium Benefit Area | 2 | 4 |
| 1 | Small Benefit Area (i.e., Localized Area) | 2 | 2 |

## Table 9-4
## Water Main Improvements Priority Ranking – Sorted by CIP Number

| CIP No. | Pipe Year Points | Pipe Material Points | Benefit Area Points | Priority Rank Total Points | Priority Rank Total Ranking |
|---|---|---|---|---|---|
| R1 | 9 | 6 | 6 | 21 | High |
| R2 | 6 | 1 | 2 | 9 | Low |
| R3 | 6 | 2 | 6 | 14 | Medium |
| L1 | 0 | 0 | 4 | 4 | Low |
| L3 | 0 | 0 | 6 | 6 | Low |

Table 9-5
Water Main Improvements Priority Ranking – Sorted by Total Points

| CIP No. | Pipe Year Points | Pipe Material Points | Benefit Area Points | Priority Rank Total | |
|---|---|---|---|---|---|
| | | | | Points | Ranking |
| R1 | 9 | 6 | 6 | 21 | High |
| R3 | 6 | 2 | 6 | 14 | Medium |
| R2 | 6 | 1 | 2 | 9 | Low |
| L3 | 0 | 0 | 6 | 6 | Low |
| L1 | 0 | 0 | 4 | 4 | Low |

### 9.4.2 Prioritizing Other Improvements

All other improvements were prioritized based on project need, maintenance requirements, existing deficiencies, capacity requirements, and reliability considerations. The results of the priority ranking of the water main and all other improvements were used to schedule the improvements, as presented in the section that follows.

## 9.5 Schedule of Improvements

The results of prioritizing the improvements were used to assist in establishing an implementation schedule that can be used by the City to assist in the planning and budgeting of capital improvement projects for the Water Utility. The implementation schedule shown in Table 9-6 includes the previously described water main improvements and all other improvements described earlier in this chapter that are planned in the next 20 years.

The prioritization evaluation is a useful scheduling tool, but cannot account for real-time or real-world changes which may create opportunities for projects to necessarily be constructed out of order.

Some examples of this include, funding opportunities like grants or loans, developer potential, property ownership changes or acquisitions, and other Capital needs of the City and its related utilities or departments. Staff and Managers of the water system should carefully review opportunities and make adjustments as deemed appropriate.

The project cost estimates shown in the table are based on 2020 dollars for all years shown. These cost estimates will be adjusted by the City at the time of project implementation to include an escalation factor that represents inflation and the construction market conditions anticipated at the actual time of construction. The financial program in Chapter 10 describes in more detail the escalation factor to be used for future project cost adjustments.

## Table 9-6
## Planned Improvements Implementation Schedule

| ID Num | Description | Water Main Priority | Estimated Project Cost (2020 x$1,000) | 20-Year Schedule of Improvements Planned Year of Project and Estimated Cost in 2020 (x$1,000) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WATERMAIN REPLACEMENT | | | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031-40 |
| R1 | 12" Tolt 2 Supply Line from Tolt Supply Station to NE Big Rock Rd | High | $1,800 | $270 | $810 | $720 | | | | | | | | | |
| R2 | 8" Water Main in Bruett Rd from 3rd Ave NE to 3rd Pl NE | Low | $193 | | | | | | | | | | | | $193 |
| R3 | 8" Water Main in 1st Ave from NE Stephens to NE Valley Street | Medium | $329 | | | | | | $329 | | | | | | |
| LOOPING | | | | | | | | | | | | | | | |
| L1 | 8" Water Main in 1st Ave from NE Virginia Street to NE Stephens | Low | $111 | | | | | | | | | | $111 | | |
| L2 | 12" Water Main in Batten Rd NE from NE 140th Pl to Big Rock Rd | Low | $2,072 | | | | | | | $518 | $1,036 | $518 | | | |
| FACILITIES | | | | | | | | | | | | | | | |
| F1 | Remove 555/485 PRV's on NE Big Rock Road and 275th Ave NE to convert 485 Zone to 555 Zone and reconfigure existing NE Big Rock Road/275th Ave NE pressure relief station to a 555/450 PRV. | | $220 | | $220 | | | | | | | | | | |
| F2 | Crestview Estates Reservoir Improvements and Recoating | | $2,733 | | | | | | | | | | | $547 | $2,186 |
| F3 | Big Rock Road Reservoir Re-coating and Inlet/ Outlet Improvements | | $1,661 | | $415 | $831 | $415 | | | | | | | | |
| F4 | 615 Zone Pump Station Improvements | | $238 | | $60 | $179 | | | | | | | | | |
| F5 | Tolt 1 Supply Station Improvements | | $291 | | | | | $291 | | | | | | | |
| F6 | Tolt 2 Supply Station Improvements | | $279 | | | | | $279 | | | | | | | |
| F7 | Telemetry and Control Improvements | | $439 | $39 | $400 | | | | | | | | | | |
| F8 | Taylors Landing Well Arsenic Treatment | | $650 | | | | | | | | | | | | $650 |
| F9 | Water Department Building | | $1,200 | | | $200 | | | | | | | | | $1,000 |
| CITYWIDE PROGRAM | | | | | | | | | | | | | | | |
| CW1 | Conservation and Leak Detection | | $210 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $100 |
| CW2 | Water Reclamation | | $105 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $50 |
| CW3 | Cross Connection Control | | $105 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $50 |
| CW4 | Comprehensive Plan | | $674 | $175 | $50 | | | | | | | | | $225 | $225 |
| CW5 | Risk and Resiliency Plan | | $100 | $20 | | | | | $20 | | | | | $ 20 | $40 |
| CW6 | GIS Asset Management Program | | $210 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $10 | $100 |
| CW7 | Well Protection Program | | $105 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $5 | $50 |
| Total Annual Cost (note - average cost per year is shown for years beyond 2030) | | | $13,726 | $539 | $1,990 | $1,964 | $450 | $605 | $384 | $553 | $1,071 | $553 | $146 | $827 | $464 |

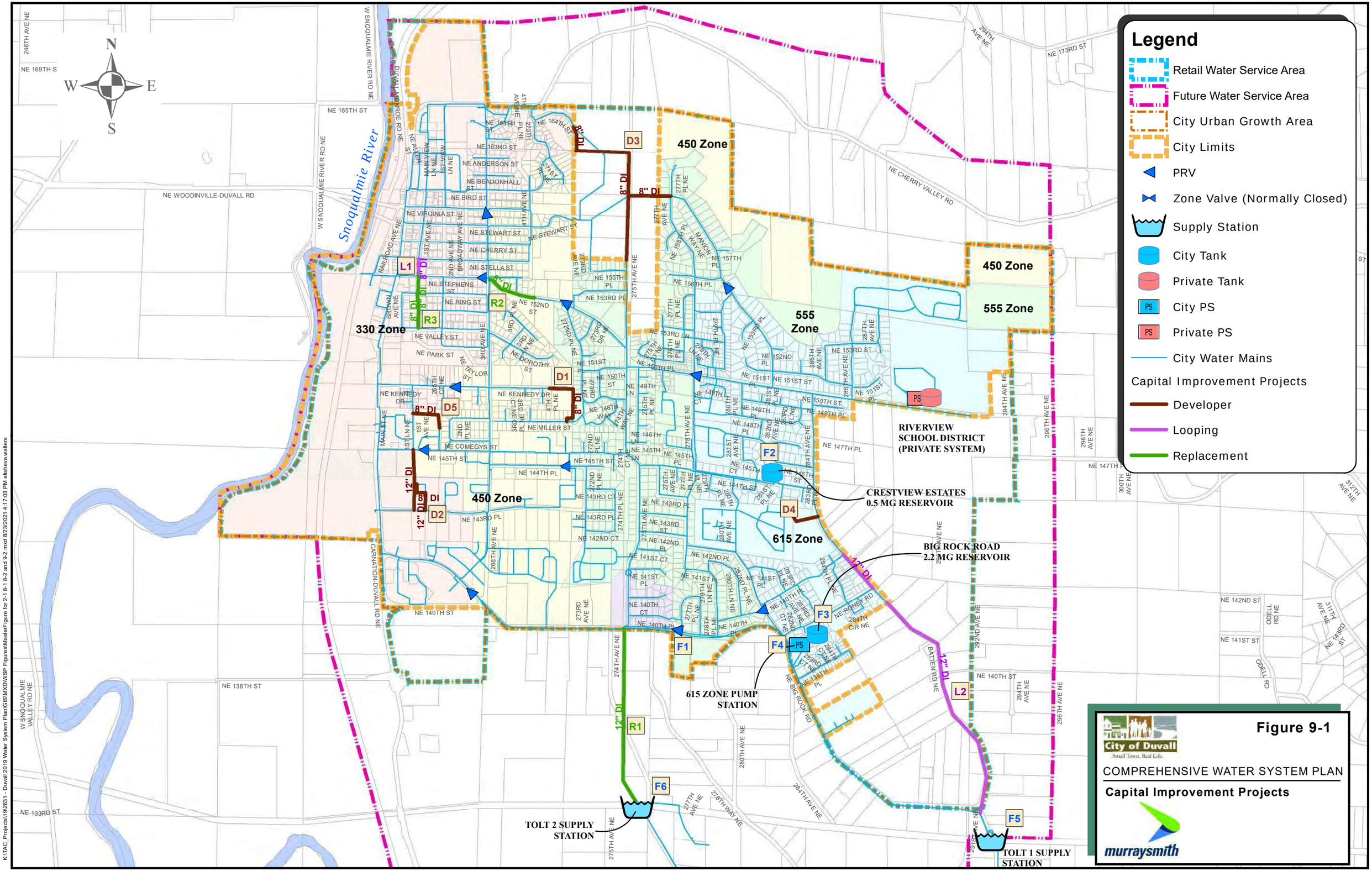


**Figure 9-1**

City of Duvall
Small Town. Real Life.

COMPREHENSIVE WATER SYSTEM PLAN

**Capital Improvement Projects**

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NORTH

SOUTH

700

600

500

400

300

Approximate SPU Tolt Supply Variation

Riverview School District Connection (Private System)

615 Zone

615 Zone

555 Zone

555 Zone

450 Zone

450 Zone

330 Zone

330 Zone

PRS (Manion Wy)

PRS (NE 150th St)

4" Altitude Valve with Backpressure Sustaining

0.5 MG CRESTVIEW ESTATES RESERVOIR
Diameter: 37.7'
Base Elev: 496'
8,400 GAL/FT

OE = 556'

PRS (NE 140th Pl)

TOLT 1 SUPPLY STATION (Big Rock Road)

8" Electronic Control Valve

4" Electronic Control Valve

TOLT 2 SUPPLY STATION (275th Ave)

10" Electronic Control Valve

4" Electronic Control Valve

6" Altitude Valve

615 ZONE PUMP STATION

6" Pressure Relief Valve

OE = 450.5'

2.2 MG BIG ROCK ROAD RESERVOIR
Diameter: 138'
Base Elev: 430'
111,000 GAL/FT

PRS (NE 152nd St/Bruett Rd)

PRS (Miller St)

PRS (NE 144th Pl)

PRS (NE 143rd Pl)

Pressure Relief (Big Rock Rd)

PRS (Virginia St)

PRS (Stephens St)

PRS (Kennedy St)

PRS (NE 145th St)

PRS (NE 143rd St)

PRS (Big Rock Rd–Safeway)

Pressure Relief (Railroad Ave NE)

Pressure Relief (Main St NE)

## LEGEND

- 615 ZONE
- 555 ZONE
- 485 ZONE
- 450 ZONE
- 330 ZONE
- ADJACENT SYSTEM
- FACILITIES AT SAME SITE
- PUMP STATION
- PRESSURE REDUCING STATION/VALVE
- CONTROL VALVE
- MASTER METER
- PRESSURE RELIEF STATION/VALVE

## ABBREVIATIONS

| | |
|---|---|
| ELEV | ELEVATION |
| FT | FEET |
| GAL | GALLONS |
| MG | MILLION GALLONS |
| OE | OVERFLOW ELEVATION |

August 2021

**Figure 9-2**

City of Duvall
Small Town. Real Life.

COMPREHENSIVE WATER SYSTEM PLAN

**PROPOSED WATER SYSTEM HYDRAULIC PROFILE**

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K:\TAC_Projects\19\2631 – Duvall 2019 Water System Plan\CAD\Figures\19-2631-300-WA-FIG 9-2.dwg Figure 9-2 8/16/2021 11:23 AM ELISHEVA.WALTERS 23.0s (LMS Tech)

murraysmith

# Section **10**

Chapter 10

# Financial Plan

## 10.1 Introduction

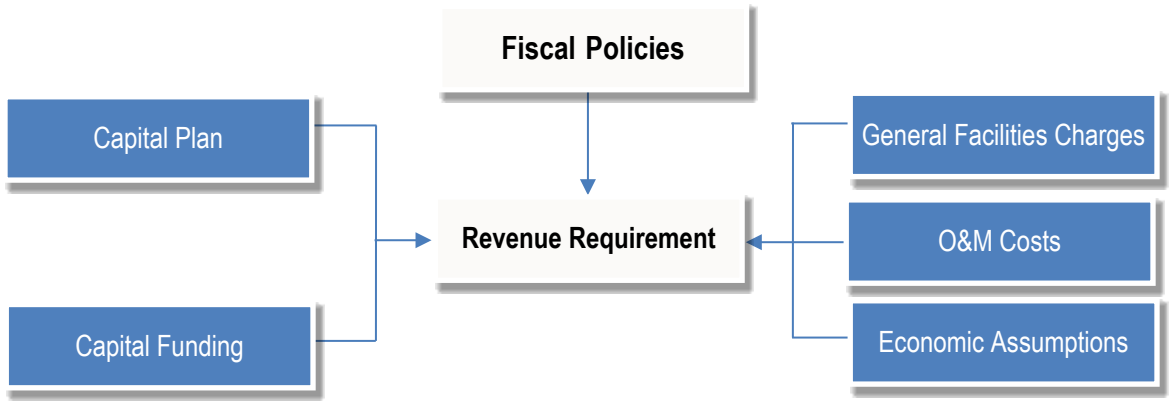
### 10.1.1 Utility Background

The City of Duvall (City) water utility covers a service area of over three square miles. The utility is responsible for maintaining approximately 42 miles of water transmission and distribution pipes, two reservoirs with 2.7 MG of storage capacity, and 5 pressure zones with 15 pressure-reducing stations. Revenue to fund the water system includes monthly water fees and general facilities charges (connection charges). Completion of this rate study was done in coordination with the development of the Duvall Water System Plan.

### 10.1.2 Revenue Requirement

The main purpose of this study is to develop a funding plan ("revenue requirement") for the City's water utility for the 2021-2030 study period, which aligns with the first ten years of the City's twenty-year capital improvement program (CIP). A full twenty-year forecast was also performed and is shown in Appendix U. The revenue requirement identifies the total revenue needed to fully fund the utility on a standalone basis considering current financial obligations and future capital expenditures identified in the CIP. Rate revenue increases are applied "across-the-board" for the utility; there were no rate design changes incorporated in this study.

Figure 10-1: Revenue Requirement Overview



## 10.2 Financial History

This section includes a historical summary of financial performance as reported on the City's C-4 Statement (*Fund Resources and Uses Arising from Cash Transactions)* for the water utility. Comparative statements for the previous six years (2014 through 2019) are summarized in **Table 10-1,** which covers beginning reserves, revenues, expenses, and ending reserves for each year.

### Table 10-1: Fund Resources & Uses from Cash Transactions (C-4 Statement)

| C-4 Statement: 401 Water Fund | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| **Beginning Cash and Investments** | | | | | | |
| 30810 Reserved | $ 644,821 | $ 657,717 | $ - | $ 680,269 | $ - | $ - |
| 30880 Unreserved | 2,143,467 | 2,197,242 | 3,130,298 | 2,535,784 | 3,920,953 | 4,629,784 |
| **Total Beginning Cash and Investments** | **$ 2,788,288** | **$ 2,854,959** | **$ 3,130,298** | **$ 3,216,053** | **$ 3,920,953** | **$ 4,629,784** |
| **Operating Revenue** | | | | | | |
| 340 Charges for Goods and Services | $ 1,673,069 | $ 1,847,267 | $ 2,067,964 | $ 2,003,035 | $ 1,995,423 | $ 1,977,909 |
| 350 Fines and Penalties | 72,189 | 73,288 | 72,708 | 57,900 | 60,450 | 57,618 |
| 360 Miscellaneous Revenues | 31,295 | 37,578 | 48,128 | 682,954 | 432,625 | 548,766 |
| **Total Operating Revenue** | **$ 1,776,553** | **$ 1,958,133** | **$ 2,188,800** | **$ 2,743,889** | **$ 2,488,498** | **$ 2,584,293** |
| **Operating Expenses** | | | | | | |
| 530 Utilities | $ 1,347,685 | $ 1,479,020 | $ 1,469,269 | $ 1,646,619 | $ 1,641,841 | $ 1,811,493 |
| **Total Operating Expenses** | **$ 1,347,685** | **$ 1,479,020** | **$ 1,469,269** | **$ 1,646,619** | **$ 1,641,841** | **$ 1,811,493** |
| **Nonoperating Revenues** | | | | | | |
| 370-380, 395 & 398 Other Financing Sources | $ 35,145 | $ 143,780 | $ - | $ - | $ - | $ - |
| **Total Nonoperating Revenues** | **$ 35,145** | **$ 143,780** | **$ -** | **$ -** | **$ -** | **$ -** |
| **Nonoperating Expenditures** | | | | | | |
| 591-593 Debt Service | $ 273,467 | $ 279,543 | $ 224,836 | $ 15,680 | $ - | $ - |
| 594-595 Capital Expenditures | 56,642 | 24,647 | 74,638 | 63,022 | 93,860 | 465,603 |
| 597 Transfers-Out | 67,232 | 43,365 | 334,056 | 313,667 | 43,969 | (1) |
| **Total Nonoperating Expenditures:** | **$ 397,341** | **$ 347,555** | **$ 633,530** | **$ 392,369** | **$ 137,829** | **$ 465,602** |
| **Net Increase (Decrease) in Cash and Investments** | **$ 66,672** | **$ 275,338** | **$ 86,001** | **$ 704,901** | **$ 708,828** | **$ 307,198** |
| **Ending Cash and Investments** | | | | | | |
| 5081000 Reserved | $ 657,717 | $ 668,240 | $ 680,269 | $ - | $ - | $ - |
| 5088000 Unreserved | 2,197,242 | 2,462,058 | 2,536,032 | 3,920,955 | 4,629,784 | 4,936,987 |
| **Total Ending Cash and Investments** | **$ 2,854,959** | **$ 3,130,298** | **$ 3,216,301** | **$ 3,920,955** | **$ 4,629,784** | **$ 4,936,987** |

Some observations are provided below:

- The City paid off its existing water utility debt obligations in 2017.
- Average annual capital expenditures from 2014 to 2019 were approximately $130,000.
- Charges for goods and services have increased from $1.7 million to approximately $2.0 million from 2014 to 2019, for an annual growth rate of approximately 3.4 percent.
- Operating expenditures have steadily increased from $1.3 million to $1.8 million in 2019, for an annual growth rate of approximately 6.1 percent.

- The City increased its ending cash and investments from $2.9 million in 2014 to $4.9 million in 2019 – an increase of approximately $2 million.

# 10.3 Fiscal Policies

## 10.3.1 Background

The basic framework for evaluating utility revenue needs includes sound fiscal policies. Several policy topics are important to consider as part of managing the finances of the utility including cash reserves, debt management, and rate funded system reinvestment (planned rate funded capital).

According to the City's adopted Financial Policies document, per Resolution 04-04, a water reserve fund of $600,000 was set up in 2011 to provide sufficient cash flow to meet any unforeseen emergency. Based on annual inflationary adjustments, the City currently maintains a water reserve of approximately $700,000. During this rate study, City staff requested that FCS GROUP evaluate the City's current policies as compared to industry standards. The following *Operating Reserves* and *Capital Reserves* sections apply such industry standards to the City's water utility to arrive at a combined minimum reserve funding target of between $730,000 and $1,280,000. Reserves higher than this may be prudent, especially in the capital reserve, if the City is saving up in advance to help cash fund upcoming capital projects.

## 10.3.2 Cash Reserves

When evaluating reserve levels and objectives, it is important to recognize that the value of reserves lies in their potential use. A reserve strategy that deliberately avoids any use of reserves negates their purpose. The fluctuation of reserve levels may indicate that the system is working, while lack of variation over many years strongly suggests that the reserves are, in fact, unnecessary.

### *10.3.2.1 Operating Reserve*

An operating reserve is designed to provide a liquidity cushion; it protects the utility from the risk of short-term variation in the timing of revenue collection or payment of expenses. The most common operating reserve target for water utilities is between 60 days to 90 days of operating expenses.

**Recommended Policy:** Achieve a year-end minimum balance target of between **60-90 days (16%-25%)** of total annual operating expenditures. This equates to a range of between roughly **$360,000-$540,000** based on the 2021 operating budget of roughly $2.2 million.

### *10.3.2.2 Capital Reserve*

The capital reserve provides a source of emergency funding for unexpected asset failures or other unanticipated capital needs. This capital reserve policy is not intended to guard against catastrophic system failure or extreme acts of nature. The most common capital reserve target for water utilities is between 1-2% of the original cost of the utility's plant-in-service.

**Recommended Policy:** Achieve a year-end minimum balance target of between **1-2%** of the original cost of the utility's plant-in-service. This equates to a range of roughly **$370,000-$740,000** based on the plant-in-service cost estimate of $37 million by the end of 2021.

## 10.3.3 Debt Management

The City currently does not have any outstanding water utility related loans. Based on discussions with City staff, it is the City's preference that the water utility continues to primarily cash-fund capital projects during the rate study period. If the City were to issue debt in the future, some considerations are provided below.

### *10.3.3.1 Debt Reserve*

A debt reserve is most often required as a condition of bond issuance, though some state loan programs also require a reserve. The reserve intends to protect bondholders (or the agency issuing loans) from the risk of the borrower defaulting on their payments and is most often linked to either average annual debt service or maximum annual debt service.

**Recommended Policy:** The policy should be dictated by terms outlined in contracts for debt obligations if the water utility chooses to utilize debt in the future.

### *10.3.3.2 Debt Service Coverage*

Debt service coverage is typically a requirement associated with revenue bonds and some state loans, and it is an important benchmark to measure the riskiness of the water utility's capital funding plans. Coverage is most easily understood as a factor applied to annual debt service. In such a case, if it issues revenue bonds, the water utility agrees to collect enough revenue to meet operating expenses and not only pay debt service but to collect an additional 25% above bonded debt service. The extra revenue is a "cushion" that makes bondholders more confident that debt service will be paid on time.

**Recommended Policy:** We recommend a more conservative internal policy coverage target of at least 1.50 to 2.00 on revenue bond debt if the water utility chooses to utilize debt in the future.

### 10.3.4 Rate Funded System Reinvestment

Rate funded system reinvestment is the funding of long-term infrastructure replacement needs through a regular (annual) and predictable rate provision, which helps minimize reliance on debt. Specific benchmarks for annual funding might include any of the following: original cost depreciation expense; replacement cost depreciation expense; an amount determined by an asset management plan; and directly budgeted replacement as needs arise.

Most commonly, utilities that have addressed replacement funding needs have used historical (original cost) depreciation expense as the basis for a reasonable level of reinvestment in the system. This strategy and level of funding satisfies several standards for reasonable rates:

- It avoids decline in system asset value (financial integrity);
- It charges customers commensurate with their consumption of facility useful lives and avoids the possibility of charging customers more than the current cost to provide service (rate equity); and
- It provides a substantial source of funding for replacement (capital funding adequacy).

**Recommended Policy:** We recommend that the City fund at least $200,000 per year in annual rate funded capital The City is forecast to hit this target as soon as 2026. Consider phasing towards fully funding original cost depreciation as development growth slows.

Despite annual original cost depreciation being $900,000 by 2030 (estimate), with the forecast growth (new customers paying GFCs and monthly rates), debt can be avoided even if the City does not fully fund depreciation expense. As the City matures and growth slows, it would be prudent to reevaluate this policy and strive to fund full depreciation from rates at that time.

Table 10-2 provides a summary of the recommended fiscal policies for the water utility.

#### Table 10-2: Summary of Fiscal Policies

| Policy | Recommended Target |
|---|---|
| Operating Reserve | 90 days of O&M ($540,000 based on 2021 budget). |
| Capital Reserve | 2% of original cost of plant-in-service ($740,000 based on 2021 assets). |
| Debt Service Coverage | An internal policy target of at least 1.50 to 2.00. |
| Rate Funded System Reinvestment | Rate fund $200,000 of capital projects per year by 2030. Consider trying to fully fund depreciation as growth slows and the system ages. |

## 10.4 Revenue Requirement

This section presents the revenue requirement analysis for the water utility, which is summarized in Table 10-3. As mentioned previously, forecasted increases will generate the revenue needed to fully fund the water utility on a standalone basis, considering operating and maintenance expenditures, fiscal policy achievement, and capital project needs. Preliminary results were presented to the City Council on February 16th, 2021. The proposed rate increases documented in this chapter include a 1.60% automatic CPI-based increase that has already been adopted for 2021, followed by 2.50% increases annually thereafter.

### Table 10-3: Summary Results of the Revenue Requirement Forecast

| Recommended Rate Schedule | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual Rate Adjustments | 1.60% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% |

### 10.4.1 Economic & Inflation Factors

The operating and maintenance expenditure forecast largely relies on the City's 2021-22 adopted budget for the Water Fund (Fund 401). Each line item in the budget is then adjusted annually by utilizing one of the following factors:

- General Cost Inflation – assumed to be 2.5 percent per year based on both the Washington State Economic & Revenue Forecast Council projection for the Consumer Price Index (CPI) as well as the recent historical performance of the Seattle-Tacoma-Bellevue CPI.
- Construction Cost Inflation – assumed to be 3.0 percent per year based on the historical Engineering News-Record Construction Cost Index (20-City Average).
- Personnel Cost Inflation – assumed to be 3.6 percent per year based on industry experience in the region as well as by referencing the Employment Cost Indices for wages and benefits (3.00 percent per year for wages and 5.00 percent per year for benefits).
- Taxes – State Excise tax rate of 5.029 percent, State Business and Occupation tax rate of 1.75 percent, and City Utility tax rate of 10 percent.
- Fund Earnings – assumed to be 0.50 percent per year based on the Local Government Investment Pool (LGIP) for Washington.
- Customer Growth – based on discussions with City staff, the City is assumed to add 605 ERUs from 2020 through 2025 (roughly 100 units per year), and approximately 30 ERUs annually thereafter.

## 10.4.2 Fund Balances

The Water Fund (Fund 401) and Water CIP Fund (Fund 407) track operating and capital activity related to the water utility. Fund 401 had an estimated beginning fund balance on January 1, 2021 of approximately $3.5 million, and Fund 407 had an estimated beginning fund balance on January 1, 2021 of approximately $2.6 million.

### Table 10-4: Cash Balances for Fund 401 & 407

| Description | Beginning 2021 Cash Balances |
|---|---|
| Fund 401 - Operating | $3,529,800 |
| Fund 407 - Capital | $2,550,063 |
| **Total Beginning Cash January 1, 2021** | **$6,079,863** |

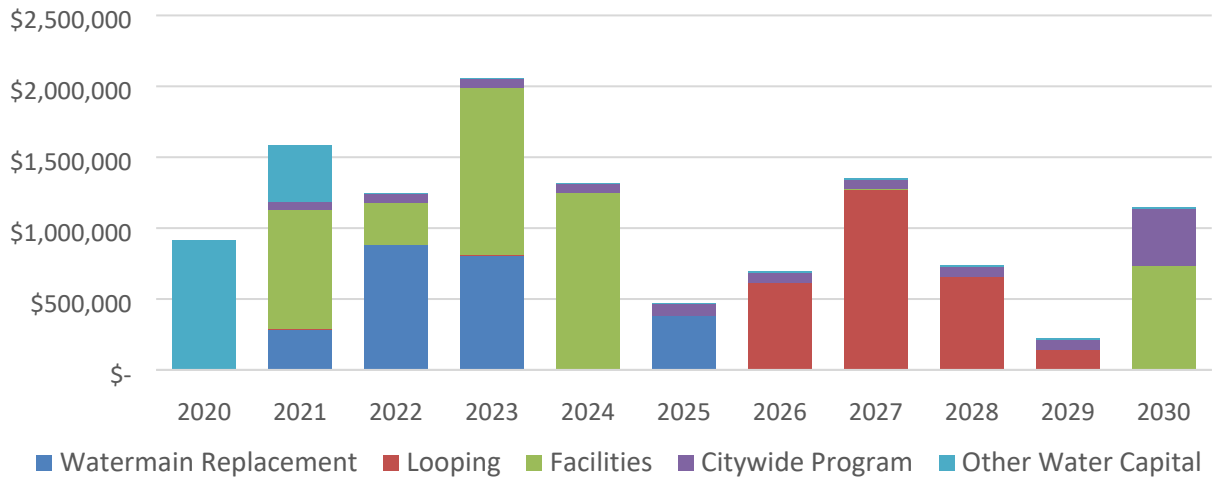
## 10.4.3 Existing Debt Obligations

The City does not have any debt associated with the water utility at this time. Additionally, no new debt is assumed in this forecast.

## 10.4.4 Capital Expenditure Forecast

The 2020-30 CIP was provided by the City and its consulting engineer, Murraysmith, and is shown in **Chapter 9** of this Plan. Costs were provided by project, by year, and are in 2020 dollars. To estimate the actual spending by year, costs are escalated to the estimated year of construction. **Figure 10-2** shows the planned annual capital spending, with cost escalation.

### Figure 10-2: Capital Expenditure Forecast (2020-2030)



## 10.4.5 Revenue Requirement Methodology

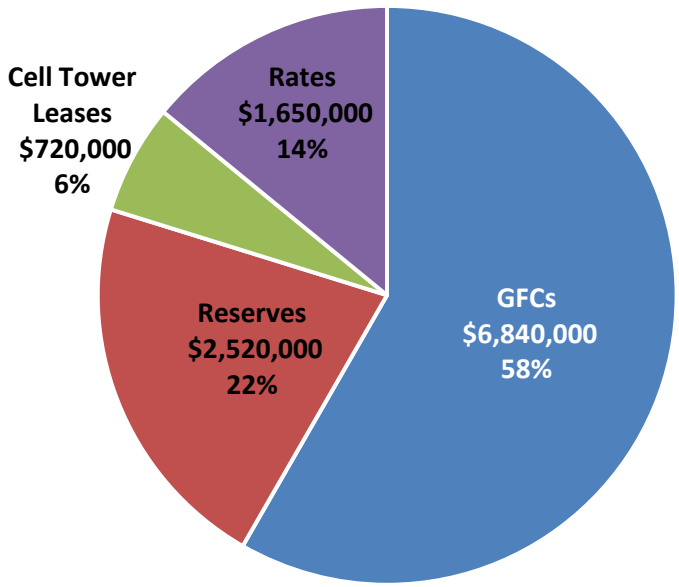
The revenue requirement analysis evaluates the sufficiency of the utility's revenues against its financial obligations. The cash flow test determines whether or not the utility's annual revenues are sufficient to cover the known cash requirements for each year of the forecast.

The City can temporarily waive the requirements of the cash flow test as part of a conscious decision to phase in rate increases, as long as its operating reserve balance is sufficient to absorb the resulting cash-flow deficit.

## 10.4.6 Capital Funding Strategy

The 2020-30 capital plan totals $11.7 million with cost escalation, of which $6.8 million is expected to be funded through GFC revenues, $1.7 million is expected to be funded through annual rate revenues, $700,000 from cell tower lease revenues, and $2.5 million is expected to be funded through the City's current reserves. The capital funding strategy is summarized in Figure 10-3.

### Figure 10-3: Capital Funding Strategy 2020-2030

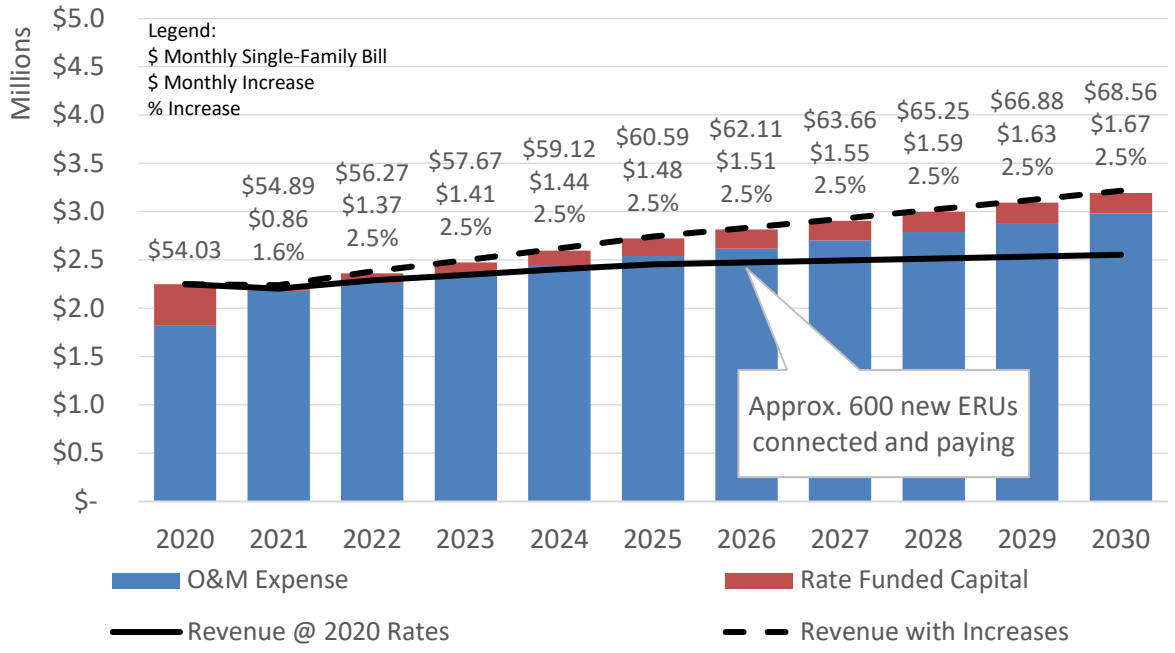


## 10.4.7 Revenue Requirement Results

**Figure 10-4** graphically represents the revenue requirement forecast through 2030. The bars represent costs of the utility such as operating expenses and annual rate revenue earmarked for capital projects. Additional observations are provided below:

- Solid line: Revenue at existing rates.
  - Rate revenue is expected to be roughly $2.2 million in 2021 and is expected to increase with customer growth, even before future rate adjustments. This line also includes miscellaneous revenues.
- Dashed line: Revenues with rate increases.
  - Rate revenues with increases are expected to grow to $3.2 million by 2030.
- Blue bar: Operating and maintenance expense (O&M).
  - Operating expenses are based on the adopted 2021-22 budget and increase with the annual cost escalation assumptions previously discussed.
- Red bar: Rate revenue that is available for capital projects.
  - This amount increases gradually after 2021 as revenues increase with rate increases and growth. By 2026, $200,000 per year would be available for capital projects.

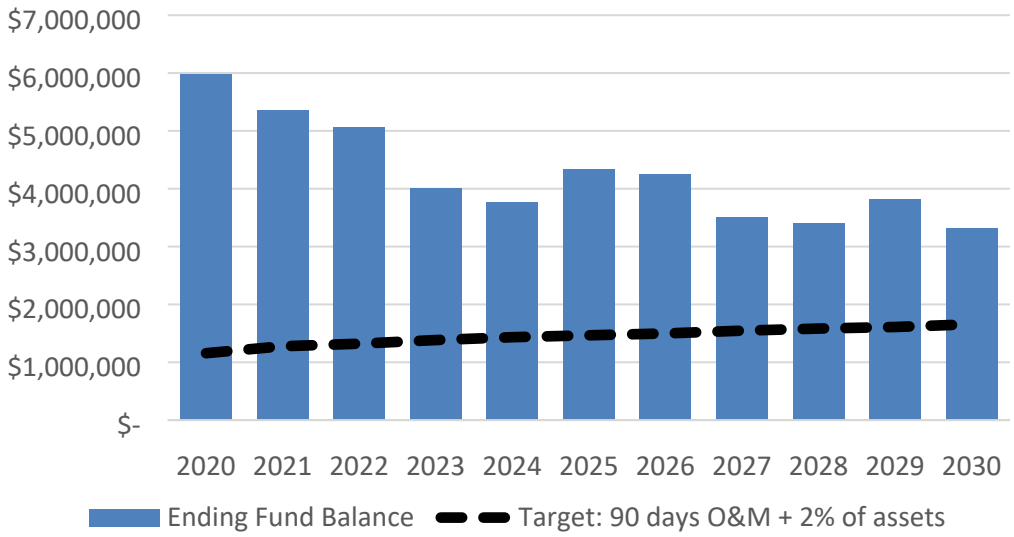
### Figure 10-4: Revenue Requirement Forecast



## 10.4.8 Forecasted Reserve Balances

The recommended operating fund balance is 90 days of total annual operating expenditures, and the recommended capital fund balance is 2% of the original cost of the utility's plant-in-service. These two reserve targets total approximately $1,275,000 in 2021 – an amount that grows as operating expenditures increase and as the City adds assets to the water utility. **Figure 10-5** shows that in each year of the forecast, the utility is expected to meet the combined target.

### Figure 10-5: Combined Reserve Forecast



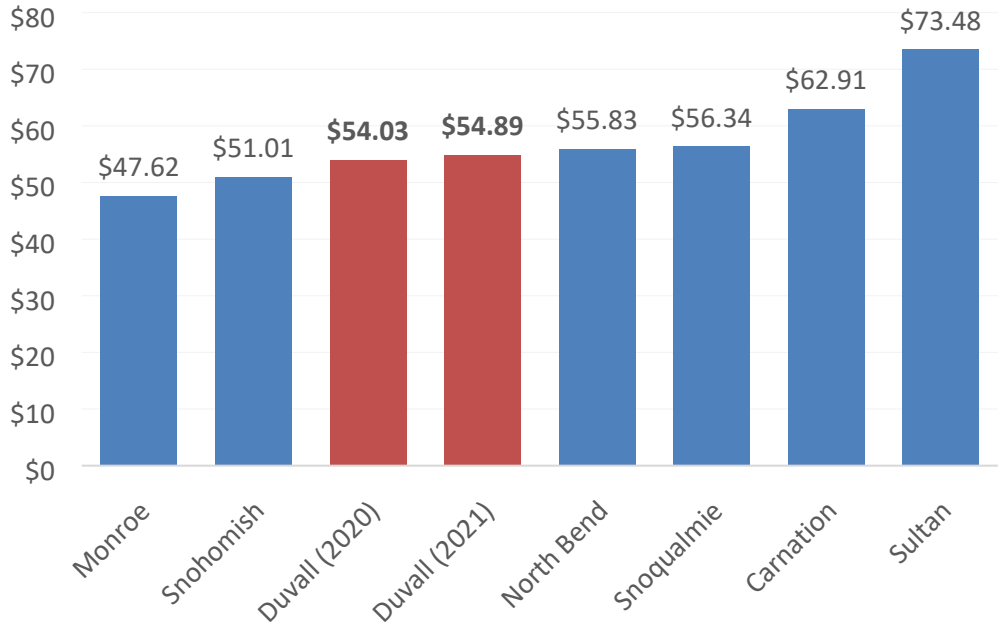
## 10.4.9 Single-Family Residential Rate Comparison

As a resource to the City and its customers, a rate survey of regional water utilities is provided below. Figure 10-6 shows each jurisdiction's 2020 monthly single-family residential (SFR) rate. Note that each jurisdiction has a unique set of geographic traits, customers, and system characteristics that can have a significant impact on rates.

Some cities embed their city utility tax in their rates, while others separately itemize the tax on customer bills above the stated rates. We do not have complete data on the billing practices of other cities, so there may or may not be a tax embedded in the utility rates for other jurisdictions. Lastly, some of these jurisdictions may have already adjusted rate increases in 2021, so the City's current position may change relative to changes in other jurisdictions.

The City's existing water rates are near the bottom of the survey group, more expensive than Monroe and Snohomish but less expensive than North Bend, Snoqualmie, Carnation, and Sultan. The City's water rates will stay near the bottom following the 1.6 percent increase in 2021.

### Figure 10-6: Monthly 2020 Single-Family Residential Water Rates



## 10.4.10 Affordability

The US Environmental Protection Agency (USEPA), since the inception of the Clean Water Act, has provided some guidance on how to measure financial burden. Called the residential indicator (RI), the EPA's measure divides the annual residential cost of utility service by the median household income (MHI) of the relevant service area. The resulting value is the RI. A value of 2.5% or higher indicates a "high burden" based on USEPA standards for water utilities.

The median household income for Duvall, Washington is estimated to be $166,000 as of 2020. This is based on a survey from the Census Bureau in 2018. The median income is forecasted to include a 2.5% annual escalation; two years of inflation have been added to the Census Bureau survey figure.

Table 10-5 presents an average single-family bill with the projected annual rate increases for the forecast period, tested against the threshold. Applying the 2.5% test, Duvall's rates are forecasted to remain well within the indicated affordable range through 2039.

### Table 10-5: Affordability Table

| Year | Inflation | Median HH Income | Projected Monthly Bill | Projected Annual Bill | % of Median HH Income |
|---|---|---|---|---|---|
| 2020 | 2.50% | $165,718 | $54.03 | $648.36 | 0.39% |
| 2021 | 2.50% | $169,861 | $54.89 | $658.73 | 0.39% |
| 2022 | 2.50% | $174,107 | $56.27 | $675.20 | 0.39% |
| 2023 | 2.50% | $178,460 | $57.67 | $692.08 | 0.39% |
| 2024 | 2.50% | $182,922 | $59.12 | $709.38 | 0.39% |
| 2025 | 2.50% | $187,495 | $60.59 | $727.12 | 0.39% |
| 2026 | 2.50% | $192,182 | $62.11 | $745.30 | 0.39% |
| 2027 | 2.50% | $196,986 | $63.66 | $763.93 | 0.39% |
| 2028 | 2.50% | $201,911 | $65.25 | $783.03 | 0.39% |
| 2029 | 2.50% | $206,959 | $66.88 | $802.60 | 0.39% |
| 2030 | 2.50% | $212,133 | $68.56 | $822.67 | 0.39% |
| 2031 | 2.50% | $217,436 | $70.27 | $843.23 | 0.39% |
| 2032 | 2.50% | $222,872 | $72.03 | $864.32 | 0.39% |
| 2033 | 2.50% | $228,444 | $73.83 | $885.92 | 0.39% |
| 2034 | 2.50% | $234,155 | $75.67 | $908.07 | 0.39% |
| 2035 | 2.50% | $240,009 | $77.56 | $930.77 | 0.39% |
| 2036 | 2.50% | $246,009 | $79.50 | $954.04 | 0.39% |
| 2037 | 2.50% | $252,159 | $81.49 | $977.89 | 0.39% |
| 2038 | 2.50% | $258,463 | $83.53 | $1,002.34 | 0.39% |
| 2039 | 2.50% | $264,925 | $85.62 | $1,027.40 | 0.39% |

# 10.5 Conclusion

## 10.5.1 Revenue Requirement & Rate Schedule

The recommended rate increases in **Tables 10-6 and 10-7** allow the City to meet the following objectives:

- Continue to fund existing operations, plus inflation;
- Allow the utility to complete its 20-year CIP without the need for debt;
- Generate approximately $200,000 per year for capital projects by 2026, and;
- Maintain utility reserves at a healthy level throughout the forecast.

### Table 10-6: Recommended Rate Schedule (Years 1-10)

| Recommended Rate Schedule | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual Rate Adjustments | | 1.60% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% |
| Monthly Fixed Charge | $28.22 | $28.67 | $29.39 | $30.12 | $30.88 | $31.65 | $32.44 | $33.25 | $34.08 | $34.93 | $35.81 |
| 201 – 400 cu. ft. | $4.20 | $4.27 | $4.37 | $4.48 | $4.60 | $4.71 | $4.83 | $4.95 | $5.07 | $5.20 | $5.33 |
| 401 – 600 cu. ft. | $5.40 | $5.49 | $5.62 | $5.76 | $5.91 | $6.06 | $6.21 | $6.36 | $6.52 | $6.68 | $6.85 |
| 601 – 800 cu. ft. | $6.61 | $6.72 | $6.88 | $7.06 | $7.23 | $7.41 | $7.60 | $7.79 | $7.98 | $8.18 | $8.39 |
| 801 – 1,000 cu. ft. | $7.81 | $7.93 | $8.13 | $8.34 | $8.55 | $8.76 | $8.98 | $9.20 | $9.43 | $9.67 | $9.91 |
| Over 1,001 cu. ft. | $9.04 | $9.18 | $9.41 | $9.65 | $9.89 | $10.14 | $10.39 | $10.65 | $10.92 | $11.19 | $11.47 |

### Table 10-7: Recommended Rate Schedule (Years 11-20)

| Recommended Rate Schedule | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
|---|---|---|---|---|---|---|---|---|---|
| Annual Rate Adjustments | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% |
| Monthly Fixed Charge | $36.70 | $37.62 | $38.56 | $39.52 | $40.51 | $41.52 | $42.56 | $43.63 | $44.72 |
| 201 - 400 cu. ft. | $5.46 | $5.60 | $5.74 | $5.88 | $6.03 | $6.18 | $6.33 | $6.49 | $6.66 |
| 401 - 600 cu. ft. | $7.02 | $7.20 | $7.38 | $7.56 | $7.75 | $7.95 | $8.14 | $8.35 | $8.56 |
| 601 - 800 cu. ft. | $8.60 | $8.81 | $9.03 | $9.26 | $9.49 | $9.73 | $9.97 | $10.22 | $10.47 |
| 801 - 1,000 cu. ft. | $10.16 | $10.41 | $10.67 | $10.94 | $11.21 | $11.49 | $11.78 | $12.07 | $12.38 |
| Over 1,001 cu. ft. | $11.47 | $11.76 | $12.05 | $12.35 | $12.66 | $12.98 | $13.30 | $13.63 | $13.98 |

## 10.5.2 Rate Structure Evaluation

The City's current rate structure consists of a monthly fixed charge and a five-block increasing volume charge per hundred cubic feet of water consumption. Volume charge block sizes are 200-400 cubic feet block one; 401-600 cubic feet block two; 601-800 cubic feet block three, 801-1,000 cubic feet block four, and 1,001 cubic feet and above block five. The City's existing structure encourages water demand efficiency through the application of increasing block rates.

## 10.5.3 Updating this Study's Findings

It is recommended that the City revisit the study findings during the forecast period to check that the assumptions used (such as customer growth) are still appropriate and that no significant changes have occurred that would alter the results of the study. The City should use the study findings as a living document, routinely comparing the study outcomes to actual revenues and expenses. Any significant or unexpected changes may require adjustments to the rate strategy recommended in this report

# Appendix

# Appendix A

## Water Service Area Agreements

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**AGREEMENT**
**FOR ESTABLISHING WATER UTILITY SERVICE AREA BOUNDARIES**
**AS IDENTIFIED BY THE EAST KING COUNTY**
**COORDINATED WATER SYSTEM PLAN**

## PREAMBLE

The Agreement for the water utility service area boundary identifies the external boundary of the service area for which the designated water purveyor has assumed direct retail water service responsibility. The responsibilities accepted by the water purveyor are outlined in the East King County Coordinated Water System Plan (CWSP), and as defined by the adopted rules and regulations of the Department of Health (DOH). This agreement does not give new authorities or responsibilities to the water purveyor or to the County or State regulatory agencies, but rather acknowledges the geographical area for these designated service responsibilities.

The terms used within this Agreement shall be as defined in the implementing regulations of Chapter 70.116 RCW, except as identified below.

1. East King County Critical Water Supply Service Area Map shall mean the map referenced in the Agreement as Attachment A for the retail service area, except as amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

2. Retail Service Area shall mean the designated geographical area in which a purveyor shall supply water either by direct connection, by a satellite system, or through interim service by an adjacent utility or Satellite System Management Agency under agreement with the designated utility.

3. Wholesale Service Area shall mean the designated geographical area in which a purveyor, a group of purveyors, or another organization provides water to other water purveyors on a wholesale basis. A wholesale water supplier shall not provide water to individual customers in another purveyor's retail service area except with the concurrence of the purveyor responsible for the geographical area in question.

4. Lead Agency for administering the Agreement for Establishing Water Utility Service Area Boundaries shall be King County, unless otherwise established by amendment to the CWSP.

The authority for this Agreement is granted by the Public Water System Coordination Act of 1977, Chapter 70.116 RCW.

WHEREAS, Such an Agreement is required in WAC 248-56-730, Service Area Agreements-Requirement of the Public Water System Coordination Act; and

WHEREAS, Designation of retail water service areas, together with the cooperation of utilities, will help assure that time, effort, and money are best used by avoiding unnecessary duplication of service; and

WHEREAS, Definite future service areas will facilitate efficient planning for, and provision of, water system improvements within East King County as growth occurs; and

WHEREAS, Definite retail and wholesale service areas will help assure that water reserved for public water supply purposes within East King County will be utilized in the future in an efficiently planned manner,

NOW, THEREFORE, the undersigned party, having entered into this Agreement by signature of its authorized representative, concurs with and will abide by the following provisions:

Section 1. Service Area Boundaries. The undersigned party acknowledges that the East King County Critical Water Supply Service Area Map, included as Attachment A to this Agreement and as may be subsequently updated, identifies the utility's future water service area. The undersigned further acknowledges that there are no service area conflicts with adjacent water utilities, or, where such conflicts exist, agrees that no new water service will be extended within disputed areas until such conflicts are resolved.

Section 2. Common Service Area Transfer. It is understood that utilities may initially continue existing water service within the boundaries of neighboring utilities, as defined in Section 1 hereof. Such common service areas, if they exist, are described in Attachment B to this agreement. Also included in Attachment B are copies of, or a list of, all resolutions, ordinances, or agreements enabling these uncontested overlays. The undersigned party agrees that any water line for retail service extending outside of the retail service area boundary, as set for in Section 1, shall be phased out and service transferred to the designated adjacent utility on an economic basis or by mutual agreement.

Economic basis considerations may include, but are now limited to:

(a) A determination by the present owner of service lines that maintenance, repair, and/or replacement costs exceed attributable income.

(b) Planned or imminent major street improvements or major

improvements to either or both water systems which include an opportunity to transfer service. The terms of the transfer of service ares described in this Section shall be established in a separate agreement among the adjacent utilities whose boundaries are affected.

Section 3. Boundary Streets. Unless separate agreements exist with adjacent utilities concerning water services or other utility services, this party agrees that the water utility which is located to the north and/or east of boundary streets between this party and adjacent utilities will be entitled to provide future water service on both sides of those streets. Depth of service on boundary streets shall be limited to one platted lot or as otherwise agreed by the utilities. Existing services on boundary streets shall remain as connected unless transfer of service is agreed to by both parties, as per Section 2. These provisions do not disallow the placement of mains in the same street by adjacent utilities where geographic or economic constraints require such placement for the hydraulic benefit of both utilities.

Section 4. Boundary Adjustments. If, at some time in the future it is appropriate for the undersigned party to make service area boundary adjustments, such modifications must receive written concurrence (which shall not be unreasonably withheld) of all utilities that would be directly affected by such a boundary adjustment and the proper legislative authority(ies). This provision does not apply where boundary adjustments are made as a result of municipal annexations or incorporations, nor is it intended to modify the provisions of state law. These written modifications must be noted and filed with the designated King County lead agency and DOH. It is understood by the undersigned party that if, as provided by RCW 70.116.040, it is unable to provide service within its designated service area boundary it may decline to do so. But, in that case, an applicant may be referred to other adjacent utilities, to a pre-qualified Satellite System Management Agency (SSMA), or a new utility may be created and the original service area boundary will be adjusted accordingly.

Section 5. Service Extension Policies. The undersigned party agrees that in order to expand its water service area, other than by addition of retail customers to existing water mains, or to serve in the capacity of a pre-qualified SSMA, it shall have adopted design standards and Utility Service extension policies. The design standards shall meet or exceed the East King County Minimum Design Standards.

Municipalities further agree that if they identify a service area outside of their existing municipal corporate boundaries, the municipality will assume full responsibility for providing water service equivalent to (excluding rates and charges) the level of service provided for their inside-city customers. This will be in conformance with applicable land use policies.

The agreement by reference includes the following attachments:

Attachment A - East King County Critical Water Supply Service Area Map. (see Section 1)

Attachment B - Common Service Area Agreement - Option - Utility may attach copies or list such agreements if relevent (see Section 2)

IN WITNESS WHEREOF, the undersigned party has executed this Agreement as of 3-31-97.

CITY of Duvall
Water Utility

Representative

Mayor
Title

Receipt Acknowledged:

King County

Date

Department

# INTERLOCAL AGREEMENT REGARDING WATER SERVICE AREA BOUNDARIES

This Agreement ("Agreement") is executed this 30th day of October, 2000, by and between the City of Duvall (the "City") and King County Water District No. 119 (the "District"), both of which are municipal corporations of the State of Washington.

## RECITALS

A. WHEREAS, pursuant to Chapter 70.116 RCW, the Public Water System Coordination Act, the City and the District previously agreed upon future water utility service area boundaries for the purpose of designating the water purveyor with the responsibility to provide water service within such designated water service area; and

B. WHEREAS, the future water utility service areas designated by the City and the District are contained in a Coordinated Water System Plan for East King County which was approved by the Washington State Department of Health and other government agencies with jurisdiction, pursuant to the requirements and procedures set forth in Chapter 70.116 RCW; and

C. WHEREAS, the parties now desire to modify and revise the future water service area boundary between the City and the District; now, therefore,

## AGREEMENT

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. Revised Water Service Area Boundary. The City and the District hereby agree upon a new future water service area boundary as such revised boundary is legally described on Exhibit "A" attached hereto and as such revised boundary is depicted on a map attached hereto as Exhibit "B" ("Revised Boundary").

2. Governmental Approvals. The Revised Boundary shall be approved by all governmental agencies with jurisdiction and the parties agree to give notice of the approval of this Agreement to Metropolitan King County, the Water Utility Coordinating Committee ("WUCC"), the Washington State Department of Health, the East King County Regional Water Authority, the Washington State Boundary Review Board for King County and any other governmental agencies which are required to review and approve this Agreement. The parties agree to cooperate and assist in any reasonable manner to obtain the approval of the Revised Boundary provided that the District shall pay all costs and expenses incurred to obtain such governmental agency approval including those costs and expenses incurred by the City.

3. Entire Agreement/1988 Water Service Area Agreement. This Agreement constitutes the entire agreement between the parties concerning the subject matter herein and there are no representations or agreements other than those incorporated herein. Future agreements may occur between the parties to identify, agree upon or revise future water service area boundaries. However, that portion of the District's water service area as described and depicted on Exhibit "A" ("the Anderson Area") of an agreement dated January 6, 1988 between the parties entitled "Agreement to Provide Water Service and Amending Water Planning Boundaries and Service Areas" as amended by further agreement dated June 16, 2000 (collectively the "1988 Agreement") shall be included in the City's water service area boundary and the City shall provide water service exclusively to such area if the District's water system is not extended to serve such area within seven (7) years from the date of this Agreement; in such event, the parties shall cooperate to obtain the approval of appropriate governmental agencies required for such change in service area; provided, that no other terms and conditions of the 1988 Agreement are modified or amended by this Agreement and the 1988 Agreement shall remain in full force and effect.

4. Service Area Obligation. Nothing herein shall be construed to alter the rights, responsibilities, liabilities or obligations of the either party regarding provision of water services to the future water service area designated herein except as specifically set forth herein.

Wherefore, the parties have executed this Agreement on the date and year first herein above written.

CITY OF DUVALL

Glen Kuntz 10-20-00

Mayor Date

ATTEST:

Jodee Schwinn 10-20-00

City Clerk Date

APPROVED AS TO LEGAL FORM

City Attorney

KING COUNTY WATER
DISTRICT NO. 119

By: _____
President, Board of Commissioners

# EXHIBIT "A"

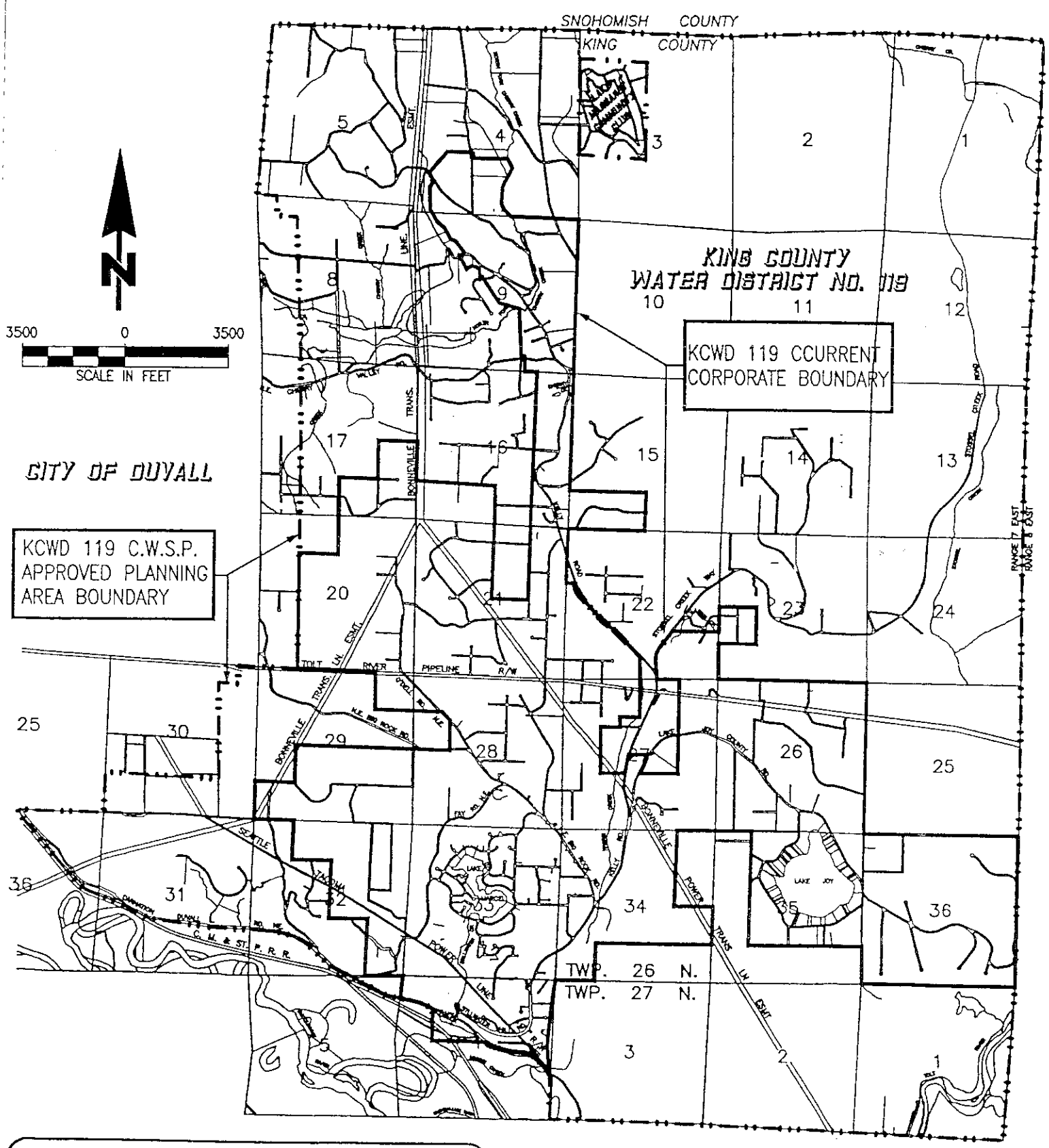
## LEGAL DESCRIPTION

DATE: OCTOBER 2000

That portion of Township 26 North, Ranges 6 and 7 East, Willamette Meridian, King County, Washington described as follows:

Beginning at a point on the north line of Section 36, Township 26 North, Range 6 East, W.M. at the south margin of Carnation-Duvall Road NE; thence East along the north line of said Section 36 to the southwest corner of Section 30, Township 26 North, Range 7 East, W.M.; thence North along the west line of the Southwest Quarter of the Southwest Quarter of said Section 30 to the northwest corner of the South Half of the South Half of said Section 30; thence East along the north line of said South Half of the South Half of Section 30 to the west line of the East Half of the East Half of said Section 30; thence North along said west line of the East Half of the East Half to the southwest corner of the Northwest Quarter of the Northeast Quarter of the Northeast Quarter of said Section 30; thence East along the south line of the said Northwest Quarter of the Northeast Quarter of the Northeast Quarter to the southeast corner thereof; thence North along the east line of said Northwest Quarter of the Northeast Quarter of the Northeast Quarter to the northwest corner of the Northeast Quarter of the Northeast Quarter of the Northeast Quarter of Section 30, Township 26 North, Range 7 East, W.M.; thence East along the north line of said Northeast Quarter, of the Northeast Quarter, of the Northeast Quarter, to the northwest corner of Section 29, Township 26 North, Range 7 East, W.M.; thence continuing East along the north line of Section 29, Township 26 North, Range 7 East, W.M. to the southwest corner of the Southeast Quarter of the Southwest Quarter of Section 20, Township 26 North, Range 7 East, W.M.; thence North along the east line of the West Half of the West Half of said Section 20 to the southwest corner of the Southeast Quarter of the Southwest Quarter of Section 17, Township 26 North, Range 7 East, W.M.; thence continuing North along the east line of the West Half of the West Half of said Section 17 to the southwest corner of the Southeast Quarter of the Southwest Quarter of Section 8, Township 26 North, Range 7 East, W.M.; thence continuing North along the east line of the West Half of the West Half of said Section 8 to the southeast corner of the Northeast Quarter of the Northwest Quarter of the Northwest Quarter of said Section 8; thence West along the south line of the Northeast Quarter of the Northwest Quarter of the Northwest Quarter to the southwest corner thereof; thence North along the west line of the Northeast Quarter of the Northwest of the Northwest Quarter to the northwest corner thereof; thence West along the north line of Section 8 to the northwest corner of said Section 8, thence North along the west line of Section 5, Township 26 North, Range 7 East, W.M. to the northwest corner thereof and the northern limits of King County and the terminus point of this description.

# EXHIBIT "B"




ecnw ENGINEERING CONSULTANTS NORTHWEST
35717 PACIFIC HWY. S.
FEDERAL WAY, WA 98003
(206) 952-7797
FAX (206) 952-7799

AGREEMENT TO PROVIDE WATER SERVICE & AMENDING
WATER PLANNING BOUNDARIES AND SERVICE AREAS
CITY OF DUVALL
WATER DISTRICT NO. 119

THIS AGREEMENT is made this the 6th day of January, 1988, between the City of Duvall, and Water District No. 119, King County.

WHEREAS, the City of Duvall is a code city under title 35A of the Revised Code of Washington, and maintains and operates a City of Duvall Water Department and municipal water supply system; and

WHEREAS, the real property outlined in Exhibit "A" attached hereto and incorporated herein by reference, consists of property the westerly 1/3 of which is in the City of Duvall's water planning area, and the balance of which is in water planning area of water District No. 119, and all of said area is geographically located close to the Big Rock Road water line, located in the City of Duvall's water service area; and

WHEREAS, Water District No. 119 requests water service from the City of Duvall so as to provide water service to the above-described real property; and

WHEREAS, the City of Duvall has offered to provide such water service to Water District No. 119 in the above described area as based upon discussions between the City Attorneys and Engineers and Water District No. 119 Attorneys and Engineers.

WHEREAS, the westerly one-third of the real property outlined above should be placed into the water planning and service area of Water District No. 119 due to engineering considerations once water service is provided under this Agreement.

NOW THEREFORE, it is hereby agreed as follows:

1. The City of Duvall shall install a tee and valve at the most southerly end of the Big Rock Road water line (this location is immediately just south of the north boundary of the Tolt pipeline right-of-way). Water District No. 119 shall reimburse the City of Duvall for its necessary expenses incurred in installing the tee and valve.

2. Water District No. 119 shall be responsible for all improvements beyond said valve, including pipelines, construction of lines, permits, water services, etc. It is expressly understood that all City of Duvall water service engineering standards as set forth by ordinance shall be applicable to such improvements including but not limited to an eight (8) inch main, installation of eight (8) inch main across frontages of properties requesting service, etc. All charges related to applying for City water service as provided by ordinance shall also be paid to the City by Water District No. 119. Water District No. 119 shall bear all costs and responsibility of maintaining and repairing the improvements. The City of Duvall shall have the right to maintain or repair the

improvements and shall be reimbursed by the Water District for same, if, after reasonable notice to the Water District of maintenance or repairs necessary in the judgment of the City, the Water District fails to effect same.

3. The water service shall be specifically limited to the real property outlined in Exhibit "A" attached hereto and incorporated herein by reference. Water District No. 119 shall be responsible for obtaining and verifying exact legal descriptions of the outlined property, and the same shall be attached hereto as Exhibit "B" and incorporated herein by reference. The same shall be submitted to and approved by the City attorneys and engineers prior to any construction.

4. Water District No. 119 shall be responsible for securing all necessary easements prior to any construction.

5. The City of Duvall shall read and total each water meter connection to the line, and shall bill Water District No. 119 accordingly. Water District No. 119 shall be responsible for billing the individual services off the line.

6. The City of Duvall shall bill Water District No. 119 for water service fees as follows: monthly service charge, basic, $18.00/400 CF; excess $1.20/100 CF; as currently set forth by city ordinance for outside City water service, or as the same may be amended by the City in the future for all outside City of Duvall water services. It is also agreed that Water District No. 119 shall reimburse the City of Duvall for any peak surcharges from the City of Seattle Water Department attributable to the water service authorized herein.

7. Water District No. 119 shall pay to the City of Duvall, prior to the installation of any improvements as authorized herein, the sum of $3,000.00 as a supplemental connection fee for reimbursement of City of Duvall expenses incurred in connection with the new Tolt Pipeline.

8. Water District No. 119 shall reimburse the City of Duvall for all fees associated with its attorneys and engineers related to the preparation of this Agreement and associated legal and engineering costs to the City of Duvall.

9. There shall be a maximum of (10) single family residence serviced by the water line authorized herein within the real property outlined above.

10. Once ten (10) single family residence water service connections are made, the City of Duvall and Water District No. 119 agree to negotiate regarding the costs attendant to the installation of a master meter.

11. Water District No. 119 will defend, protect, indemnify, and hold harmless, the City of Duvall from and against any and all claims, costs, damages, expenses or liability for any and all injuries to persons or tangible property arising from this Agreement, including the costs of attorney's fees incurred in defending any such action, involving the

improvements installed by the Water District as described in Paragraph 2 of this Agreement.

12. The parties understand and confirm that this Agreement is subject to the review and approval of the City of Seattle Water department. Water District No. 119, shall be responsible for securing the approval of the City of Seattle Water Department and be responsible for all costs, fees, permits, etc. attendant thereto. No construction or installation of water line and water service as authorized herein may commence until such approval has been duly secured.

13. The westerly one-third of the area to be serviced by Water District No. 119 by this Agreement is currently in the City of Duvall water planning area pursuant to prior agreement between the parties. The City of Duvall agrees to the placement of this area into Water District No. 119's water planning and service area. Water District No. 119 shall be responsible for obtaining the necessary governmental permits and approvals in order to have this property placed into the Water District's water planning and service area. The City of Duvall shall cooperate with Water District No. 119 in obtaining a change in the water planning and service area described herein.

14. The parties agree to review this Agreement biannually, and updates to the Agreement may be made as mutually agreed upon by the parties.

15. Both parties warrant that the signatures below of the duly authorized representatives of each are made by persons legally authorized to sign on behalf of each party, and the same have secured the permission of each party as provided by statute, ordinance, or otherwise in order to endorse this Agreement.

SIGNED this the 4th day of November 1987.

City of Duvall

Jeane Baldwin

Jeane Baldwin, Mayor
As authorized by the City
of Duvall Resolution, dated:

STATE OF WASHINGTON )
) ss.
COUNTY OF KING )

On this 12th day of November, 1987, before me, the undersigned, a Notary Public in and for the State of Washington, personally appeared before me Jeane Baldwin, to me known as the Mayor of the City of Duvall and acknowledges the said instrument to be the free and voluntary act and deed of said Mayor for the uses and purposes therein mentioned, and on oath stated that she is authorized to execute the said instrument.

Witness my hand and official seal hereto affixed the day and year first above written.

David A. Beck
NOTARY PUBLIC in and for the State of Washington, residing at Kirkland
My commission expires: 5/1/91.

SIGNED this the 6th day of January ~~1987.~~ 1988

Water District No. 119

Andrew D. Dalla Pozza
As authorized by WD119, dated:

STATE OF WASHINGTON )
) ss.
COUNTY OF KING )

On this 6th day of January, 1987, before me, the undersigned, a Notary Public in and for the State of Washington, personally appeared before me Andrew Dalla Pozza, to me known as President of King County Water District No. 119 and acknowledges the said instrument to be the free and voluntary act and deed of said District for the uses and purposes therein mentioned, and on oath stated that he is authorized to execute the said instrument.

Witness my hand and official seal hereto affixed the day and year first above written.

Notary Public
NOTARY PUBLIC in and for the State of Washington, residing at Seattle
My commission expires: 4/20/90

# Appendix B

## Water Supply Contract

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# CITY OF SEATTLE

# FULL REQUIREMENTS CONTRACT

# FOR THE

# SUPPLY OF WATER

# TO

# CITY OF DUVALL

# TABLE OF CONTENTS

**Page(s)**

# FULL REQUIREMENTS CONTRACT

**BETWEEN**
**THE CITY OF SEATTLE**
**AND**
**THE CITY OF DUVALL**

**FOR THE SUPPLY OF WATER**

THIS CONTRACT is entered into between the CITY OF SEATTLE ("Seattle"), a municipal corporation of the State of Washington, and the CITY OF DUVALL ("Water Utility"), a municipal corporation of the State of Washington.

## RECITALS

1. Seattle owns and operates a system for the supply, transmission, and distribution of potable water and is authorized to sell and distribute water to its residents and to other persons and customers located outside the corporate limits of Seattle.
2. Seattle's water system is integral to the health and welfare of the residents located within the water service area shown in Seattle's Water System Plan. Seattle intends to provide water from the system to meet the current and future needs of the residents of such water service area when such service is requested from Seattle.
3. In meeting this service commitment, Seattle must ensure that this role does not place financial burdens on its retail customers for which they do not receive a corresponding benefit.
4. This contract and contracts of a similar nature with other wholesale customers of Seattle located within Seattle's service area are intended to provide those customers with the security of a long term service commitment and to describe the terms and conditions associated with that commitment.

5. Under this contract, Seattle intends to provide wholesale water to Water Utility at an equivalent Wholesale Level of Service with the same pricing and operational principles as it provides itself.

6. Given the extensive growth of Seattle and the surrounding areas and the impacts upon infrastructure and costs, this contract is intended to provide sufficient water for growth. As a general philosophy for cost sharing purposes, the parties desire to adopt the principle that "growth should pay for growth."

7. Seattle and Water Utility, together with other Wholesale Customers of Seattle, have agreed to establish an Operating Board comprised of representatives pledged to represent the best interests of the region in order to provide overall direction to the Administrator of the Seattle Regional Water Supply System.

NOW, THEREFORE, in consideration of mutual covenants herein, it is agreed as follows:

SECTION I. **DEFINITIONS**

For the purposes of this contract, the following terms have been defined as:

"1982 Water Purveyor Contract" – That certain Water Purveyor Contract between Water Utility and Seattle having an effective date of September 8, 1982 and expiring on December 31, 2011.

"Administrator" - The Director of Seattle Public Utilities or any other title given to that person who maintains the authority to operate and manage the Seattle Regional Water Supply System.

"Block Purchase Contract" – A contract in which Seattle sells a fixed quantity of water to a wholesale customer on a take or pay basis.

"Existing Supply Resources" - Current components of the Seattle Regional Water Supply System which consist of the Cedar River storage, treatment and diversion facilities, the Tolt River storage, treatment and diversion facilities, and the Seattle Well Fields as set forth in Exhibit VII.

"Full Requirements Contract" – A contract in which Seattle supplies a Wholesale Customer with its Full Water Requirements.

"Full Water Requirements" - All of the water needed by Water Utility to meet the needs of its present and future water customers within its service area as shown in Water Utility's water system plan and as shown on Exhibit X.

"Operating Board" – A board of representatives established by Section V hereof and having the powers and duties set forth in Sections II, III, and IV hereof.

"Partial Requirements Contract" - A contract in which Seattle supplies a Wholesale Customer with that portion of its Full Water Requirements above that provided by the Wholesale Customer's own supply.

"Partial Water Requirements" – The amount of water over and above Water Utility's own sources of supply as identified in Exhibits I and XIII and in accordance with this contract needed to meet the needs of its present and future water customers within its service area as shown in Water Utility's water system plan and on Exhibit X.

"Rate of Return on Investment" - Seattle's Average Cost of Debt, plus 1.5 percent.

"Regional Water Conservation Program" - A program which addresses water conservation goals for the Seattle Regional Water Supply System for Seattle, Wholesale Customers, and other customers who enter into a water supply contract with Seattle that includes participation in the Program.

"Seattle's Average Cost of Debt" - The weighted average interest rate on Seattle's water system debt outstanding over the course of a calendar year calculated at the end of each calendar year during the term of this contract.

"Seattle Retail Distribution System" – Seattle's retail water distribution system consisting of its retail customers within the Seattle retail service area as defined in its Water System Plan, and including storage facilities, distribution mains, pumps, disinfection facilities, service connections, and all other facilities not included in the Seattle Regional Water Supply System.

"Seattle Regional Water Supply System" - Seattle's water supply system consisting of dams, impounded water, supply and transmission mains, pumps, treatment facilities, and all other facilities utilized in conveying water to the Seattle Retail Distribution System, Water Utility, and other wholesale customers. This definition does not include the Seattle Retail Distribution System.

"Seattle Transmission Facilities" – Those facilities serving the transmission needs of the Seattle Regional Water Supply System as set forth in Exhibit VIII.

"Seattle Water System Plan" - Seattle's Water System Plan dated April, 2007, and amendments thereto, prepared by Seattle to comply with the requirements of WAC 246-290-100, and successor regulations.

"Service Connection" - The water meter and associated appurtenances, including everything from the outlet from the supply pipeline to the end of the Seattle Public Utilities vault, through which water is delivered from the Seattle Regional Water Supply System to a Wholesale Customer's water system.

"Stranded Costs" – Those water supply and related costs that Seattle and others have invested for the region which may not be recovered as a result of lost revenues.

"Wholesale Customer" – Those customers who purchase water from Seattle under a Full or Partial Requirements Contract for the purposes of reselling to others.

"Wholesale Level of Service" – Water delivered by Seattle in accordance with this contract to the Service Connection intended for Wholesale Customers' distribution to their retail customers. Seattle is not responsible for compliance with Department of Health ("DOH") standards, including fire flow, emergency back-up and water quality within Water Utility's retail service area.

## SECTION II. TERM OF CONTRACT AND GUARANTEES

### II.A. Term of Contract

1. Term. This contract shall be in effect beginning at 12:01 AM on the Effective Date of this contract and shall remain in effect until 12:00 AM on January 1, 2062.

2. Effective Date. This contract shall be effective upon the date that both parties have signed the contract after approval by their respective legislative bodies ("Effective Date").

3. Subsequent Right of First Refusal. At the end of the term of this contract, Water Utility shall have a right of first refusal to continue to purchase the amount of water then purchased from Seattle at the time of contract expiration.

4. Periodic Review and Right to Change Certain Terms and Conditions. The parties may review and change certain terms and conditions governing the sale of water hereunder by January 1, 2022 and January 1, 2042, or as soon as practicable thereafter, as follows.

a. Consensual Process. On or before January 1, 2021, and then again on or before January 1, 2041, either party may provide the other with a written proposal to amend the contract terms. The parties shall then meet and consider the proposal. If the parties agree to the proposal prior to January 1, 2022 and January 1, 2042, respectively, a written amendment to this contract shall be approved and executed by both parties and this contract shall be amended accordingly.

b. Seattle' s Right to Amend. If the parties are unable to agree on a proposal by Seattle pursuant to subsection a above within the respective one-year periods, Seattle may propose in writing its desired amendment to the Operating Board. Seattle and the Operating Board shall meet and consider the proposed amendment and use reasonable efforts to resolve any differences in the proposal. After 90 days from Seattle's written proposal to the Board, Seattle may propose its desired amendment to the Seattle City Council. If the Operating Board does not agree with such proposal, it may submit a revised proposal to the Seattle City Council within 90 days of Seattle's submission of its proposal to the Seattle City Council. After receiving the Operating Board's alternate proposal, or after the lapse of the 90 day period for the Operating Board to make an alternate proposal, the Seattle City Council may then deny both proposals or approve one of them and issue an amendment to this contract which shall be in effect for the remaining term of the contract from the date of issuance, unless later amended pursuant to subsection a above, or by mutual agreement.

c. Limitation on Seattle's Right to Amend. Notwithstanding subsection b above, Seattle shall not have the right to: (i) reduce its obligation to provide the Full or Partial Water Requirements of Water Utility, as appropriate; (ii) cease to provide wholesale water to Water Utility at an equivalent Wholesale Level of Service as it provides to itself; (iii) charge a higher wholesale rate for water supply and transmission to Water Utility than that charged to the Seattle Retail Distribution System; (iv) reduce its water quality obligations hereunder; (v) change the methodology for calculating Rate of Return on Investment; (vi) restrict Water Utility's right to terminate the contract or reduce its purchase commitment; (vii) disband or significantly reduce the powers of the Operating Board; or (viii) amend any contract provision that will apply only to Water Utility.

**II.B. Agreement to Supply and Purchase Water**

1. Full Requirements Commitment. Seattle shall supply the Full Water Requirements of Water Utility for the term of this contract. Except as set forth in Exhibit I and section II.B.5 below, Water Utility shall purchase its Full Water Requirements from Seattle.

2. Adjustments in Water Utility's Service Area. In the event Water Utility acquires additional service area that is: 1) located outside of the service area identified in Exhibit X and 2) which is not already served with water from the Seattle Regional Water Supply System, then Seattle shall supply the Full or Partial Water Requirements, as appropriate, of the additional service area subject to a) the availability of water in the Seattle Regional Water Supply System determined on the same basis as would be applied to determine the availability of water for new or expanded wholesale service customers of Seattle; b) the limitation of geographical boundaries in Seattle's water rights claims or permits; and c)

Water Utility's payment of Facilities Charges ("FCs") for the service connections in that additional service area.

3. Assumption or Transfer of Responsibilities. In the event Water Utility's entire service area and service responsibilities are assumed by or are transferred to another utility or utilities, then this contract shall become null and void at the time the assumption or transfer becomes effective; provided, however, if the transferee of the service area is a Wholesale Customer, Seattle shall provide water to the transferee according to the terms of the transferee's water supply contract with Seattle. If the transferee is not a Wholesale Customer, then Seattle shall issue the transferee a water supply contract for such area subject to terms and conditions as Seattle shall determine.

4. Annexation by Seattle. If the entire service area of Water Utility is annexed to Seattle, then this contract shall become null and void upon the effective date of Seattle's assumption of Water Utility's water system.

5. Water Utility's Right to Terminate or Reduce Purchase Commitment. Water Utility's commitment to purchase water from Seattle under this contract may be terminated or reduced subject to the terms and conditions set forth below. Water Utility shall provide Seattle at least 5 years written notice of termination or reduction, provided, however, if Seattle unilaterally amends the terms and conditions of this contract pursuant to Section II.A.4 above, Water Utility may terminate this contract at any time within 1 year thereafter by giving Seattle 1 year written notice.

   a. Automatically Permitted Reductions. Water Utility may, without restriction, upon five years written notice to Seattle, reduce its water purchases from Seattle by an

amount not to exceed 10 million gallons per day ("MGD") of its average annual demand.

b. Reductions Requiring Permission. Water Utility may reduce quantities of water purchased from Seattle by more than 10 MGD or by providing less than five years advance notice of such reduction if in the judgment of the Operating Board, using the criteria listed below, it determines that such reduction is in the best interest of the Seattle Regional Water Supply System as a whole.

c. Criteria. The criteria to be used by the Operating Board in determining the best interest of the Seattle Regional Water Supply System shall include but not be limited to the following:

i. The potential for Stranded Costs and impacts on rates to either the remaining Wholesale Customers or Seattle;

ii. The cost of new resources;

iii. The feasibility and benefit of reallocating to Seattle or other customers the amount of water foregone by Water Utility; and

iv. Environmental aspects of the proposed change.

The Operating Board shall act promptly and reasonably in evaluating and deciding upon Water Utility's request. The Operating Board may approve, with or without reasonable conditions, or deny Water Utility's request based on the above criteria. Approval conditions may include a requirement that Water Utility waive its rights to be served its Full Water Requirements. If the approval conditions are unacceptable to Water Utility, it may elect in writing to withdraw its request and this contract shall continue in full force and effect.

## II.C. Continuity of Service within the Term of the Contract

1. Parity of Service. Seattle shall provide wholesale water to Water Utility at an equivalent Wholesale Level of Service that it provides to itself. In the event of a general emergency or weather-related water shortage affecting the entire Seattle Regional Water Supply System, general restrictions placed upon water deliveries to Water Utility shall be determined by the Operating Board and applied consistently to other Wholesale Customers and the Seattle Retail Distribution System. In the event of localized emergency problems, Water Utility acknowledges temporary, localized service interruptions may occur for the duration of the emergency.

2. Emergency Curtailment Measures. It is recognized by both parties that emergency water use curtailment measures may have to be adopted by Seattle to implement on a regional basis in order to meet an emergency condition or a regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other emergency factors, shall be as described in Seattle's Water Shortage Contingency Plan in effect as of the effective date of this contract, or successor contingency plans. Successor water shortage contingency plans shall be developed and implemented by Seattle in consultation with the Operating Board. Water Utility shall assist with and support all procedures or emergency curtailment measures that are implemented under the Water Shortage Contingency Plan, or its successor.

3. Other Emergencies. Seattle may temporarily interrupt or reduce deliveries of water to Water Utility if Seattle determines that such interruption or reduction is necessary or reasonable in case of system emergencies or in order to install equipment, make repairs, replacements, investigations and inspections or perform other maintenance work on the

Seattle Regional Water Supply System. Except in cases of emergency, and in order that Water Utility's operations will not be unreasonably interrupted, Seattle shall give Water Utility and the Operating Board reasonable notice of any such interruption or reduction, the reasons for and the probable duration. Seattle shall use its best efforts to minimize service interruptions to Water Utility.

4. Waiver Of Charges. If interruption or reduction in deliveries of water to Water Utility requires that Water Utility draw water supply in a manner that subjects Water Utility to demand charges (as described in Exhibit III hereto), Seattle shall waive such charges during the period of such interruption or reduction.

**II.D. Water Quality**

1. Seattle Regional Water Supply System. Seattle shall be responsible for water quality within the Seattle Regional Water Supply System as set forth below. Seattle shall construct, operate and maintain water quality treatment facilities and use its best efforts to carry out its water quality responsibilities in the most cost-effective manner for the region.

2. Applicable Standards. Seattle shall at all times during the term hereof deliver water to Water Utility's system that meets or exceeds all applicable Federal, State and local regulations as the same may change from time to time.

3. System-wide Water Quality Plan. Seattle, in consultation with the Operating Board, may develop and maintain a system-wide regional water quality plan. The plan shall describe, at a minimum, goals, objectives, procedures and the means to satisfy legal requirements and industry standards for water quality, monitoring, information exchange, best management practices, adaptive management practices, public health protection, and

cross connection control. The Operating Board may form a technical subcommittee to provide input and review of such plan. Seattle shall share available water quality data and technical expertise with all Wholesale Customers.

4. Distribution Systems. Water Utility shall be responsible for compliance with all applicable federal, State and local water quality laws and regulations applicable to water in its distribution system including any water from its own supply sources.

5. Monitoring. Water quality monitoring shall be performed by Seattle in the Seattle Regional Water Supply System and by Water Utility in its distribution system to comply with federal, State and local water quality regulations, to verify the condition of water that is passing from one entity to the other, to enhance system operation and to document the aesthetic qualities of the water. Notwithstanding the foregoing, Water Utility may contract with Seattle for water quality monitoring services as an elective service under section IV.F. hereof.

6. Water Quality Notifications to Customers (Consumer Confidence Reports). Each party shall prepare at its sole cost periodic water quality notifications to its respective retail customers and regulatory agencies as required by law. Seattle shall provide Water Utility all water quality data in a timely manner regarding the Seattle Regional Water Supply System that Water Utility may be legally required to report in such notices.

7. Water Quality Best Management Practices and Adaptive Management Practices. The Operating Board may develop best management practices ("BMPs") and adaptive management practices ("AMPs") as reasonably necessary to protect water quality within the Seattle Regional Water Supply System. The BMPs and AMPs will include recommendations to prevent deterioration of water quality in transmission and

distribution systems. The parties shall use reasonable efforts to comply with the BMPs and AMPs.

8. Flushing. Water Utility shall be solely responsible for flushing water mains within its system. Flushing allowances will be provided by Seattle only when the Operating Board determines that flushing is required to maintain or improve regional water quality.

9. New Water Sources. Prior to the introduction of any new water supply source, including any direct or indirect potable reuse water, by Water Utility which mixes with water in the Seattle Regional Water Supply System, the proposed source must be evaluated using customary and reasonable water quality criteria developed in consultation with the Operating Board to ensure compatibility with Seattle water and approved in writing by Seattle. The proposed Water Utility source must also meet all federal, state and Seattle water quality and treatment standards. Upon Seattle's request, Water Utility shall also provide Seattle with satisfactory results from a blending study to determine the compatibility of the source with existing sources already in the Seattle Regional Water Supply System, the appropriate method and level of treatment and the probable distribution of the new supply within the Seattle Regional Water Supply System. Water Utility shall also complete a flavor rating analysis of no more than 3.0 as tested by Seattle's flavor profile panel according to the methodology described by the American Water Works Association, or its successor. Water Utility shall obtain all necessary and appropriate regulatory permits, reviews, and approvals for rights to and operational use of such water supply source.

The Operating Board may form a technical subcommittee to develop water quality standards and review and advise on the water quality evaluation criteria for proposed new

sources. Such criteria for new sources shall be the same for surface water and ground water.

10. Transfers Outside the Seattle Regional Water Supply System. If, with the written consent of Seattle, water from the Seattle Regional Water Supply System is transferred between Water Utility and another water utility in a manner that does not use the Seattle Regional Water Supply System, Water Utility, the other water utility, or both, shall be fully responsible for meeting all applicable water quality standards related to the transfer of such water between their respective systems. Seattle will not be responsible for water quality outside of the Seattle Regional Water Supply System or Seattle Retail Distribution System except as may be agreed to under Section II.D.5.

**II.E. Conservation**

The parties acknowledge that conservation prolongs the time before new supply resources are needed and thus constitutes an important ongoing tool in managing the water resources of the region. Accordingly, Water Utility hereby adopts and agrees to be bound by the Regional Water Conservation Program, as it may be amended from time to time during the term of this contract. In accordance with Part 1, Section B.1.5 of the Settlement Agreement between the Muckleshoot Indian Tribe and the National Marine Fisheries Services and the City of Seattle (Civ. No. 03-3775JLR), Water Utility will implement, through its participation in the Regional Water Conservation Program, conservation measures that are substantially similar to those implemented by Seattle within the Seattle Retail Distribution System.

1. Performance Measurements. For the purposes of determining water conservation performance, Water Utility's water use shall be measured in conjunction with the use of all other participants in the Regional Water Conservation Program. The Operating Board

may develop reasonable criteria to measure the participants' water conservation performance in accordance with such program.

2. Conservation Above the Regional Water Conservation Program. Water Utility acknowledges that water conservation beyond the Regional Water Conservation Program may be required as a condition of State or federal regulations, court orders, settlements or agreements made to avoid litigation, fines or penalties, or as otherwise determined to be reasonably necessary by the Operating Board. The Operating Board may adopt reasonable additional conservation measures and targets for such purposes. Such conservation measures and targets shall apply in the same manner to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System. Except as provided in the next subsection, Water Utility shall implement such additional water conservation measures and meet the additional adopted targets.

3. Water Utility's Option to be Conservation Service Provider. Water Utility may elect to provide its own water conservation program, beyond its commitment to the Regional Water Conservation Program to meet conservation targets adopted by the Operating Board, or more stringent targets. Water Utility shall bear the additional costs thereof and shall be solely responsible for its implementation. Under this option, Water Utility shall be evaluated for meeting the additional water conservation targets solely by its own performance.

4. Incentives and Penalties. The Operating Board may adopt penalties for shortfalls in water conservation and rewards for meeting or exceeding adopted targets. In the event Water Utility or Seattle fails to meet the adopted targets set by the Operating Board, the Operating Board may assess a penalty. Penalties may not exceed the cost of Seattle

undertaking those conservation measures reasonably needed to achieve the adopted target.

5. Postponing the Need for New Water Supply Facilities. In order to avoid the necessity of developing new physical water supply facilities for as long as reasonably practicable, any water saved through conservation in either Seattle's or Water Utility's retail service areas shall be dedicated first to the municipal and industrial water supply requirements of the Seattle Regional Water Supply System before any other use of such water may be undertaken.

## SECTION III. CONDITIONS OF SERVICE

### III.A. Minimum Hydraulic Gradient

1. Initial Minimum. Seattle shall maintain a minimum hydraulic gradient or head at a maximum flow rate in amounts and at locations described in Exhibit II attached hereto for each Service Connection from the Seattle Regional Water Supply System to Water Utility's distribution system. Such gradients and locations shall be contained in Seattle's and Water Utility's future water system plans. Seattle shall operate and maintain the Seattle Transmission Facilities necessary to carry out such obligation. If Seattle and the Operating Board find that a project resulting in the modification of such minimum gradient or head would benefit the Seattle Regional Water Supply System as a whole, the minimum hydraulic gradient or head described in Exhibit II may be modified by Seattle if such modification is feasible from an economic, land use and engineering perspective taking into account the facilities required to carry out and for Water Utility to adapt to such modification. Seattle may make these modifications only once during any fifteen

(15) year period provided that four (4) years advance written notice is given to Water Utility, unless a shorter notice is approved by the Operating Board.

2. Emergencies. If Seattle is prevented by emergency circumstances from providing such minimum hydraulic gradient, Seattle shall supply not less than the volume of water equivalent to the maximum 24-hour average flow rate required by Water Utility as shown on Exhibit II for each 24 hour period that the minimum hydraulic gradient is interrupted.

3. Additional Service Connections. Additional Service Connections between Water Utility's and Seattle Regional Water Supply System's water systems or adjusted minimum gradients may be established from time to time by mutual agreement between Seattle and Water Utility subject to approval by the Operating Board. Exhibit II shall be appropriately revised to reflect such additions or adjustments.

### III.B. Resale to Other Parties

Water Utility may sell water supplied by Seattle to other water utilities located outside of Water Utility's existing or future service area only upon the prior written consent of Seattle (or oral, in case of emergency). Agreements for resale of water by Water Utility listed in Exhibit I are hereby approved by Seattle subject to whatever written terms, conditions and limitations that Seattle has imposed on such resale.

### III.C. Interconnection With Other Systems

1. Prohibition on Interconnection. Water Utility shall not interconnect any part of its system supplied with water from Seattle with other water systems without the prior written approval of the Operating Board, or, in case of emergency, upon oral approval by Seattle, which shall not be unreasonably withheld. Any such interconnection shall be subject to

the approval of the Washington State Department of Health and the installation of a meter. Such other systems must be in compliance with all applicable local, State and federal laws and regulations including the requirement that they have a valid operating permit issued by the Washington State Department of Health.

2. Requests by Seattle to Interconnect. Seattle may request that Water Utility interconnect its water system to the water system of an adjacent Wholesale Customer. Water Utility shall comply with that request subject to the terms and conditions set forth below.

a. Requirement for Interconnection. If Water Utility does not consent to Seattle's request for interconnection, Seattle may propose the interconnection of Water Utility's water system to the adjacent Wholesale Customer to the Operating Board. Water Utility may present facts and arguments to the Operating Board in opposition to the interconnection and document its costs in making the interconnection and conveying water to the adjacent Wholesale Customer. The Operating Board shall hear and consider the matter. Upon (a) a written finding by the Operating Board that the proposed interconnection with an adjacent Wholesale Customer is feasible taking into account Water Utility's capabilities, limitations, and obligations, (b) a written finding by the Operating Board that such interconnection benefits the Seattle Regional Water Supply System and (c) a written demand of the Operating Board that Water Utility carry out the interconnection, Water Utility shall be required to interconnect its facilities to the adjacent Wholesale Customer for the purpose of supplying water to that Wholesale Customer through the distribution system of Water Utility, provided that the adjacent Wholesale Customer agrees to perform the interconnection in a

location and according to a schedule which does not unduly disrupt Water Utility's operations, and to be responsible for the payment and indemnity obligations in Section III.C.2.b below.

b. Payment and Indemnity. Water Utility shall be paid its actual costs of providing such interconnection and water transmission service by the adjacent Wholesale Customer receiving the water, plus a reasonable amount for overhead, administration and rate of return (equal to Rate of Return on Investment) on such costs, and Water Utility shall be indemnified from any liability that may result from providing such interconnection by the adjacent Wholesale Customer. The Operating Board shall adopt a standard methodology for calculating costs that ensures that Water Utility is fairly compensated for such service.

### III.D. Development of Regional Supply and Transmission Infrastructure

Final decisions and authority to approve construction of capital infrastructure related to the Seattle Regional Water Supply System shall rest with the Seattle City Council. Capital construction activities include, but are not limited to installations, renewals, replacements, upgrades, expansions, and any other costs included in Seattle's comprehensive capital facilities plan.

### III.E. Metering Equipment

Seattle shall own and perform testing, cleaning and recalibration on appropriate metering devices and associated appurtenances to measure the amount of water delivered to Water Utility at the Service Connection pursuant to this contract. Seattle shall perform all other work at Water Utility's expense regardless of the cause provided that the cause is consistent with AWWA and

safety standards and practices. Water Utility shall operate and maintain its water system in a manner that the water flowing through the Service Connection meter operates within the normal operating range for the meter as specified by the manufacturer.

Until such time as Seattle determines it to be economical to install metering devices to measure the amount of water delivered from the Seattle Regional Water Supply System to the Seattle Retail Distribution System, the amount of water delivered to the Seattle Retail Distribution System shall be measured indirectly by subtracting the metered water delivered to all of Seattle's wholesale customers from 98% of the total amount of water exiting Seattle's sources of supply as measured by the supply meters.

## SECTION IV. COST OF WATER SUPPLY & TRANSMISSION

Cost-based rates are a water industry accepted practice and the historical practice of Seattle and the Wholesale Customers. The rate-making principles, policies and methodologies set forth in this Section IV are intended to meet the objective of equitable and cost-based rates.

### IV.A. Rate-making and Cost-allocation Principles

The parties will apply the following general principles and policies to the establishment of all rates, charges, and cost allocations for water supply, transmission, and related services under this contract.

1. No expenses attributable to electric power development may be allocated to the cost pools identified herein unless the pools are allocated a commensurate share of revenue derived from such development.
2. Seattle shall utilize generally accepted accounting principles, as may be amended from time to time, consistently applied as a basis for developing the financial information upon which rates and charges are based.

3. Abrupt changes in financial policies should be avoided.

4. The rate structure should encourage the efficient use of water, conservation and the timely development of new environmentally responsible water sources and should incorporate seasonal rates and other pricing approaches to encourage efficient use.

5. The rate structure should be innovative, flexible and adaptive whenever it is cost effective and beneficial in furthering the rate-making policies.

6. The rate structure should be simple to administer and easily understandable.

7. The rate structure should be fair and equitable while balancing the needs of all parties.

8. Capital costs which benefit only a new Wholesale Customer shall be allocated to that customer and not to any cost pool described in this contract.

9. Capital costs associated with improvements or facilities which benefit or serve individual Wholesale Customers or the Seattle Retail Distribution System may be allocated to a sub-regional or regional cost pool to the extent necessary to alleviate a disproportionate adverse impact to that Wholesale Customer or the Seattle Retail Distribution System from a regional or sub-regional capital improvement and where (i) such impact could have been reasonably avoided through a different project design, or (ii) the other Wholesale Customers, including the Seattle Retail Distribution System, receive tangible benefits, directly or indirectly, from the adopted capital facilities plan.

10. The Seattle Retail Distribution System shall be treated as the equivalent of a Wholesale Customer of the Seattle Regional Water Supply System for the purpose of charging Seattle the same wholesale rates and charges as Water Utility for water supply and transmission. Costs calculated under the costs pools described below shall apply to all Wholesale Customers and to the Seattle Retail Distribution System.

11. The allocation of costs associated with capital construction activities within the Seattle Regional Water Supply System shall be the responsibility of the Operating Board. The Operating Board shall use its best efforts to determine and approve a cost allocation method for infrastructure projects prior to the capital project obtaining construction approval from the Seattle City Council. Failure of the Operating Board to determine and approve a cost allocation method shall not hinder the Seattle City Council from approving capital infrastructure projects in order to assure Seattle's ability to fulfill the requirements of this contract.

12. All parties will use best efforts in establishing rates and cost allocations that reflect the rate-making and cost allocation principles set forth in this Section IV.A.

### IV.B. Ratemaking Framework

Subject to the foregoing principles, wholesale rates and charges for the services described in this contract shall be developed by Seattle based on the following framework:

1. Water Supply and Transmission Service. The costs of water supply and transmission of water shall be accounted for separately in the water supply and transmission cost pools described below. The price for each service shall be recovered through separate rates for each service. All direct costs incurred in providing water supply and transmission services shall be allocated to the appropriate cost pool and recovered through the rates for each service. In addition, certain indirect costs consisting of a reasonable overhead and administration cost shall be allocated to the appropriate cost pool and recovered through rates for each service.

2. Water Supply - Basic and Elective Services. The costs of supplying water falls into two categories – basic and elective services. Basic service costs include direct and indirect

costs attributable to the delivery of water to the Wholesale Customers and to Seattle's Retail Distribution System pursuant to the foregoing principles. Elective services are optional services, such as water quality laboratory services and specific engineering support that Seattle makes available.

3. Conservation. Costs incurred by Seattle for the Regional Water Conservation Program shall be allocated to the New Supply Cost Pool and the Operating Board will determine how to recover those costs either through rates or Facility Charges "FCs" from Wholesale Customers and Seattle.

### IV.C. Water Supply Pricing – Basic Services

1. Two Water Supply Cost Pools. For the purposes of determining costs of water supply, there shall be two cost pools: An existing supply cost pool ("Existing Supply Cost Pool") and a new supply cost pool (" New Supply Cost Pool").

   a. Existing Supply Cost Pool. The Existing Supply Cost Pool shall be accounted for as follows:

      i. A basic services rate for water supply shall be charged to recover the full costs of operating, maintaining, repairing, renewing and replacing the Existing Supply Resources incurred by Seattle.

      ii. All regional conservation programs undertaken by Seattle prior to January 1, 2002, shall be considered an Existing Supply Resource cost.

      iii. Renewal and replacement of Existing Supply Resources will be an Existing Supply Resource cost.

   b. New Supply Cost Pool. The New Supply Cost Pool shall be accounted for as follows:

i. Water supply resources developed after January 1, 2002 that expand the capacity of the Seattle Regional Water Supply System ("New Supply Resources"), including the costs of the Regional Water Conservation Program from January 1, 2002, shall be included in the New Supply Cost Pool. If any portion of a New Supply Resource project enhances reliability of Existing Supply Resources, the costs thereof may be allocated to the Existing Supply Cost Pool if the Operating Board and Seattle both agree.

ii. The cost of New Supply Resources plus Rate of Return on Investment may be recovered either through FCs or new supply rates charged to the holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System. The new supply rate shall be applied to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.

iii. The Operating Board shall determine the portion of the New Supply Resource costs that shall be recovered through FCs or through new supply rates. The FCs and new supply rates may be scalable to create an incentive for developers to build housing or commercial units with efficient water usage levels. Water Utility, as well as each other Wholesale Customer and Seattle in setting rates for retail customers shall be free to choose the method of incorporating FCs or new supply rates into their own retail rates and charges.

iv. Holders of Full and Partial Requirements Contracts who have not purchased water from Seattle under the 1982 Water Purveyor Contract shall be assessed the full marginal costs of the operation, including Rate of Return on Investment, of the New Supply Resources. This assessment may be satisfied by either paying FCs and new supply rates or arranging a special water supply rate in lieu of paying FCs.

c. Emergency Surcharge. In the event of a drought, catastrophe, or other extraordinary condition that requires emergency expenditures to maintain a sufficient water supply, Seattle may impose an emergency surcharge on all holders of Full and Partial Requirements Contracts in order to pay for such expenditures or maintain financial stability of the Seattle Regional Water Supply System, or both. Any such emergency surcharge shall be presented to the Operating Board prior to adoption by the Seattle City Council. Seattle shall consider the comments of the Operating Board but shall nevertheless have the full authority to adopt the emergency surcharge.

**IV.D. Transmission Pricing - Basic Services**

1. Transmission Costs Pools. For purposes of determining the cost of the transmission of water to the Wholesale Customers there shall be two transmission cost pools consisting of an existing transmission cost pool ("Existing Transmission Cost Pool") and a new transmission cost pool ("New Transmission Cost Pool").

a. Existing Transmission Cost Pool. Costs to be allocated to the Existing Transmission Cost Pool shall consist of the following: operation, maintenance, repairs, renewals, and replacements to the Seattle Transmission Facilities.

i. The Seattle Transmission Facilities are owned and operated as a regional network by Seattle to convey water to wholesale customers and to the Seattle Retail Distribution System. Therefore, the price of transmission for water transmitted within the Seattle Transmission Facilities shall be calculated on the same basis to holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.

ii. Costs incurred for purposes of transmission reliability may be included in the Existing Transmission Cost Pool subject to the approval of the Operating Board and Seattle.

b. New Transmission Cost Pool. The cost of new transmission facilities shall be included in the New Transmission Cost Pool. The renewal, replacement, upgrade, expansion, or modification of existing Seattle Transmission Facilities which create an expansion of transmission capacity may be allocated to the New Transmission Cost Pool. The Operating Board shall decide what portion of costs of renewal, replacement, upgrade, expansion or modification of existing Seattle Transmission Facilities may be allocated to the New Transmission Cost Pool and what portion of costs of a transmission project that extends the geographic extent of the transmission system that shall be allocated to the New Transmission Cost Pool or recovered from a new Wholesale Customer if the project benefits only that new Wholesale Customer. Except for costs allocated to a specific Wholesale Customer, New Transmission Cost Pool costs shall be recovered through new transmission rates or FCs as determined by the Operating Board. The new

transmission rate shall be applied in a uniform manner to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.

2. Demand Charge

a. Seattle may adopt a demand charge in accordance with the methodology described in Exhibit III. The demand charge rate (i.e., dollars per 1000 gallons of deficient storage) shall be based on the equivalent cost of providing the deficient storage.

b. The proceeds of the demand charge will be treated in rate setting as a credit to the New Transmission Cost Pool.

c. Seattle shall suspend the demand charge rate in the event of emergencies and unforeseen conditions.

3. Cost of New or Changed Service Connection. If Seattle requests a change in the location of the Service Connection to Water Utility for the benefit of the Seattle Regional Water Supply System, then the costs, including any retirement costs of the old Service Connection, shall be included in the appropriate transmission cost pool. If Water Utility requests a new Service Connection or a change in location of an existing Service Connection, then Water Utility shall pay the costs of the new or changed Service Connection, including any retirement costs of the old Service Connection regardless of the cause provided that the cause is consistent with AWWA and safety standards and practices.

### IV.E. Allocation of Costs and Revenues into Cost Pools

1. Accounting. Seattle shall maintain a cost accounting system consistent with the provisions of this contract and generally accepted accounting principles, as amended

from time to time, consistently applied in developing the financial information for determining the costs of acquisition, construction, repair, renewal, replacement, upgrade, expansion, maintenance, and operation of the facilities in each cost pool.

a. Asset Accounts. An asset account shall be maintained for each facility and within that account Seattle shall record the original cost of that facility plus betterments and less retirements.

b. Depreciation. Facilities shall be depreciated according to industry-standard water system asset lives and a record of life-to-date depreciation shall be maintained for each facility. No depreciation shall be recorded in the first calendar year of operation of a facility. A full year's depreciation shall be recorded in every subsequent year.

c. Net Book Value. The net book value of any facility shall be its original cost plus betterments and less retirements as recorded in its facility asset account, less life-to-date depreciation.

2. Infrastructure Costs. Each cost pool shall include the infrastructure costs for its respective facilities, calculated on a utility, cash or other basis depending upon the facility and the cost pool as set forth below.

a. Utility Basis. The utility basis shall be used to calculate the infrastructure costs for all Existing Supply Resources and Seattle Transmission Facilities, as well as their replacements and betterments. The utility basis may also be used for New Supply Resources and new transmission facilities in Seattle's discretion. Under the utility basis, the infrastructure cost for a facility in any year shall be the sum of (i) the annual depreciation expense recorded for that facility and (ii) the

product of the net book value of that facility and the Rate of Return on Investment.

At Seattle's discretion, interest costs may be considered current infrastructure costs during the construction of a facility. However, any such interest costs must be considered contributions in aid of construction, and not included in the Net Book Value of the facility for purposes of calculating Utility Basis costs in future years.

b. Cash Basis. The cash basis may be used in Seattle's discretion for New Supply Resources and transmission facilities or a portion thereof. Under the cash basis, the infrastructure cost for a facility in any year shall be the actual cash expenditure made by Seattle in that year for either the payment of construction costs or actual principal and interest costs on debt issued to finance its construction. In the event that the depreciation lifetime of the facility is less than the term of the debt issued to finance all or a portion of the facility, debt maturities will be selected such that the construction cost of the facility will be fully amortized at the end of its depreciation lifetime.

c. Other Basis. Seattle, with the approval of the Operating Board, may determine one or more other bases on which to calculate infrastructure costs and may apply these bases to facilities in the New Supply and New Transmission Cost Pools. Disposition of any facilities under another basis will be determined at the same time in accordance with Section IV.E.4.

3. Operations Costs. The costs of operating the assets assigned to a cost pool shall be included in the cost pool. The annual operations costs of a cost pool shall be the labor,

materials, equipment and other direct costs required for the operation, maintenance, and repair of the facilities in that cost pool, together with any net profit or expense from the disposition of facilities in that pool. Operations costs shall include the cost of general and administrative overhead applied in a manner consistent with its application to capital construction projects.

a. Existing Supply Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Supply Cost Pool shall be as follows: The operations cost base in the Existing Supply Cost Pool for the year 2010 shall be determined in accordance with the line item labeled "2010 Costs in identified activities" under Existing Supply in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the Existing Supply Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base from the previous year shall be adjusted by the percentage increase in the operations cost in the Existing Supply cost centers identified in Exhibit IX, as amended from time to time.

b. Existing Transmission Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Transmission Cost Pool shall be as follows: the operations costs base in the Existing Transmission Cost Pool for the year 2010 shall be determined in accordance with the line item labeled "2010

Costs in identified activities" under Existing Transmission in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the Existing Transmission Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base from the previous year shall be adjusted by the percentage increase in the operations cost in the Existing Transmission cost centers identified in Exhibit IX, as amended from time to time.

c. New Supply Operations Costs. The operation costs of the Regional Water Conservation Program after January 1, 2002, together with the costs of operating facilities assigned to the New Supply Cost Pool and any other costs allocated by the Operating Board, shall be assigned to the New Supply Cost Pool. The operations cost base in the New Supply Cost Pool for 2010 shall be determined in accordance with the line item labeled "2010 Costs in identified activities" under New Supply in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the New Supply Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base shall

be adjusted by the percentage increase in the operations costs in the New Supply cost centers as identified in Exhibit IX, as amended from time to time.

d. New Transmission Operations Costs. The actual costs of operating facilities assigned to the New Transmission Cost Pool and any other costs allocated by the Operating Board, shall be assigned to the New Transmission Cost Pool.

4. Disposition Costs. The costs of disposing of assets within a cost pool shall be included in the cost pool. Net disposition costs shall be calculated as follows:

a. Disposition Under the Utility Basis. The net book value of the facility, less any sales, salvage, or other revenues derived from the disposition of that facility.

b. Disposition Under the Cash Basis. The value of principal of unpaid maturities of debt used to finance the construction cost of the facility, less any sales, salvage or other revenues derived from the disposition of that facility.

c. Disposition Under Other Basis. Disposition of any facilities whose infrastructure costs are calculated on another basis under section IV.E.2.c. above shall be determined by the parties as part of the definition of such other basis.

5. Creation of Additional Cost Pools. Seattle, in its discretion, may create additional cost pools to provide equity and flexibility in payment arrangements and the allocation of costs as the Seattle Regional Water Supply System expands to include new infrastructure, operations, and customers. The costs in an additional cost pool, or a portion thereof, may be added to an existing cost pool subject to the consent of the Operating Board if the costs to be allocated satisfy the criteria for allocation to the existing cost pool.

6. Facilities Charge Revenues. Supply FC revenues, which consist of those revenues from FCs the Operating Board has determined are to recover a certain portion of New Supply

Resources costs, shall offset infrastructure costs in the New Supply Cost Pool. Surpluses and deficits in actual Supply FC revenues over costs to be recovered through the Supply FC shall be carried forward and earn simple interest at Seattle's Average Cost of Debt.

Any current-year deficit (including any surplus balance available from previous years) shall be paid by rates for the New Supply Cost Pool. New Supply Cost Pool rates shall be discounted by surplus Supply FC revenues until any deficit Supply FC balance is repaid, except the amount of this discount shall not exceed, without the agreement of the Operating Board, twice the maximum annual deficit paid by the rate for the New Supply Cost Pool in any one year.

In the event that Supply FC surplus balances exceed the Net Book Value of assets whose costs are allocated to the Supply FC, the difference between the Supply FC balance and the Net Book Value of these assets shall be used to discount the rate for the New Supply Cost Pool (and the Supply FC surplus balance shall be reduced by the amount of this discount). The use and accounting for transmission FCs shall be done in a like manner to supply FCs. Seattle and Water Utility agree that FC revenues are the sole property of Seattle.

7. Allocation of Cost Pools by Customer Class. The costs in cost pools shall be allocated within the pools as follows:

   a. Allocation of Existing Supply Cost Pool. The total cost of the Existing Supply Cost Pool shall be allocated to two customer classes as follows:

      i. Block Purchase Customer Class. The portion of costs in the Existing Supply Cost Pool allocated to holders of Block Purchase Contracts shall be determined pursuant to those contracts.

ii. Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated the remaining costs in the Existing Supply Cost Pool.

b. Allocation of New Supply Cost Pool. The costs allocated to the New Supply Cost Pool shall be:

i. Block Purchase Customer Class. The holders of Block Purchase Contracts shall be allocated no costs from the New Supply Cost Pool.

ii Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated all costs in the New Supply Cost Pool.

c. Allocation of Existing Transmission Cost Pool. The costs of the Existing Transmission Cost Pool shall be allocated as follows:

i. Block Purchase Customer Class. The proportion of costs in the Existing Transmission Cost Pool allocated to holders of Block Purchase Contracts shall be determined pursuant to those contracts.

ii Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated the remaining costs in the Existing Transmission Cost Pool.

d. Allocation of New Transmission Cost Pool.

i. Block Purchase Customer Class. The holders of Block Purchase Contracts shall be allocated no costs from the New Transmission Cost Pool.

ii Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated all costs in the New Transmission Cost Pool.

e. Allocation of Additional Cost Pools. At the time an additional cost pool is created by Seattle pursuant to Section IV.E.5, the additional cost pool will be allocated by customer class.

8. Facilities Charges. If Seattle establishes FCs as authorized herein, then such charges shall be calculated as follows:

a. ERU Definition. Seattle shall develop a definition of an Equivalent Residential Unit ("ERU") based on, meter size as set forth in Exhibit VI, number of residential units, water use, or other basis which shall be consistent with accepted industry standards. The Operating Board shall have the right to review and comment on the definition and Seattle shall consider the Operating Board's comments.

b. Record-Keeping. Water Utility shall provide Seattle with an annual accounting, in a form acceptable to Seattle, of its retail water service connections by January 31st of each year, which shall be accurate as of December 31st of the preceding year. Water Utility shall report the size of the meter and other pertinent data such as the number of residential units or square footage served or water use. Seattle shall provide Wholesale Customers with an annual accounting of its retail service connections on the same basis. Upon reasonable notice, Water Utility shall make its billing and connection records available to Seattle for inspection and copying

during normal business hours and Seattle's billing and connection records shall be made available to any Wholesale Customer on the same basis.

c. Annual Calculation of ERUs. Until such time as Seattle develops another basis, the calculation of ERUs in any year shall be the annual growth in the number of meters installed by Water Utility during the year taking into account the size of each meter.

d. Imposition of Facilities Charges. Seattle shall collect and Water Utility shall pay FCs based on the following:

i. the number of ERUs added during the previous month determined by the number of meters installed. Seattle shall pay FCs into the accounts of the Seattle Regional Water Supply System on the same basis.

ii. Seattle Report on ERUs. Seattle shall prepare and distribute a report no later than March 31st of each year showing the ERU count of the Seattle Retail Distribution System and each Wholesale Customer on such basis for the previous year and each year since the effective date of this contract.

e. Rate Setting. The structure of FCs or water rates charged to the holders of Full and Partial Requirements Contracts shall be determined by Seattle, at its sole discretion, except that the price may not, without the consent of Water Utility, be set to collect more than the costs forecast under Section IV hereof and Rate of Return on Investment. FCs shall be calculated as set forth on page 1 of Exhibit VI.

9. Cost Audit. At the end of each fiscal year, Seattle shall provide a statement of actual costs allocated to each cost pool and other costs and revenues received, which statement may be audited by an external auditor selected by the Operating Board. In addition,

Water Utility may have the statement audited by an external auditor of its choice, solely at Water Utility's expense.

10. Transition.

a. Settling the Purveyor Balance Account. The parties agree that they will settle the Purveyor Balance Account, as that term is used in Section III.I of the 1982 Water Purveyor Contract, in the following manner no later than December 31, 2011, unless the parties enter into a payment agreement in accordance with this subsection. The Purveyor Balance Account shall be credited if there is a surplus or charged if there is a deficit, to the Wholesale Customers who remained under the 1982 Water Purveyor Contract until the Effective Date of this contract. The Purveyor Balance Account as of December 31, 2010 (which will be finally audited in the 3rd quarter of 2011), shall be prorated by each of those Wholesale Customer's share of the total Purveyor demand (e.g flow) since the most recent year that the balance was at zero. There will be separate prorations for the Old Water and New Water accounts as those terms are defined in the 1982 Water Purveyor Contract. In the event the appropriate credits or charges are not or cannot be paid in full by December 31, 2011, the parties shall be entitled to pay the appropriate credits or charges over a term of up to three years with the then current interest at Seattle's Average Cost of Debt. The specific terms of any payment agreement between the parties shall be reasonable and subject to the review and approval of the parties.

b. Prior Operating Board Decisions. Water Utility acknowledges and agrees it will be bound by decisions the Operating Board has made under the authority in this

contract that have been made prior to the Effective Date of this contract so that such decisions apply to all holders of Full and Partial Requirements Contracts.

c. Application of Facilities Charges based on Meter or Connection Size. Seattle and Water Utility acknowledge and agree that Water Utility has unresolved concerns relating to guidance issued by the Operating Board in 2002 regarding the application of FCs based on meter or connection size where other requirements (e.g. operational, regulatory) may dictate the meter or connection size, and therefore, may not be an appropriate indicator of the annual demand placed on water supplies. The parties agree that circumstances have changed since that guidance was issued that warrant reconsideration of the guidance. Therefore, Seattle will initiate a discussion with the Operating Board in 2011, which Water Utility may participate in to present its concerns, and will endeavor to resolve the issue for action by the Operating Board as soon as practicable after Water Utility becomes represented by the Operating Board.

d. Waiver of Facilities Charges. Seattle shall not charge Water Utility FCs until January 1, 2012 if the amount of water it purchases from Seattle does not exceed its old water allowance under the 1982 Water Purveyor Contract. This waiver, however, shall not relieve Water Utility from the record-keeping requirement of subsection IV.E.8 above.

e. Transition Growth Surcharge. A transition growth surcharge of $0.60 per CCF shall be applied to the rates of Water Utility for delivery of water in excess of the old water allowance of the 1982 Water Purveyor Contract through December 31, 2011. The revenue from this surcharge shall be used to discount the base rates of

the holders of Full and Partial Requirements Contracts by not more than $0.16 per CCF. In the event that the revenues generated by the surcharge exceed those required to fund the discount, Seattle may keep the difference.

f. Early Contract Signing Fee. Within two months of the Effective Date of this contract, Water Utility agrees to pay to Seattle an Early Contract Signing Fee of $13,235. If Water Utility requires a longer period, it may pay the fee in monthly increments until December 2011 at 1% interest.

g. Transfer to Full and Partial Rates and Facilities Charges.

i. Within two months of the Effective Date of this contract, Seattle will: 1) make appropriate changes to its billing system to charge Water Utility for water supplied under this contract at the then current rates for Full or Partial Requirements Contracts under Seattle Municipal Code ("SMC") Section 21.04.440.E.2 ("Billing System Change Date"); and 2) credit back to Water Utility the difference between the amount Water Utility paid for water supplied at the then current rates for Water Purveyor Contracts under SMC 21.04.440.E.1 and what the Water Utility would have paid for water supplied at the then current rates for Full or Partial Requirements Contracts under SMC 21.04.440.E.2 from January 1, 2011 until the Billing System Change Date.

ii. Within two months of the Effective Date of this contract, Water Utility will submit to Seattle an accounting of the number of retail connections made to its water system between January 1, 2011 and the Effective Date of the contract and payment of any FCs at the then current FC rate under

SMC 21.04.440.E.2 that would have been paid in accordance with this contract from January 1, 2011 until the Effective Date of this contract.

h. Existing Regional Deficit. The parties acknowledge and agree that as of December 31, 2010, there may be an existing regional deficit or surplus in the running balance under Section IV.I.1 that was created by Wholesale Customers signing contracts prior to 2011 and the Seattle Regional Distribution System. Although Water Utility did not contribute to the existing deficit or surplus, it will have to pay higher or lower rates in the 2012-2014 rate period to help eliminate the deficit or surplus, respectively. In the event of a deficit, Seattle agrees to credit back to Water Utility, 70% of the amount that Water Utility will contribute to eliminating the existing deficit through higher rates. In the event of a surplus, Water Utility agrees to pay Seattle 70% of the amount that Water Utility will benefit from eliminating the existing surplus through lower rates. The actual amount of the existing deficit or surplus will be determined during the annual cost audit process for 2010, which is targeted for third quarter 2011. The amount to be credited or charged will be based on Water Utility's percentage of 2010 annual flow times the total existing regional deficit or surplus times 70%. Upon the completion of the 2010 annual cost audit process, Seattle will provide Water Utility with an accounting of the total credit or charge in writing. Beginning January 2012, Seattle will provide one or more monthly credits or charges on Water Utility's water bill until the entire credit or charge balance is paid off. Seattle or Water utility, as appropriate, will pay the entire balance by December 31, 2012. Any outstanding credit or charge balance will accrue interest at

Seattle's average cost of debt from December 31, 2010 until the entire balance is paid off.

**IV.F. Elective Services**

1. Water Supply Services. Seattle may provide certain elective services (e.g. conservation, engineering) to Water Utility upon request by Water Utility. Such services shall be negotiated and contracted for separately between Water Utility and Seattle.

2. Transmission Wheeling. In consultation with the Operating Board, excess transmission capacity may be made available by Seattle for a fee for purposes of wheeling water between points within the Seattle Regional Water Supply System to Water Utility or to others.

3. Water Quality. So long as Seattle owns and operates a water quality lab, Water Utility may request the services of that lab based on its published rates.

**IV.G. Rate Adjustment**

1. Rate Adjustment. Upon 120-days notice to Water Utility of its intent to do so, Seattle may adjust water service rates and FCs to Water Utility subject to the terms of this contract. Rate adjustments will be effected only within five years of the completion of a cost of service study to be conducted by Seattle, which shall include an analysis of the allocation of operation, maintenance and capital costs between cost pools. Such study shall be prepared in accordance with accepted industry standards. In addition, Seattle shall review the Operating Board's comments and recommendations on the rate proposal and provide a written explanation of any recommendations that are not accepted.

2. Rate Consultant. An independent rate consultant shall be selected by Seattle in consultation with the Operating Board. Detailed information and progress reports from

the consultant will be made to Water Utility during the course of the study upon drafting of each major study section directly affecting Water Utility and other Wholesale Customers. A final consultant report shall be made available to Water Utility not less than 30 days before Seattle formally transmits any resulting rate adjustment proposal to the Operating Board.

### IV.H. Retail Rate-Setting

Each party to this contract shall have sole authority for establishing retail rates, connection charges and other fees and charges within its respective jurisdiction.

### IV.I. Truing Actual Costs and Actual Revenues

A mechanism for reconciling revenue targets for the various cost pools and the actual revenues received during each year shall be implemented by Seattle as follows:

1. For each previously identified class of customers in each cost pool, Seattle shall maintain a running balance of the excess or deficit of actual rate revenues collected less actual expenses incurred. Each balance shall earn simple interest at the rate of Seattle's Average Cost of Debt. At the end of each year, each balance shall be adjusted to reflect the operating results of that year. The statement of these balances shall be reviewed and approved by an external auditor.
2. FC balances shall be carried forward as set forth in Section IV.E.6.
3. Each wholesale rate study shall adjust rates to eliminate the cost pool balances. ERU fees shall be based on the costs of increments in supply and transmission capacity, and shall not be adjusted to reflect surpluses or deficits in FC revenues.

SECTION V. **OPERATING BOARD**

1. Purpose. The purpose of the Operating Board is to provide certain limited authority to a board of representatives over policy and operational matters as they affect the Seattle Regional Water Supply System.

2. Structure and Authority. The Operating Board shall have the powers and authority as set forth herein. Exhibit IV describes the structure and authority of the Operating Board. In the event of a conflict between provisions of this contract which grant specific powers to the Operating Board and Exhibit IV, such grants of specific powers shall control.

3. Review. The structure and authority of the Operating Board may be reviewed as of January 1, 2012 and every five years thereafter to determine its effectiveness in addressing regional and contractual issues. The review may address the composition of the Board and its powers and authority as set forth herein and in Exhibit IV, provided that notwithstanding any other term or provision of this contract, Seattle shall not have the power to disband the Operating Board nor take away or diminish the powers vested in the Operating Board as set forth in Sections II, III and IV of this contract. Either party may initiate the review. The reviewing party shall provide the other with its comments and proposals. The parties agree to consider the other party's comments and proposals and to respond in writing stating its reasons for rejecting any proposals and the reasons for its own counter-proposal. After consideration of all comments and proposals at each five year interval, Seattle may make changes in the structure and authority of the Operating Board that are not inconsistent with the provisions of this subsection.

SECTION VI. **PLANNING**

### VI.A. Reporting of Planning Data

1. By no later than April 1 of each year, Water Utility shall report to Seattle and the Operating Board as follows:

   a. Its annual and peak day total system demand for each year, during the term of this contract, as of December 31st of the previous year.

   b. Its forecast of Full or Partial Water Requirements, as appropriate, for the year including estimates of annual water consumption and maximum 24-peak demand for the ensuing calendar year, and for the fifth, tenth, and fifteenth year in the future. Such forecasts shall reflect the best judgment of Water Utility.

2. Water Utility shall report other data relating to water supply and demand as may be reasonably requested by Seattle for water planning purposes.

3. Records relevant to water supply and consumption within the possession of Seattle or Water Utility shall be provided to the other upon reasonable request.

### VI.B. Submittal of Water Utility Water System Plans

Water Utility shall provide a copy of its water system plan, including any amendments, to Seattle for review.

### VI.C. Seattle as Water Planning Agency

Seattle shall be the lead agency and primary planning authority for the purposes of fulfilling its obligations to provide for the Full or Partial Water Requirements of Water Utility, as appropriate. Seattle, in consultation with the Operating Board, shall examine and investigate water supplies suitable and adequate to meet the present and reasonable future needs of Seattle and the

Wholesale Customers. Seattle shall prepare and adopt a plan for acquiring such water supplies in a timely fashion. The plan shall provide for the lands, waters, water rights and easements necessary therefor, and facilities for retaining, storing and delivering such waters, including dams, reservoirs, aqueducts and pipelines to convey same throughout the Seattle Regional Water Supply System. In preparing or adopting the plan, Seattle shall consider as possible alternatives or additional water supply sources, the acquisition of water from sources controlled or developed by individual water utilities, legally constituted groups of water utilities or utilities which are not presently supplied by the Seattle Regional Water Supply System. Seattle has final responsibility for the plan and for fulfilling the obligations of this contract. However, the Operating Board may participate in developing the plan by proposing goals and objectives for the Seattle Regional Water Supply System, by making any additional suggestions and by acting in a review capacity.

### VI.D. Comprehensive Capital Facilities Plan

Before ordering any major improvements to fulfill the requirements of this contract, Seattle shall adopt and maintain a comprehensive capital facilities plan for the Seattle Regional Water Supply System, which provides for such improvements. Any capital facilities plan adopted by Seattle for the Seattle Regional Water Supply System shall comply with and implement the Rate-making and Cost Allocation Principles in Section IV.A of this contract. This plan shall identify any reasonable costs for capital improvements to alleviate a disproportionate adverse impact to the distribution system(s) of Water Utility, another Wholesale Customer represented on the Operating Board or Seattle, to the extent it is caused by a capital improvement in the capital facilities plan for the Seattle Regional Water Supply System. When such plan is updated or amended, it shall be reviewed by the Operating Board prior to submission to the Seattle City Council. The Operating Board shall respond within 60 days of receipt of the plan, or its approval

shall be presumed to be given. The response submitted by the Operating Board regarding facilities substantially affecting Water Utility and other Wholesale Customers shall be seriously considered by Seattle. Seattle shall reply to the Operating Board within 90 days with its comments. The Operating Board and Seattle shall use their best efforts to arrive at a mutually acceptable plan.

### VI.E. Emergency Planning

An emergency plan shall be prepared and maintained by Seattle as part of its Water System Plan to provide for water supply in the event of drought or disaster. Such plan shall be prepared pursuant to the procedure outlined in Section VI.D. Water Utility shall use reasonable efforts to comply with the provisions of such plan, or alternatively, Water Utility may adopt its own emergency plan if it believes it is prudent to do so.

## SECTION VII. PAYMENT

### VII.A. Collection of Money Due City

Seattle shall bill Water Utility on a monthly basis for all charges due under this contract. Water Utility shall pay such charges within 60 days of the billing date.

### VII.B. Penalties for Late Payment

All late payments, and any refund of an amount in dispute that was paid under protest, shall accrue interest at 1% per month.

### VII.C. Billing Disputes

Water Utility may dispute the accuracy of any portion of charges billed by Seattle by notifying Seattle in writing within the 60-day payment period of the specific nature of the dispute and paying the undisputed portion of the charges. This provision is not intended to limit Water

Utility's right to dispute billing errors or charges that are not reasonably discoverable by Water Utility within the 60-day payment period.

Seattle shall consider and decide any billing dispute in a reasonable and timely manner. Any billing disputes that remain after such consideration shall be reconciled pursuant to the dispute resolution procedures of this contract.

SECTION VIII. **CONTRACT AMENDMENTS**

Seattle shall notify Water Utility and all other holders of Full or Partial Requirements Contracts of any amendments to such contracts within 30 days of the execution of such amendment. Water Utility shall then have 90 days to decide whether to include such amendment in this contract by giving written notice to Seattle of its election to do so. Upon the issuance of such notice, Seattle shall issue the amendment to Water Utility and the amendment shall be final and binding upon both parties upon mutual execution.

SECTION IX. **DISPUTE RESOLUTION**

Dispute resolution shall proceed as follows:

**IX.A. Operating Board Review**

Any dispute regarding this contract that remains unresolved after good faith negotiations between Water Utility and Seattle shall be referred to the Operating Board for consideration and recommendation. Each party shall submit a written statement regarding the dispute to the Operating Board.

1. If the dispute cannot be resolved in discussions with the Operating Board, then the Operating Board shall provide written recommendations to each party within 60 days of the above submittal setting forth its interpretation of the applicable facts and law.

2. If either party rejects the written recommendation of the Operating Board, that party shall, within 10 days, notify the other party in writing of its reasons.

### IX.B. Seattle City Council Review

The written statements of the parties, the recommendations of the Operating Board, if applicable, and the written reasons for either party's rejection of those recommendations shall then be submitted to the Seattle City Council for review.

1. Within 60 days of the submittal of the written materials, the Seattle City Council shall provide written recommendations to resolve the dispute.
2. If either party rejects the written recommendation of the Seattle City Council, that party shall, within 10 days, notify the other party in writing of its reasons.

### IX.C. Non-binding Mediation

Within 10 days of receiving the written rejection of the Seattle City Council's recommendations by one or both parties, each party shall designate in writing not more than 5 candidates it proposes to act as a non-binding mediator.

1. If the parties cannot agree on one of the mediators from the combined list within 5 days, the Operating Board shall, within an additional 5 days, select one of the mediators from either list to serve as mediator.
2. Upon selection of the mediator, the parties shall use reasonable efforts to resolve the dispute within 30 days with the assistance of the mediator.

### IX.D. Resort to Litigation

If mediation fails to resolve the dispute within 30 days of selection of the mediator, the parties may thereafter seek redress in court subject to Section X.H below.

### IX.E. EFFICIENCY OF REVIEW

In order to facilitate a more efficient review of disputes under this Section, the Parties agree to skip the step in Section IX.A above in order to avoid a redundant act. The Parties may also mutually agree to skip the step in Section IX.C, if it is in the best interests of the Parties in resolving the dispute.

## SECTION X. MISCELLANEOUS

### X.A. Notification

Whenever written notice is required by this contract, that notice shall be given to the following representatives by actual delivery or by the United States mail (registered or certified with return receipt requested,) addressed to the respective party at the following addresses or a different address hereafter designated in writing by the party):

| SEATTLE: | WATER UTILITY: |
|---|---|
| Director | Public Works Manager |
| Seattle Public Utilities | City of Duvall |
| Seattle Municipal Tower | PO Box 1300 |
| 700 Fifth Ave., Suite 4900 | Duvall, WA 98019 |
| PO Box 34018 | |
| Seattle, WA 98124-4018 | |

The date of giving such notice shall be deemed to be the postmarked date of mailing.

### X.B. Severability

The purpose of this contract is to provide for long-term water supply planning and certainty for both Seattle and Water Utility through adoption of orderly plans calling for the expenditure of significant sums of money for regional water supply and transmission facilities. It is the intent of the parties that if any provision of this contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this contract or its application to other entities, or circumstances shall not be affected. The remaining provisions shall continue in full force and effect, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular invalid provision; provided, however, if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and non-feasible, is found to seriously affect the consideration and is inseparably connected to the remainder of the contract, the entire contract shall be null and void.

### X.C. Consent

Whenever it is provided in this contract that the prior written consent or approval of either party is required as a condition precedent to any actions, in each such instance said consent or approval shall not be unreasonably withheld, and in each such instance where prior consent is sought, failure of the party to respond in writing within 90 days of the request shall be deemed as that party's consent or approval unless expressly stated herein. This provision does not apply to requests for amendments of this contract.

### X.D. Emergency Situations

Nothing in this contract shall be deemed to preclude either party from taking necessary action to maintain or restore water supply in emergency situations and such action shall not be deemed a violation of this contract.

### X.E. No Joint Venture - Individual Liability

This is not an agreement of joint venture or partnership, and no provision of this contract shall be construed so as to make Water Utility individually or collectively a partner or joint venturer with any other Wholesale Customer or with Seattle. Neither party is an agent of the other. Neither Seattle nor Water Utility shall be liable for the acts of the other in any representative capacity whatsoever.

### X.F. Complete Agreement

This contract represents the entire agreement between the parties hereto concerning the subject matter hereof. This contract may not be amended except as provided herein.

### X.G. Relinquishment of Prior Contract

Upon the Effective Date of this contract, Water Utility relinquishes its then existing 1982 Water Purveyor Contract with Seattle and the terms and conditions of that 1982 Water Purveyor Contract shall have no further force and effect.

### X.H. Venue, Jurisdiction and Specific Performance

In the event of litigation between the parties, venue and jurisdiction shall lie with the King County Superior Court of the State of Washington. The parties shall be entitled to specific performance of the terms hereof.

### X.I. Default

In the event of default of any provision of the contract, the non-defaulting party shall issue written notice to the other party setting forth the nature of the default. If the default is for a monetary payment due hereunder, the defaulting party shall have thirty (30) days to cure the default. In the event of other defaults, the defaulting party shall use its best efforts to cure the default within ninety (90) days. If such default cannot be reasonably cured within such ninety (90) day period, the defaulting party shall, upon written request prior to the expiration of the ninety (90) day period be granted an additional sixty (60) days to cure the default.

### X.J. Force Majeur

The time periods for the parties' performance under any provisions of this contract shall be extended for a reasonable period of time during which a party's performance is prevented, in good faith, due to fire, flood, earthquake, lockouts, strikes, embargoes, acts of God, war and civil disobedience. If this provision is invoked, the parties agree to immediately take all reasonable steps to alleviate, cure, minimize or avoid the cause preventing such performance, at their sole expense.

### X.K. Successors

This contract shall inure to the benefit of and be binding upon the parties and their successors and assigns.

### X.L. Exhibits

Exhibits I through X are attached hereto and are hereby incorporated by reference as if set forth in full herein.

## SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereby execute this contract.

THE CITY OF DUVALL

BY: _____

TITLE:_____

DATE _____

AUTHORIZING LEGISLATION: ORDINANCE/RESOLUTION _____

THE CITY OF SEATTLE

BY: _____
Director, Seattle Public Utilities

DATE:_____

AUTHORIZING LEGISLATION: ORDINANCE No.

## SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereby execute this contract.

THE CITY OF DUVALL

BY: _____

TITLE: Mayor, City of Duvall

DATE 3/24/11

AUTHORIZING LEGISLATION: ORDINANCE/RESOLUTION AB11-14

THE CITY OF SEATTLE

BY: _____
Director, Seattle Public Utilities

DATE: 5/5/11

AUTHORIZING LEGISLATION: ORDINANCE No.

## LIST OF EXHIBITS

I. Contract Sections II.B and III.B list

II. Service Connections, Minimum Hydraulic Gradients, and Maximum Flow Rates of Water Supplied

III. Demand Charge Methodology

IV. Operating Board Structure

V. Reserved

VI. Calculation of ERUs as a Part of Facilities Charges

VII. Seattle Supply Facilities

VIII. Seattle Transmission Facilities

IX. Cost Centers used for Operations Cost Indexes

X. Water Utility Service Area

**EXHIBIT I**

List of documents, commitments, adjustments, reductions, agreements, and/or written approvals by Seattle regarding the supply, purchase or resale of water according to Sections II.B. and III.B of this Contract:

1. Intertie Agreements:

| Entity/location | Meter Size | Capacity | Type of Service | Comment |
|---|---|---|---|---|
| City of Duvall near intersection of Big Rock Road and Tolt River Pipeline | -- | As needed | Continuous | See Below* |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

2. Independent Well Sources:

3. Water Supply Contracts To Other Water Utilities:

*The City has an intertie with the Water District 119 from which five customers of the District are supplied in an area not yet connected to the District's main system. This will eventually become an emergency intertie with Water District 119 when the District mains are further extended to that location.

**EXHIBIT II**

# SERVICE CONNECTIONS, MINIMUM HYDRAULIC GRADIENTS, AND MAXIMUM FLOW RATES OF WATER SUPPLIED

| SERVICE CONNECTION[1] | | | | MINIMUM HYDRAULIC GRADIENT FOR PLANNING PURPOSES AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum) | MAXIMUM FLOW RATE UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT APPLIES (gpm) [3,4] |
|---|---|---|---|---|---|
| LOCATION | STATION NUMBER [2] | PIPELINE SEGMENT NUMBER[2] | SIZE OF METER (IN.) | | |
| Tolt Pipeline & Big Rock Road NE | 112 | 23 | 6 | 645 | 1,800 |
| Tolt Pipeline near Pipeline station 714 (275 Ave NE) | 111 | 23 | 4 | 640 | backup |
| | | | | TOTAL: | 1,800 |

**Notes:**

(1) Water is provided to Service Connections at a Wholesale Level of Service.

(2) Station and Pipeline Segment Numbers pertain to cost allocations and the demand metering program.

(3) City of Seattle's estimate of Water Utility's average daily demand for 2030 with a peaking factor of 2.0 for peak day use.

(4)

**EXHIBIT III**

# DEMAND CHARGE METHODOLOGY

The policy of Seattle Public Utilities is to supply water to its Wholesale Customers at, as near as is practical, the twenty-four hour average flow rate, during the peak demand season (June through August). To comply, the Wholesale Customers have to construct adequate storage volume within their individual systems, or sometimes collectively, so as to avoid excessive peak flow withdrawals from the Seattle Transmission Facilities. The Demand Metering Program is established to set performance standards, and to monitor the Wholesale Customer's compliance with this policy. If an individual Water Utility exceeds the prescribed threshold, a "demand charge" is calculated.

Except where other agreements supersede the provisions of this contract, each Water Utility shall be subject to a demand charge based on effective deficient storage, as determined by the peak instantaneous flow rate, and the equivalent financing costs to provide storage. The demand charge rate (i.e., dollars per 1000 gallons of deficient storage) shall be based on the equivalent cost of providing the deficient storage. This rate will be determined as part of each rate study.

The Demand Metering Program is charged with implementation of the "demand charge" methodology. It shall be the responsibility of Seattle, in consultation with the Operating Board, to determine the appropriate means to achieve the program's purpose. The options that may be considered range from temporary suspension on a year by year basis to full activation, as described below.

There shall be no requirement for Seattle to install demand-metering equipment at each Service Connection in order to assess a demand charge. Seattle may choose to apply "demand metering" selectively to certain parts of the Seattle Transmission Facilities that are designated as "critical" from the standpoint of hydraulic capacity or other operational considerations. Seattle may choose to apply "demand metering" intermittently in various parts of the Seattle Transmission Facilities for the purpose of monitoring for compliance by individual Wholesale Customers or groups of Wholesale Customers on a given line segment.

**EXHIBIT IV**

# OPERATING BOARD STRUCTURE

1. Structure. The Operating Board (or "Board") shall be structured as follows:

   a. The Board shall consist of seven (7) members, composed of three members representing Seattle Public Utilities (SPU), three members representing Seattle's Wholesale Customers selected as described below and one independent party selected as set forth below to be a tie-breaker as needed. Board members shall, to the best of their ability, act in the best interests of the Seattle Regional Water Supply System as a whole and shall not represent the interest of a group of utilities or an individual utility.

   b. The term of each Board position shall commence on January 1 and shall be for four (4) years. Terms of each Board position shall be staggered such that no more than two positions are renewed in any single year. Board members may serve not more than three successive terms.

   c. Three Board members representing the Wholesale Customers will be selected from the holders of Full and Partial Requirements Contracts . Wholesale Customers will be sorted into three categories based on utility size. The selected categories will be small, medium and large utilities, which will be made up from approximately equal numbers of holders of Full and Partial Requirements Contracts. Each category of utility may elect, by majority vote (one vote per utility) its representative to the Operating Board. The Board will be recomposed on January 1, 2012 and every 5 years thereafter.

   d. The seventh member of the Board shall be a person having expertise in the operations of regional water supply systems. Such person shall be selected by majority vote of the other Board members. In the event of a deadlock in selecting the independent representative, the independent Board member shall be selected by Judicial Arbitration and Mediation Services Inc., of Seattle, Washington or its successor. The seventh member shall not vote on issues coming before the Board unless there is a deadlock in the voting among the other six Board members. The seventh member may nevertheless express his or her opinions in Operating Board discussions. Such member shall have no employment, financial or contractual relationship with Seattle nor any Wholesale Customer or any other actual or apparent conflict of interest in holding this position.

2. Voting. Except as otherwise provided above, each member of the Board shall have one vote on all matters coming before the Board. Each Board member may appoint an alternate to vote in his or her absence. A quorum of four (4) Board members present shall be required for any vote. Members of the Board may not grant proxies for any vote.

3. Chairperson. The Board shall have a Chairperson who will be selected and have duties as defined below:

   b. The Chairperson shall be selected at the first regularly scheduled meeting of each new year.

c. All Chairpersons shall be selected by the Board using a nomination and voting process.

d. Nomination for the position of Chairperson shall be taken from Board members. The Chairperson shall be selected based upon the simple majority vote of Board members. Should the Board fail to elect a Chairperson at the first regularly scheduled meeting of the new year, a designated representative from SPU shall be the Acting Chairperson until such time as the Board elects a Chairperson.

e. The Chairperson shall have the responsibility to call meetings, determine the agenda and preside over meetings. In the absence of the Chairperson, for whatever reason, a designated representative from SPU shall be the Acting Chairperson for that meeting. The Chairperson shall also act as the spokesperson for the Board and liaison between the Administrator and the Seattle City Council's Committee on Seattle Public Utilities & Neighborhoods or successor committees.

4. Schedule/Procedures. The Board shall adopt a regular meeting schedule and notify all Wholesale Customers of the schedule. The Operating Board may adopt it own internal procedures. The latest edition of Roberts Rules of Order shall, in the absence of agreement by the Operating Board on procedural matters, govern all meetings and votes of the Operating Board.

5. Reporting. The Board will provide reports to the Wholesale Customers and to the Seattle City Council Committee on Seattle Public Utilities & Neighborhoods, or successor City Council committee, on its decisions and recommendations in a timely manner.

6. Responsibilities and Authority of the Board. Where no clear responsibility or authority on an issue is established in this contract the responsibility and authority shall rest with the Seattle City Council.

7. Expenses. The Board shall be authorized to incur reasonable expenses which will be allocated by the Board to either or both of the New Transmission or Supply Cost Pools.

## EXHIBIT V - RESERVED

**EXHIBIT VI**

# Calculation of ERUs as a Part of Facilities Charges

The ERU Fee is:

- the flat debt service payment required to finance the facility providing the ERU over the lesser of (i) the facility life or (ii) the period over which new demand will fully utilize the facility's supply

- divided by -

- the number of new ERUs of demand expected in each year.

Seattle's Average Cost of Debt shall be used as the interest rate in this calculation. In the event that several New Supply Resources are added simultaneously, the facilities may be considered together as providing a total new supply capacity for a total construction cost.

Example: A new facility costing $100 million is built with a capacity of 100,000 ERUs. Growth of 5,000 ERUs per year is expected over the next 20 years, so the facility is projected to be supplying its full capacity in 20 years. Were this facility financed over 20 years at 6% interest, the flat annual debt service payment would be $8.7 million. Each ERU would cost 0.02% of this annual amount, or about $1,740.

At the time a New Supply Resources is added, the ERU price for this supply shall be calculated. This ERU price shall then be averaged with the then-current ERU Fee. This average shall be weighted by the number of unpurchased ERUs available at the then-current ERU fee and the number of new ERUs being added at the new ERU price. This weighted average shall be the new ERU Fee, and the number of ERUs available at the fee shall be the sum of the unsold ERUs at the previous fee and the ERU capacity of the new facility.

Example: 10 years ago, a $100 million facility was constructed that can supply 100,000 ERUs. Growth and demand projections have proven accurate, and now 50,000 ERUs have been purchased, each for $1,740. The facility also has an additional 50,000 ERUs still available at the same price. This year, we construct a facility worth $70 million, with a capacity of 40,000 ERUs. Based on demand projections, this facility (on its own) would be fully utilized in 10 years, and its ERU price is therefore $2,375. The average price of any of the 90,000 available ERUs is therefore $2,022.

**EXHIBIT VI**

# ERUs by Connection Size

| Connection Size | Number of ERUs |
|---|---|
| ¾" and smaller | 1 |
| 1" | 2 |
| 1 1/2" | 5 |
| 2" | 8 |
| 3" | 22 |
| 4" | 31 |
| 6" | 66 |
| 8" | 112 |
| 10" | 169 |
| 12" | 238 |

**ERU Proving Methodology**

The size of the water service connection used to serve an establishment depends upon both the total demand of that establishment and the instantaneous flow required by that establishment. For this reason, connection size is only a general indicator of the annual demand placed on water supplies by the establishment.

**EXHIBIT VII**

# Seattle Supply Facilities

1. **Cedar Source**
   - All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the Cedar River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Regional Water Supply System only to the extent of SPU share or responsibility.
   - All facilities located within the Lake Youngs Reservation as defined by Seattle ownership of the land except for conveyance facilities used to transport finished water during non-emergency operation
   - All facilities located within the Lake Youngs Aqueduct, the Landsburg Tunnel, and the Lake Youngs Supply Lines right-of-way, including the right-of-way itself
   - Existing Morse Lake Floating Pump Stations

2. **Tolt Source**
   - All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the South Fork Tolt River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Regional Water Supply System only to the extent of SPU share or responsibility.
   - Tolt Treatment Facility

3. **Seattle Wellfields**
   - Riverton Wells, including all pumping and treatment equipment, original yard piping, to the connection to CRPL4, and the low flow piping to Riverton Reservoir
   - Boulevard Well, including all pumping and treatment equipment, and all piping up to the connection to CRPL4

4. **Other**
   - One Percent Conservation Program through December 31, 2001
   - GIS Projects related to facilities identified herein as part of the Seattle Regional Water Supply System

**EXHIBIT VIII**

# Seattle Transmission Facilities

1. Pipelines

- Tolt Pipeline No. 1 from the Tolt Regulating Basin to Lake Forest Reservoir, including any transfer and ancillary small diameter parallel pipes
- Tolt Pipeline No. 2 (where constructed), including any transfer and ancillary small diameter parallel pipes
- Tolt Tieline
- Tolt Eastside Supply Line (from TESS Junction to the intersection of SE 16th ST and 145th Place SE)
- Tolt Eastside Line Extension (from the intersection of SE 16th ST and 145th Place SE to Eastside Reservoir)
- The 540 head Pipeline from Maple Leaf Reservoir to Lake Forest Reservoir
- Lake Youngs Bypass No. 4 from the outlet of each of the Cedar Treatment Facility clearwells to Control Works
- Lake Youngs Bypass No. 5 from the outlet of each of the Cedar Treatment Facility clearwells to the Lake Youngs Tunnel
- The Lake Youngs Tunnel (from the original lake outlet to Control Works)
- The Maple Leaf Pipeline (from the intersection of 18th Avenue E. and E. Prospect Street to Maple Leaf Reservoir)
- Cedar River Pipeline No. 1 from Control Works to Volunteer Reservoir
- Cedar River Pipeline No. 2 from Control Works to Lincoln Reservoir
- Cedar River Pipeline No. 3 from Control Works to the intersection of 18th Avenue E. and E. Prospect Street
- 30" intertie between Cedar River Pipelines 2 and 3 in east Olive Street
- Cedar River Pipeline No. 4 from Control Works to the West Seattle Pipeline
- Cedar Eastside Supply Line (from the Cedar Wye to the intersection of SE 16th St and 145th Place SE)
- West Seattle Pipeline from Augusta Gatehouse to Cedar River Pipeline 4
- The 8th Avenue S. Pipeline between S. 146th Street and S. 160th Street
- The Bow Lake Pipeline (between 8th Avenue S. and CRPL 4, and as relocated outside runways at Seatac Airport)
- The Burien Feeder (in S. 146th Street between 8th Avenue S. and CRPL 4)
- The Fairwood Line (between Fairwood Pump Station and Soos Reservoirs)
- The 24-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 12-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 630 head pipeline between Lake Youngs Pump Station and the Cedar River WSD pump station at the eastern boundary of the Lake Youngs Reservation

2. Reservoirs, Tanks, and Standpipes, including overflow pipes, all valves, appurtenances, and disinfection facility located on the premises of each storage facility, unless otherwise noted

- Lake Forest Reservoir
- Eastside Reservoir
- Riverton Reservoir
- Maple Leaf Reservoir (excluding Roosevelt Way Pump Station and its suction and discharge piping, Maple Leaf Tank and 520 zone piping, except where solely serving the disinfection facility)
- Soos Reservoirs

3. Pump Stations, Major Valve Structures, and other Facilities

- Eastgate Pump Station
- TESS Junction Pump Station
- Lake Hills Pump Station
- Maplewood Pump Station
- Maple Leaf Pump Station
- Bothell Way Pump Station
- Fairwood Pump Station
- Lake Youngs Pump Station
- The Control Works
- Augusta Gatehouse

4. Service Connections to Wholesale Customers installed before January 1, 2002 are part of the Seattle Transmission Facilities. Service Connections to Wholesale Customers installed after December 31, 2001shall not be part of the Seattle Transmission Facilities.

The Seattle Transmission Facilities include all necessary and convenient appurtenances, including, but not limited to, rights of way, line valves, system meters, and remote automation devices.

**EXHIBIT IX (as amended)**

# Cost Centers Used for Operations Cost Indices

The following costs centers or successor cost centers, as reflected in the amended Exhibit IX, and as amended further from time to time, that capture the direct costs of operation of Existing Supply Facilities, Seattle Transmission Facilities and the Regional Water Conservation Program shall be used as the indices for operations cost in the Existing Supply Cost Pool, Existing Transmission Cost Pool and for the Regional Water Conservation Program in the New Supply Cost Pool.

Supply

| Program | Project | Project Name | Activity |
|---|---|---|---|
| Communications | N1203 | Communications Activity Group | N120304 Purveyor Relations |
| Audit & Accounting | N3303 | Customer Audit | N330303 Purveyor Audit |
| Watershed Management | N5401 | Program Management | N540194 Department Support |
| Watershed Management | N5401 | Program Management | N540195 General Expense |
| Watershed Management | N5401 | Program Management | N540196 General Management |
| Watershed Management | N5401 | Program Management | N540197 Training |
| Watershed Management | N5401 | Program Management | N540198 Safety |
| Watershed Management | N5401 | Program Management | N540199 Personnel |
| Watershed Management | N5401 | Program Management | N540289 Capital Purchase |
| Watershed Management | N5403 | Support Services | N540301 Modified Duty |
| Watershed Management | N5403 | Support Services | N540302 Procuring/Paying/Receiving |
| Watershed Management | N5403 | Support Services | N540303 Vehicle Equipment Downtime |
| Watershed Management | N5404 | Watershed Protection | N540401 Hydrological Data Collection |
| Watershed Management | N5404 | Watershed Protection | N540402 Fire Protection |
| Watershed Management | N5404 | Watershed Protection | N540403 Inspection |
| Watershed Management | N5404 | Watershed Protection | N540404 Boundaries |
| Watershed Management | N5405 | Facility Management | N540501 WS Grounds |
| Watershed Management | N5405 | Facility Management | N540502 WS Buildings |
| Watershed Management | N5405 | Facility Management | N540503 WS Facilities & Roads |
| Watershed Management | N5406 | Watershed Road Maintenance | N540601 Grade/Gravel/Ditching |
| Watershed Management | N5406 | Watershed Road Maintenance | N540602 Bridges/Streams Culvert |
| Watershed Management | N5406 | Watershed Road Maintenance | N540603 Roads/Row/Vegetation Cutting |
| Watershed Management | N5406 | Watershed Road Maintenance | N540604 Tolt Roads & Streams |
| Watershed Management | N5407 | Watershed Operations Support | N540701 Veh/Equipment Management |
| Watershed Management | N5407 | Watershed Operations Support | N540702 Veh/Equip/Tool Repair |
| Watershed Management | N5408 | Water Quality & Hydrology | N540801 Water Quality Monitoring |
| Watershed Management | N5408 | Water Quality & Hydrology | N540802 Hydrological Monitoring |
| Watershed Management | N5409 | Public/Cultural Programs | N540901 Recreation Planning |
| Watershed Management | N5409 | Public/Cultural Programs | N540902 Management & Research |
| Watershed Management | N5409 | Public/Cultural Programs | N540903 Watershed Education |
| Watershed Management | N5409 | Public/Cultural Programs | N540904 Watershed Public Information |
| Watershed Management | N5410 | Wildlife & Fisheries Programs | N541001 Program Planning & Evaluation |
| Watershed Management | N5410 | Wildlife & Fisheries Programs | N541002 Interagency/Public Involvement |
| Watershed Management | N5410 | Wildlife & Fisheries Programs | N541003 Ecological Monitoring & Research |
| Watershed Management | N5410 | Wildlife & Fisheries Programs | N541004 Habitat & Species Inventory |
| Watershed Management | N5410 | Wildlife & Fisheries Programs | N541005 Habitat Enhancement/Restoration |
| Watershed Management | N5411 | Resource Information Mgmt | N541101 Program Plan/Evaluation |
| Watershed Management | N5411 | Resource Information Mgmt | N541102 Information Maintenance |

| Program | Project | Project Name | Activity |
|---|---|---|---|
| Watershed Management | N5411 | Resource Information Mgmt | N541103 Information Services |
| Watershed Management | N5412 | Special Projects | N541202 Silviculture |
| Watershed Management | N5412 | Special Projects | N541205 Land Exchanges/Acquisitions |
| Watershed Management | N5415 | Cedar HCP | N541501 ASSESS OF EXPAND FOREST STAND |
| Watershed Management | N5415 | Cedar HCP | N541502 ASSESS EXPAND FOREST ATTRIBUTE |
| Watershed Management | N5415 | Cedar HCP | N541503 AUGMENT FOREST HABITAT INV |
| Watershed Management | N5415 | Cedar HCP | N541504 LONG-TERM FOREST HABITAT |
| Watershed Management | N5415 | Cedar HCP | N541505 OLD-GROWTH CLASSIFICATION |
| Watershed Management | N5415 | Cedar HCP | N541506 RIPARIAN RESTOR PROJECT MONIT |
| Watershed Management | N5415 | Cedar HCP | N541507 UP0LAND FOREST RESTOR PROJ MONT |
| Watershed Management | N5415 | Cedar HCP | N541515 GIS DATA COMPATIBILITY STUDY |
| Watershed Management | N5415 | Cedar HCP | N541516 FOREST HABITAT MODELING |
| Watershed Management | N5415 | Cedar HCP | N541517 SPECIE HABITAT RELATION MODEL |
| Watershed Management | N5416 | Cedar HCP | N541601 CRHCP GIS SUPPORT |
| Watershed Management | N5416 | Cedar HCP | N541603 CRHCP TECHNICAL SUPPORT |
| Watershed Management | N5417 | Cedar HCP | N541701 ROAD MAINTENANCE |
| Watershed Management | N5418 | Cedar HCP | N541801 EXPERIMENTAL STREAM MONITORING |
| Watershed Management | N5418 | Cedar HCP | N541802 LONG-TERM STREAM MONITORING |
| Watershed Management | N5418 | Cedar HCP | N541803 AQUATIC RESTORATION MONITORING |
| Watershed Management | N5418 | Cedar HCP | N541804 BULL TROUT SURVEYS (ADULT) |
| Watershed Management | N5418 | Cedar HCP | N541805 BULL TROUT SPAWNING SURVEY |
| Watershed Management | N5418 | Cedar HCP | N541806 BULL TROUT FRY/JUVENILE SURVEY |
| Watershed Management | N5418 | Cedar HCP | Riparian Zone Studies |
| Watershed Management | N5418 | Cedar HCP | N541809 BULL TROUT STREAM DISTRIBUTION |
| Watershed Management | N5418 | Cedar HCP | N541810 BULL TROUT REDD INUNDATION STU |
| Watershed Management | N5418 | Cedar HCP | N541811 COMMON LOON MONITORING |
| Water Quality & Supply | N5503 | Water System Operations | N550301 Water Management |
| Water Quality & Supply | N5503 | Water System Operations | N550302 Water System Control |
| Water Quality & Supply | N5503 | Water System Operations | N550303 Anadromous Fishery Mgmt |
| Water Quality & Supply | N5503 | Water System Operations | N550304 SCADA Management |
| Water Quality & Supply | N5503 | Water System Operations | N550305 Highline Well Field |
| Water Quality & Supply | N5503 | Water System Operations | N550306 Morse Lake PS |
| Water Quality & Supply | N5503 | Water System Operations | N550307-SAFETY PROCESS MGMT COMPLIANCE |
| Water Quality & Supply | N5503 | Water System Operations | N550308-EPA RISK MGMT COMPLIANCE |
| Water Quality & Supply | N5504 | Water System Analysis | N550401 Eng Analysis/Modeling |
| Water Quality & Supply | N5504 | Water System Analysis | N550402 Water Rights Mgmt |
| Water Quality & Supply | N5504 | Water System Analysis | N550403 DEMAND METERING |
| Water Quality & Supply | N5505 | Surface Water Trtmnt Rule | N550501 Monitoring, Reporting & Admin |
| Water Quality & Supply | N5505 | Surface Water Trtmnt Rule | N550502 Cholrination Facilities O&M |
| Water Quality & Supply | N5505 | Surface Water Trtmnt Rule | N550503 Watershed Management |
| Water Quality & Supply | N5506 | Total Coliform Rule Compl. | N550601 Monitoring, Reporting & Admin |
| Water Quality & Supply | N5508 | Lead & Copper Rule Compl. | N550801 Monitoring, Reporting & Admin |
| Water Quality & Supply | N5508 | Lead & Copper Rule Compl. | N550802 Corrosion Trtmnt Facil O&M |
| Water Quality & Supply | N5509 | Fluoridation Program | N550901 Fluoridation Program O&M |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551001 Otr Reg/Operational Analysis |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551002 Disinfection By-Product Rule |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551003 Limnology |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551005 WQ Lab |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551006 DW Reg Dev & App Research |
| Water Quality & Supply | N5510 | Other Reg Comp/Monitoring | N551007 Public Information/Notification |
| Water Quality & Supply | N5511 | Special Projects | N551104 LIMS & QA/QC |

| | | | |
|---|---|---|---|
| Water Quality & Supply | N5512 | Cedar HCP | N551201 INTERIM CHINOOK COHO |
| Water Quality & Supply | N5513 | Cedar HCP | N551301 HCP STREAMFLOW GAUGING |
| Water Quality & Supply | N5513 | Cedar HCP | N551302 SWITCHING CRITERIA STUDY |
| Water Quality & Supply | N5513 | Cedar HCP | N551303 STEELHEAD REDD MONITORING |
| Water Quality & Supply | N5513 | Cedar HCP | N551304 CHINOOK STUDIES |
| Water Quality & Supply | N5513 | Cedar HCP | Salmonid Studies |
| Water Quality & Supply | N5514 | WQ Monitoring | N551403 DRINKING WATER QUALITY MONITOR |
| Water Quality & Supply | N5515 | HCP Fisheries | N551501 FRY CONDITION AT RELEASE |
| Water Quality & Supply | N5515 | HCP Fisheries | N551502 FRY MARKING & EVALUATION |
| Water Quality & Supply | N5515 | HCP Fisheries | N551503 FRY TRAPPING & COUNTING |
| Water Quality & Supply | N5515 | HCP Fisheries | N551504 FISH HEALTH |
| Water Quality & Supply | N5515 | HCP Fisheries | N551505 SHORT-TERM FRY REARING |
| Water Quality & Supply | N5515 | HCP Fisheries | N551506 LAKE WASHINGTON PLANKTON STUDY |
| Water Quality & Supply | N5515 | HCP Fisheries | N551508 ADULT SURVIVAL DISTRIBUTION |
| Water Quality & Supply | N5515 | HCP Fisheries | N551509 PHENOTYPIC & GENETIC STUDY |
| Water Quality & Supply | N5516 | Tolt DBO | N551601-CONTRACTOR PAYMENTS |
| Water Quality & Supply | N5516 | Tolt DBO | N551603-MANAGEMENT COSTS |
| Resource Planning | N5609 | Water Resource & Habitat Issues | N560903-ESA |

Transmission

| Program | Project | Project Name | Activity |
|---|---|---|---|
| Water Operation | N6540 | WT - Headwork/Storage | N654001 Program Maintenance |
| Water Operation | N6540 | WT - Headwork/Storage | N654002 Event Driven Repairs |
| Water Operation | N6541 | WT - Transmission Pipeline Maint | N654101 Program Maintenance |
| Water Operation | N6541 | WT - Transmission Pipeline Maint | N654102 Event Driven Repairs |
| Water Operation | N6542 | WT - Value Op/Maint - Water Tran | N654201 Program Maintenance |
| Water Operation | N6542 | WT - Value Op/Maint - Water Tran | N654202 Event Driven Repairs |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654301 Grade/gravel roads - P |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654302 Grade/gravel roads - E |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654303 Bridges/culverts - P |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654304 Bridges/culverts - E |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654305 Fences/gates - P |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654306 Fences/gates - E |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654307 Mow ROW - P |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654308 Mow ROW - E |
| Water Operation | N6543 | WT - Grounds/Roads/ROW | N654309 Mow Other |
| Water Operation | N6544 | WT - Facility Maintenance | N654401 Program Maintenance |
| Water Operation | N6544 | WT - Facility Maintenance | N654402 Event Driven Repairs |
| Water Operation | N6545 | WT - Castings | N654501 Casting Adjustments |
| Water Operation | N6546 | WT - Customer Services | N654601 Communications/Dispatch |
| Water Operation | N6546 | WT - Customer Services | N654602 Locating/Marking |
| Water Operation | N6547 | WT - Damage by Others | N654701 P/L/ROW/Facility |
| Water Operation | N6548 | WT - Transmission Shops | N654801 Shops/Fabrication |
| Water Operation | N6549 | WT - General Expenses | N654905 Tools/small equipment |
| Water Operation | N6549 | WT - General Expenses | N654906 Standy |
| Water Operation | N6549 | WT - General Expenses | N654907 Truck Inventory |
| Water Operation | N6549 | WT - General Expenses | N654908 Downtime - Job Related |
| Water Operation | N6549 | WT - General Expenses | N654909-DISASTER-EMERG RESPONSE |

**Regional Water Conservation Program**

| Program | Project | Project Name | Activity |
|---|---|---|---|
| Community Services | N5303 | Resource Conservation | N530301 1% Conservation |

# Cost Centers Used for Operations Cost Indices

# amended 12/31/2009

Existing Supply

| Program | Project | Project Name | Activity | Description |
|---|---|---|---|---|
| SPU General Expense | N0108 | Emergency Response | NN90036 | 4/23/09 Tolt Trmt Plant Emrgcy |
| SPU General Expense | N0503 | Water Fund Contracts | N050302 | Tolt DBO Contract Payments |
| SPU General Expense | N0503 | Water Fund Contracts | N050303 | Cedar DBO Contract Payments |
| Branch Administration | N3106 | Water Wholesale Contracts | N310601 | Wholesale Water Contracts Mgmt |
| Customer Billing Services | N3303 | Customer Audit | N330303 | Purveyor |
| Cedar & Tolt Watershed Srvcs | N5401 | Program Management | N540198 | Safety |
| Drainage & Wastewater | N6210 | Landsburg Mgmt & HCP Support | N621001 | Oprtn of Passage Facility-HCP |
| Drainage & Wastewater | N6210 | Landsburg Mgmt & HCP Support | N621002 | Interim Hatchery Ops-HCP |
| Water Operation | N6510 | Misc Water Operations | N651004 | Alternative Duty |
| Water Operation | N6540 | Headwork/Storage | N654003 | (Cedar) Chlorination Facility O&M |
| Water Operation | N6540 | Headwork/Storage | N654004 | Fluoridation Program O&M |
| Water Operation | N6540 | Headwork/Storage | N654005 | RMP/PSM Compliance |
| Water Operation | N6573 | In-Town Reservoir Treatment | N657304 | Highline Well F(Location Code) |
| Asset Data Systems | N6903 | SCADA Development & Support | N690301 | SCADA SYSTEM PLANNING |
| Asset Data Systems | N6903 | SCADA Development & Support | N690302 | SCADA INFRASTRUCTURE O&M |
| Asset Data Systems | N6903 | SCADA Development & Support | N690303 | DAM SAFETY SCADA |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731101 | Fry Condition @ Release - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731102 | Fry Marking & Evaluation - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731103 | Fry Tapping & Counting - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731104 | Fish Health – HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731105 | Adult Survival Distribution - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731106 | Pheno & Gen Study - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731107 | Zooplnktn Stds (Spmg) - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731108 | HCP Support |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731109 | Operation of Passage Facility - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731110 | Landsburg Fish Ladder - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731111 | DW Quality Monitoring - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731112 | Interim Hatchery Ops - HCP |
| Surface Water LOB | N7311 | Landsburg Mtgtn & HCP Support | N731113 | Adaptive Mgmt - Sockeye Hatch |
| Drinking Water LOB | N7503 | Water LOB Planning & Perf | N750303 | Network Hydraulic Model Dev |
| Drinking Water LOB | N7504 | Water Resource Business | N750403 | Hydrology Model Dev & Maintenance |
| Drinking Water LOB | N7504 | Water Resource Business | N750404 | Water Resource Operation Mgmt |
| Drinking Water LOB | N7504 | Water Resource Business | N750406 | Morse Lake Pump Plant |
| Drinking Water LOB | N7504 | Water Resource Business | N750407 | Anadromous Fishery Mgmt |
| Drinking Water LOB | N7504 | Water Resource Business | NN90053 | Tolt Spillway Leak Repair |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750501 | Existing Stream Gage At Cedar F |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750502 | Exist. Stream Gage Below Landsburg |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750503 | New Stream Gag Above Powerhouse |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750504 | New Gage At Renton |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750505 | Temporary Gages In Lower River |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750506 | Accretion Flow Study |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750507 | Switching Criteria Study |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750509 | Instream Flow Commission |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750511 | Dead Strg Bull Trout Dlta Mdln |
| Drinking Water LOB | N7505 | HCP Instream Flow Monitor & Res | N750512 | Steelhead Redd Monitoring |
| Drinking Water LOB | N7507 | Water Quality & Treatment Business Area | N750705 | Tolt Management Costs |
| Drinking Water LOB | N7507 | Water Quality & Treatment Business Area | N750707 | Cedar DBO Management Costs |
| Drinking Water LOB | N7509 | Operations Plan & System Control | N750802 | Water System Monitor & Control |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751101 | Fry Condition @ Release - HCP |

| | | | | |
|---|---|---|---|---|
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751102 | Fry Marking & Evaluation - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751103 | Fry Trapping & Counting - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751104 | Fish Health – HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751105 | Adult Survival Distribution - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751106 | Pheno & Gen Study – HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751107 | Zooplnktn Stds (Sprng) - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751108 | HCP Support |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751109 | Operation of Passage Facility - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751110 | Landsburg Fish Ladder - HCP |
| Drinking Water LOB | N7511 | Landsburg Mitigation. & HCP Support | N751112 | Interim Hatchery Ops - HCP |
| Tech systems | N7705 | SCADA Development & Support | N770501 | SCADA System Planning |
| Tech systems | N7705 | SCADA Development & Support | N770502 | SCADA Infrastructure O&M |
| Watershed Management | N7801 | Program Management | N780196 | General Management |
| Watershed Management | N7803 | Support Services | N780301 | Procuring/Paying/Receiving |
| Watershed Management | N7804 | Watershed Protection | N780401 | Hydrological Data Collection |
| Watershed Management | N7804 | Watershed Protection | N780402 | Fire Protection |
| Watershed Management | N7804 | Watershed Protection | N780403 | Inspection |
| Watershed Management | N7804 | Watershed Protection | N780404 | Boundaries |
| Watershed Management | N7804 | Watershed Protection | N780405 | Facilities Security |
| Watershed Management | N7805 | Facility Management | N780501 | WS Grounds |
| Watershed Management | N7805 | Facility Management | N780502 | WS Buildings |
| Watershed Management | N7805 | Facility Management | N780503 | WS Edu Facilities Mgmt |
| Watershed Management | N7806 | Watershed Road Maintenance | N780601 | Grade/Gravel/Drain |
| Watershed Management | N7806 | Watershed Road Maintenance | N780602 | Bridges/Streams Culvert |
| Watershed Management | N7806 | Watershed Road Maintenance | N780603 | Roads/ROW/Vegetation Cutting |
| Watershed Management | N7806 | Watershed Road Maintenance | N780604 | Tolt Roads & Streams |
| Watershed Management | N7807 | Watershed Operations Support | N780701 | Vehicle/Equipment Management |
| Watershed Management | N7807 | Watershed Operations Support | N780702 | Vehicle/Equip/Tool Repair |
| Watershed Management | N7808 | Water Quality & Hydrology | N780801 | Hydrological Monitoring |
| Watershed Management | N7809 | Public/Cultural Programs | N780901 | Recreation Planning |
| Watershed Management | N7809 | Public/Cultural Programs | N780902 | CR Management & Research |
| Watershed Management | N7809 | Public/Cultural Programs | N780903 | Watershed Education |
| Watershed Management | N7809 | Public/Cultural Programs | N780904 | Watershed Public Information |
| Watershed Management | N7809 | Public/Cultural Programs | N780905 | Educational Center Operations |
| Watershed Management | N7809 | Public/Cultural Programs | N780906 | Cedar River Watershed Institute |
| Watershed Management | N7809 | Public/Cultural Programs | N780907 | Tolt WS MP Impl Cultural Rest |
| Watershed Management | N7810 | Wildlife & Fisheries Programs | N781001 | Program Planning & Evaluation |
| Watershed Management | N7810 | Wildlife & Fisheries Programs | N781002 | Interagency/Public Involvement |
| Watershed Management | N7810 | Wildlife & Fisheries Programs | N781003 | Ecological Monitoring & Research |
| Watershed Management | N7810 | Wildlife & Fisheries Programs | N781004 | Habitat & Species Inventory |
| Watershed Management | N7810 | Wildlife & Fisheries Programs | N781005 | Habitat Enhancement/Restoration |
| Watershed Management | N7811 | Resource Information Mgmt | N781101 | Information Services |
| Watershed Management | N7812 | Special Projects | N781201 | Silviculture |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781301 | Assess Of Expand Forest Stand |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781302 | Assess Expand Forest Attribute |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781303 | Long-Term Forest Habitat Inventory |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781304 | Old-Growth Classification |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781305 | Riparian Restoration Project Monitoring |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781306 | Upland Forest Restoration Project Mont |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781308 | Experimental Murrelet Habitat |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781309 | Spotted Owl Baseline Survey |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781311 | OPTION SPECIES/HABITAT SURVEYS |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781312 | GIS Data Compatibility Study |
| Watershed Management | N7813 | CRHCP WS Terestrl Mnitr/Resrch | N781313 | Species Habitat Relation Modeling |
| Watershed Management | N7814 | CRHCP Program Support | N781401 | CRHCP Technical Support |
| Watershed Management | N7814 | CRHCP Program Support | N781402 | BPA Mitigation Program - Watershed |
| Watershed Management | N7815 | CRHCP Watershed Road Managment | N781501 | Road Maintenance |
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781601 | Long-Term Stream Monitoring |

| | | | | |
|---|---|---|---|---|
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781602 | Aquatic Restoration Monitoring |
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781604 | Bull Trout Spawning Survey |
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781605 | Bull Trout Fry/Juvenile Survey |
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781606 | Bull Trout Stream Distribution |
| Watershed Management | N7816 | CRHCP WS Aquatic Monitr/Resrch | N781607 | Common Loon Monitoring |
| Watershed Management | N7817 | Watershed Svc MIT Implement | N781701 | Watershed Tribal Relations Coordination |
| Watershed Management | N7818 | Tolt WS MP Impl Habitat Rest | N781801 | Tolt WS MP Impl Habitat Rest |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790301 | SWTR Monitoring, Reporting & Adm |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790302 | TCR Monitoring, Reporting & Adm |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790303 | LCR Monitoring, Reporting & Adm |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790304 | DBP Monitoring, Reporting & Adm |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790305 | Public Information/Notification |
| Laboratory Services | N7903 | WQ Regulatory Compliance | N790306 | Regulatory Support |
| Laboratory Services | N7904 | WQ Monitoring | N790402 | Operations Support |
| Laboratory Services | N7904 | WQ Monitoring | N790403 | Limnology |
| Laboratory Services | N7905 | Customer Support | N790502 | Applied Research |
| Laboratory Services | N7906 | Lab Systems | N790601 | WQ Lab Facility O&M |
| Laboratory Services | N7906 | Lab Systems | N790602 | Lab System Administration & Support |
| Laboratory Services | N7906 | Lab Systems | N790603 | QA Admin |
| Pre-Capital | N5001 | E - Water Fund | E100078 | Cedar Falls Railroad Hazard |
| Pre-Capital | N5001 | E - Water Fund | E101008 | Rock Creek Fishway |
| Pre-Capital | N5001 | E - Water Fund | E105018 | BPA - Rd Improve |
| Pre-Capital | N5001 | E - Water Fund | E105019 | BPA Roads Other Decommission |
| Pre-Capital | N5001 | E - Water Fund | E105035 | BPA Forest ROW Plant Removal |
| Pre-Capital | N5001 | E - Water Fund | E105036 | BPA Forest ROW Wood Rplment |
| Pre-Capital | N5001 | E - Water Fund | E105038 | BPA Old Forest Restore |
| Pre-Capital | N5001 | E - Water Fund | E107004 | Watershed Emergency/Opportunity |
| Pre-Capital | N5001 | E - Water Fund | E107015 | Watershed Vegetation Management |
| Pre-Capital | N5001 | E - Water Fund | E107016 | Muckleshoot Agreement Implementation Plan |
| Pre-Capital | N5001 | E - Water Fund | E107019 | Restoration Thinning Slash Tree |
| Pre-Capital | N5001 | E - Water Fund | E109001 | BPA Cedar Invasive Vegetation Mgmt |
| Pre-Capital | N5001 | E - Water Fund | E109002 | BPA Restoration Slash Treatment |
| Pre-Capital | N5001 | E - Water Fund | E109003 | BPA Information Mgmt Systems |

## Existing Transmission

| SECTION XI. OGRAM | PR | Project | Project Name | Activity | |
|---|---|---|---|---|---|
| Water Operation | | N6540 | WT - Headwork/Storage | N654001 | Program Maintenance |
| Water Operation | | N6540 | WT - Headwork/Storage | N654002 | Event Driven Repairs |
| Water Operation | | N6541 | WT - Transmission Pipeline Mai | N654101 | Program Maintenance |
| Water Operation | | N6541 | WT - Transmission Pipeline Mai | N654102 | Event Driven Repairs |
| Water Operation | | N6541 | WT - Transmission Pipeline Mai | NN90043 | CRPL4 at Airport Expressway |
| Water Operation | | N6542 | WT - Valve Op/Maint-Water Tran | N654201 | Program Maintenance |
| Water Operation | | N6542 | WT - Valve Op/Maint-Water Tran | N654202 | Event Driven Repairs |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654301 | Grade/Gravel Roads - P |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654302 | Grade/Gravel Roads - E |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654303 | Bridges/Culverts – P |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654304 | Bridges/Culverts – E |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654305 | Fences/Gates – P |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654306 | Fences/Gates – E |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654307 | Mow Row – P |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654308 | Mow Row – E |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | N654309 | Mow Other |
| Water Operation | | N6543 | WT - Grounds/Roads/Row | NN90042 | Derby Creek and Tolt ROW |
| Water Operation | | N6544 | WT - Facility Maintenance | N654401 | Program Maintenance |
| Water Operation | | N6544 | WT - Facility Maintenance | N654402 | Event Driven Repairs |
| Water Operation | | N6545 | WT - Castings | N654501 | Casting Adjustments |
| Water Operation | | N6546 | WT - Customer Services | N654601 | Communications/Dispatch |

| | | | | |
|---|---|---|---|---|
| Water Operation | N6546 | WT - Customer Services | N654602 | Locating/Marking |
| Water Operation | N6547 | WT - Damage By Others | N654701 | P/L/Row/Facility |
| Water Operation | N6548 | WT - Transmission Shops | N654801 | Shops/Fabrication |
| Water Operation | N6549 | WT - General Expenses | N654905 | Tools/Small Equipment |
| Water Operation | N6549 | WT - General Expenses | N654906 | Standby |
| Water Operation | N6549 | WT - General Expenses | N654907 | Truck Inventory |
| Water Operation | N6549 | WT - General Expenses | N654908 | Downtime - Job Related |
| Water Operation | N6549 | WT - General Expenses | N654909 | Disaster-Emergency Response |

## New Supply

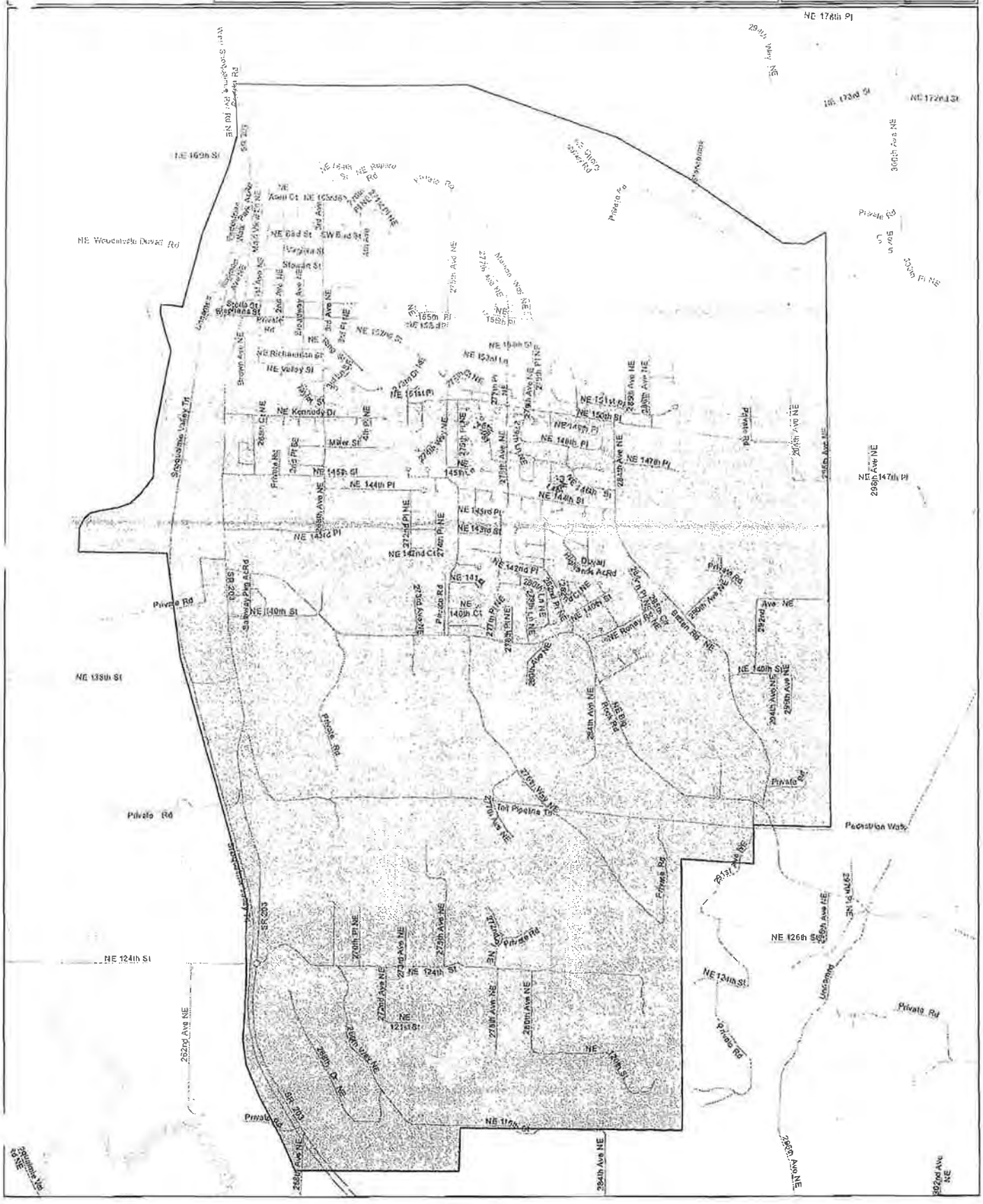
| Program | Project | Project Name | Activity | |
|---|---|---|---|---|
| Customer Service | N3904 | Resource Conservation | N390401 | Water Conservation |
| Customer Service | N3904 | Resource Conservation | N390412 | Water Conservation-Landscape |

## New Transmission

| Program | Project | Project Name | Activity | |
|---|---|---|---|---|
| Branch Administration | N3106 | Water Wholesale Contracts | N310602 | Operating Board Website |

# DUVALL ULTIMATE SERVICE AREA

Duvall



**OPERATING BOARD ANIZATIONAL CHART**

**By Category**

| | FUTURE? | | | CURRENT | | INTERIM 2011 | Representative |
|---|---|---|---|---|---|---|---|
| 1 | Northshore | 2,394,673 | | Northshore | | Northshore | Matt Everett - OB Member |
| 2 | Highline | 2,143,580 | | Highline | | Highline | Ron Speer - Alternate |
| 3 | Soos Creek | 1,873,183 | LARGE | Soos Creek | LARGE | Soos Creek | |
| 4 | Woodinville | 1,781,785 | | Woodinville | | Woodinville | |
| 5 | WD 20 | 1,237,780 | | | | WD 20 | Walt Canter - OB Member |
| 6 | Mercer Island | 855,678 | | | | Mercer Island | Terry Smith - Alternate |
| 1 | Cedar River | 800,755 | | WD 20 | | Cedar River | |
| 2 | Shoreline | 771,973 | MEDIUM | Mercer Island | MEDIUM | Shoreline | |
| 3 | Bothell | 640,359 | | Cedar River | | Bothell | |
| 4 | WD 49 | 556,683 | | Shoreline | | WD49 | |
| 5 | WD 125 | 515,485 | | | | WD 125 | Steve Moye - OB Vice Chair |
| 6 | Coal Creek | 485,859 | | | | Coal Creek | John Thompson - Alternate |
| 1 | WD 90 | 433,468 | | WD 125 | | Olympic View | |
| 2 | Olympic View | 361,712 | SMALL | Coal Creek | SMALL | WD 45 | |
| 3 | Duvall | 224,298 | | Olympic View | | WD 90 | |
| 4 | WD 119 | 115,579 | | WD 45 | | WD 119 | |
| 5 | WD 45 | 100,229 | | | | Duvall | |
| 6 | Renton | 59,904 | | | | Renton | |
| | | 2010 10 ccf Consumption | | | | | |

May 3, 2011

**EXHIBIT X**

# Water Utility Service Area

SEE NEXT PAGE

# Appendix C

## Water Facilities Inventory (WFI) Form

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# WATER FACILITIES INVENTORY (WFI) FORM

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/03/2018
Printed: 2/20/2020
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

| 1. SYSTEM ID NO. | 2. SYSTEM NAME | 3. COUNTY | 4. GROUP | 5. TYPE |
|---|---|---|---|---|
| 20750 8 | DUVALL CITY OF | KING | A | Comm |

**6. PRIMARY CONTACT NAME & MAILING ADDRESS**

MIKE E. FISHER [PW SUPERINTENDENT]
PO BOX 1300
DUVALL, WA 98017

**7. OWNER NAME & MAILING ADDRESS**

DUVALL, CITY OF
MIKE E. FISHER
PW DIRECTOR
PO BOX 1300
DUVALL, WA 98019

**STREET ADDRESS IF DIFFERENT FROM ABOVE**

ATTN
ADDRESS
CITY STATE ZIP

**STREET ADDRESS IF DIFFERENT FROM ABOVE**

ATTN
ADDRESS
CITY

**9. 24 HOUR PRIMARY CONTACT INFORMATION**

Primary Contact Daytime Phone: (425) 788-3434
Primary Contact Mobile/Cell Phone: (206) 255-1374
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: xxxxxxxxxxxxxxxxxxx

**10. OWNER CONTACT INFORMATION**

Owner Daytime Phone: (425) 788-3434
Owner Mobile/Cell Phone: (206) 914-3469
Owner Evening Phone:
Fax: (425) 788-0311
E-mail: xxxxxxxxxxxxxxxxxxx

**11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)**

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

**12. WATER SYSTEM CHARACTERISTICS (mark all that apply)**

- [x] Agricultural
- [x] Commercial / Business
- [x] Day Care
- [x] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [x] Hospital/Clinic
- [x] Industrial
- [x] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [x] Residential
- [x] School
- [ ] Temporary Farm Worker
- [x] Other (church, fire station, etc.): _____

**13. WATER SYSTEM OWNERSHIP (mark only one)**

- [ ] Association
- [x] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

**14. STORAGE CAPACITY (gallons)**

2,700,000

| 15 | 16 | 17 | 18 SOURCE CATEGORY | | | | | | | | | 19 USE | | | 20 | 21 TREATMENT | | | | | 22 | 23 | 24 SOURCE LOCATION | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source Number | SOURCE NAME<br>LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER.<br>Example: WELL #1 XYZ456<br>IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME<br>Example: SEATTLE | INTERTIE SYSTEM ID NUMBER | WELL | WELL FIELD | WELL IN A WELL FIELD | SPRING | SPRING FIELD | SPRING IN SPRINGFIELD | SEA WATER | SURFACE WATER | RANNEY / INF. GALLERY | OTHER | PERMANENT | SEASONAL | EMERGENCY | SOURCE METERED | NONE | CHLORINATION | FILTRATION | FLUORIDATION | IRRADIATION (UV) | OTHER | DEPTH TO FIRST OPEN TERVAL IN FEET | CAPACITY (GALLONS PER MINUTE) | 1/4, 1/4 SECTION | SECTION NUMBER | TOWNSHIP | RANGE |
| S01 | 77050Y/SEATTLE (2) | 77050 Y | | | | | | | | | | X | | | | X | | | | | | | 0 | | | 00N | 00E |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# WATER FACILITIES INVENTORY (WFI) FORM - Continued

| 1. SYSTEM ID NO. | 2. SYSTEM NAME | 3. COUNTY | 4. GROUP | 5. TYPE |
|---|---|---|---|---|
| 20750 8 | DUVALL CITY OF | KING | A | Comm |

| | ACTIVE SERVICE CONNECTIONS | DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS | DOH USE ONLY! APPROVED CONNECTIONS |
|---|---|---|---|
| **25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)** | | 2895 | Unspecified |
| A. Full Time Single Family Residences (Occupied 180 days or more per year) | 2541 | | |
| B. Part Time Single Family Residences (Occupied less than 180 days per year) | 0 | | |
| **26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)** | | | |
| A. Apartment Buildings, condos, duplexes, barracks, dorms | 35 | | |
| B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year | 354 | | |
| C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year | 0 | | |
| **27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)** | | | |
| A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units) | 0 | 0 | |
| B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc. | 142 | 142 | |
| **28. TOTAL SERVICE CONNECTIONS** | | 3037 | |

**29. FULL-TIME RESIDENTIAL POPULATION**

A. How many residents are served by this system 180 or more days per year? 7500

| 30. PART-TIME RESIDENTIAL POPULATION | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. How many part-time residents are present each month? | | | | | | | | | | | | |
| B. How many days per month are they present? | | | | | | | | | | | | |

| 31. TEMPORARY & TRANSIENT USERS | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month? | | | | | | | | | | | | |
| B. How many days per month is water accessible to the public? | | | | | | | | | | | | |

| 32. REGULAR NON-RESIDENTIAL USERS | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month? | 1492 | 1492 | 1492 | 1492 | 1492 | 1492 | | | 1492 | 1492 | 1492 | 1492 |
| B. How many days per month are they present? | 20 | 20 | 20 | 20 | 20 | 20 | | | 20 | 20 | 20 | 20 |

| 33. ROUTINE COLIFORM SCHEDULE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * Requirement is exception from WAC 246-290 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | 10 | 10 | 10 |

| 34. NITRATE SCHEDULE | QUARTERLY | ANNUALLY | ONCE EVERY 3 YEARS |
|---|---|---|---|
| (One Sample per source by time period) | | | |

**35. Reason for Submitting WFI:**

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

**36. I certify that the information stated on this WFI form is correct to the best of my knowledge.**

**SIGNATURE:** _____ **DATE:** _____

**PRINT NAME:** _____ **TITLE:** _____

| WS ID | WS Name |
|---|---|
| 20750 | DUVALL CITY OF |

**Total WFI Printed: 1**

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

# *Water Facilities Inventory (WFI)*

| | | | |
|---|---|---|---|
| **Report Create Date:** | 2/20/2020 | | |
| **Water System Id(s):** | 207508 | | |
| **Print Data on Distribution Page:** | ALL | | |
| **Print Copies For:** | DOH Copy | | |
| **Water System Name:** | ALL | | |
| **County:** | -- Any -- | | |
| **Region:** | ALL | | |
| **Group:** | ALL | | |
| **Type:** | ALL | | |
| **Permit Renewal Quarter:** | ALL | | |
| **Water System Is New:** | ALL | | |
| **Water System Status:** | ALL | | |
| **Water Status Date From:** | ALL | **To** | ALL |
| **Water System Update Date** | ALL | **To** | ALL |
| **Owner Number:** | ALL | | |
| **SMA Number:** | ALL | | |
| **SMA Name:** | ALL | | |
| **Active Connection Count From:** | ALL | **To:** | ALL |
| **Approved Connection Count** | ALL | **To:** | ALL |
| **Full-Time Population From:** | ALL | **To:** | ALL |
| **Water System Expanding** | ALL | | |
| **Source Type:** | ALL | | |
| **Source Use:** | ALL | | |
| **WFI Printed For:** | On-Demand | | |

# Appendix D

## Water System Facility Data

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# City of Duvall
# Comprehensive Water System Plan
# Supply Station Facilities Data

**Supply Facility Data**

| Name | Suction Pressure Zone | Discharge Pressure Zone | Year Const. | Above or Below Grade | Maximum Capacity (gpm) | Flow Meter Size | Have Standby Power | Have Pressure Relief | Have Surge Protection |
|---|---|---|---|---|---|---|---|---|---|
| Tolt 2 Supply Station (Sta 111) | SPU | 450 | 1963 | Below | 1,200 | 12 | No | No | No |
| Tolt 1 Supply Station (Sta 112) | SPU | 615 | 1984 | Below | 1,760 | 12 | No | No | No |

**Control Valve Data**

| Name | Description | Control Valve Size | Control Valve Model | Valve Mfgr | Valve Elv (feet) | Valve Set Point (psi) | Valve Set Point (feet H.E.) |
|---|---|---|---|---|---|---|---|
| Tolt 2 Supply Station (Sta 111) | Mainline | 10 | 131G-12BCSYKX | Cla-Val | 269 | 75 | 442 |
| Tolt 2 Supply Station (Sta 111) | Bypass | 4 | 131G-12BCSYKX | Cla-Val | 269 | 80 | 454 |
| Tolt 1 Supply Station (Sta 112) | Mainline | 8 | 131G-12BCSYKX | Cla-Val | 467 | 65 | 617 |
| Tolt 1 Supply Station (Sta 112) | Bypass | 4 | 131G-12BCSYKX | Cla-Val | 467 | 70 | 629 |

**Control Data**

| Name | Control Component | Supplied Pressure Zone | Supply To Zone Priority | Supply Operation Priority | Station Have Telemetry |
|---|---|---|---|---|---|
| Tolt 2 Supply Station (Sta 111) | Flow Rate Controlled | 450 | | | Yes |
| Tolt 1 Supply Station (Sta 112) | Flow Rate Controlled | 615 | | | Yes |

**Other Data**

| Name | Ground Elv (feet) | Control Valve Elv (feet) | SPU Min. Con. Head (feet)[1] | Normal Pressure Inlet (psi) | Normal Pressure Outlet (psi) |
|---|---|---|---|---|---|
| Tolt 2 Supply Station (Sta 111) | 274 | 269 | 630 | 220 | 80/75 |
| Tolt 1 Supply Station (Sta 112) | 472 | 467 | 635 | 100 | 70/65 |

1 Minimum head elevations based on City of Seattle datum rounded to nearest 5 feet. Revised 12/13/96, effective 12/13/00 due to Tolt Filtration Plant improvements. To convert between City of Seattle and NAVD88 Datums, use: ("City of Seattle Datum" + 9.7 ft. = NAVD88)

# City of Duvall
# Comprehensive Water System Plan
# Pump Station Facilities Data

**Pump Station Data**

| Name | Suction Pressure Zone | Discharge Pressure Zone | Year Const. | Above or Below Grade | Maximum Capacity (gpm) | Meter Size & Model | Have Standby Power | Have E.G. Set Receptacle | Have Surge Protection |
|---|---|---|---|---|---|---|---|---|---|
| 615 Zone BPS | 450 | 615 | 1996 | Above | 2,000 | 12" | Yes | Yes | 6" SAV |
| | | | | | | | | | |

**Pump Data**

| Pump Name | Pump Manufacturer | Pump Model | Pump Type | Current Pump Rate (gpm) | Design Capacity (gpm) | Design Head (feet) | Motor Mfgr | Motor Size (HP) | Control Valve Size & Model |
|---|---|---|---|---|---|---|---|---|---|
| Booster Pump #1 | Floway | 8 JOH | VT 6 stage | | 350 | 154 | GE | 30 | Check only |
| Booster Pump #2 | Peerless | 2624332/MC | VT 4 stage | | 1000 | 165 | GE | 60 | Check only |
| Booster Pump #3 | Goulds | DWI 12RJLC | VT 3 stage | | 1000 | 158 | US Electric | 60 | Check only |
| Notes: | All pumps have VFD's | | | | | | | | |

**Pump Curve Data**

| Pump Name | Point 1 | | Point 2 | | Point 3 | | Pump Serial Number | Pump Impeller Diameter |
|---|---|---|---|---|---|---|---|---|
| | Flow (gpm) | Head (feet) | Flow (gpm) | Head (feet) | Flow (gpm) | Head (feet) | | |
| Booster Pump #1 | | | | | | | 21245-1-1 | |
| Booster Pump #2 | | | | | | | | |
| Booster Pump #3 | | | | | | | FR426919 | |

**Pump Control Data**

| Pump Name | Control Facility | Supplied Pressure Zone | Supply To Zone Priority | Pump Operation Priority | Station Have Telemetry |
|---|---|---|---|---|---|
| Booster Pump #1 | 615 Zone pressure | 615 | Secondary, Tolt 1st | Primary | Yes |
| Booster Pump #2 | 615 Zone pressure | 615 | Secondary, Tolt 1st | 1st Lag | Yes |
| Booster Pump #3 | 615 Zone pressure | 615 | Secondary, Tolt 1st | 2nd Lag | Yes |

# City of Duvall
# Comprehensive Water System Plan
# Storage Facilities Data

## Reservoir Data

| Reservoir Name | Pressure Zone | Year Const. | Material | Capacity (gallons) | Overall Height (feet) | Diameter (feet) | Water Base Elv (feet) | Overflow Elv (feet) | Ground Elv (feet) | Seismic Restraint (Y or N) |
|---|---|---|---|---|---|---|---|---|---|---|
| Crestview Estates | 555 | 1988 | Steel | 500,000 | 63.2 | 38 | 496.0 | 556.0 | 496 | Y |
| Big Rock Road | 450 | 1996 | Steel | 2,200,000 | 27.3 | 138 | 430.0 | 450.5 | 430 | N |

## Piping Data

| Reservoir Name | Outlet Size (in) | Inlet Size (in) | Elevated Inlet Elv. (feet) | Altitude Valve | | Overflow Size (in) | Drain Size (in) | Meter Size (in) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Size (in) | Setting (feet) | | | | |
| Crestview Estates | 12 | 8 to 6 | 545 | 4 | | 6 | 12/6 | n/a | 1 |
| Big Rock Road | 12 | inlet/outlet combo | n/a | 6 | | 8 | 12 | n/a | 2 |

1. Altitude control valve with backpressure sustaining and 8" insertion flow meter on inlet piping
2. Altitude control valve (Cla-Val 210-03-ADS) with solenoid control from 615 Zone

## Storage Data

| Reservoir Name | Max Water Height (feet) | Volume Per Foot (gallons) |
|---|---|---|
| Crestview Estates | 60.0 | 8,484 |
| Big Rock Road | 20.5 | 111,887 |

## Level Control Data

| Reservoir Name | Controlled Supply Facility | Reservoir Have Telemetry | Normal Operating Range (feet) |
|---|---|---|---|
| Crestview Estates | 615 Zone Pump Station | Yes | 544 - 555 |
| Big Rock Road | Tolt 2 Supply Station | Yes | 440 - 450 |

# City of Duvall
# Comprehensive Water System Plan
# Pressure Reducing Station Data

**Station Data**

| PRV Name | Upper Pressure Zone | Lower Pressure Zone | Year Const. | Ground Elv (feet) | Normal Pressure Inlet (psi) | Normal Pressure Outlet (psi) | Station Operation Status |
|---|---|---|---|---|---|---|---|
| Kennedy Drive | 450 | 330 | | 213 | 99 | 54 | Active |
| 26500 145th | 450 | 330 | | 168 | 118 | 73 | Active |
| Park Street | 450 | 330 | | 200 | 104 | 60 | Active |
| 3rd & Virginia | 450 | 330 | | 222 | 95 | 50 | Active |
| 3rd & Stewart | 450 | 330 | | 220 | 96 | 51 | Active |
| 3rd & Cherry | 450 | 330 | | 220 | 96 | 51 | Active |
| 3rd & Stella | 450 | 330 | | 220 | 96 | 51 | Active |
| 143rd & 268th | 450 | 330 | | 235 | 89 | 44 | Active |
| NE Big Rock Road | 450 | 330 | | 173 | 116 | 71 | Active |
| Stephens St & Broadway | 450 | 330 | | 188 | 110 | 65 | Active |
| 272nd & 143rd | 555 | 450 | | 300 | 106 | 63 | Active |
| Sunset Heights 144th | 555 | 450 | | 292 | 109 | 67 | Active |
| Millers Home Stead | 555 | 450 | | 317 | 98 | 56 | Active |
| Bruett Road | 555 | 450 | | 320 | 97 | 55 | Active |
| Kasper Heights | 555 | 485 | | 360 | 80 | 56 | Active |
| 275th & 141st | 555 | 485 | | 336 | 90 | 66 | Active |
| 150th & 278th | 615 | 555 | | 436 | 77 | 49 | Active |
| Manion & 156th | 615 | 555 | | 434 | 78 | 50 | Active |
| 282nd & 140th | 615 | 555 | | 406 | 90 | 62 | Active |

**PRV Set Point Data**

| PRV Name | Description | Valve Size (inches) | Valve Mfgr | Valve Model | Valve Elv (feet) | Valve Set Point (psi) | Valve Set Point (feet H.E.) |
|---|---|---|---|---|---|---|---|
| Kennedy Drive | Small PRV | 2 | Cla-Val | 90G-01AS | 208 | 50 | 324 |
| | Large PRV | 6 | Cla-Val | 90G-01AB | 208 | 45 | 312 |
| 26500 145th | Small PRV | 2 | Cla-Val | 90G-01AS | 163 | 66 | 315 |
| | Large PRV | 6 | Cla-Val | 90G-01AB | 163 | 61 | 304 |
| Park Street | Small PRV | 3 | Cla-Val | G-01A W/X4 | 195 | 48 | 306 |
| | Large PRV | -- | -- | -- | -- | -- | -- |
| 3rd & Virginia | Small PRV | 3 | Cla-Val | 90G-01AS | 217 | 50 | 333 |
| | Large PRV | 6 | Cla-Val | 90G-01AB | 217 | 45 | 321 |
| 3rd & Stewart | Small PRV | 2 | Cla-Val | 90G01AJ | 215 | 50 | 331 |
| | Large PRV | -- | -- | -- | -- | -- | -- |
| 3rd & Cherry | Small PRV | 2 | Cla-Val | 90G-01AS | 215 | 50 | 331 |
| | Large PRV | -- | -- | -- | -- | -- | -- |
| 3rd & Stella | Small PRV | 2 | Cla-Val | 90G-01AS | 215 | 50 | 331 |
| | Large PRV | -- | -- | -- | -- | -- | -- |
| 143rd & 268th | Small PRV | 1-1/4 | Cla-Val | 90G-01AS | 230 | 35 | 311 |
| | Large PRV | 4 | Cla-Val | 90G-01AB | 230 | 30 | 299 |
| NE Big Rock Road | Small PRV | 4 | Cla-Val | 90G-01YBC | 168 | 65 | 318 |
| | Large PRV | 10 | Cla-Val | 90G-01YBC | 168 | 60 | 307 |
| Stephens St & Broadway | Small PRV | 3 | Cla-Val | 90G-01AS | 183 | 55 | 310 |
| | Large PRV | 8 | Cla-Val | 90G-01AB | 183 | 50 | 299 |
| 272nd & 143rd | Small PRV | 3 | Cla-Val | 90G-01AS | 295 | 45 | 399 |
| | Large PRV | 6 | Cla-Val | 90G-01AB | 295 | 40 | 387 |
| Sunset Heights 144th | Small PRV | 2 | Cla-Val | 90G-01AS | 287 | 55 | 414 |
| | Large PRV | 6 | Cla-Val | 90G-01AB | 287 | 50 | 403 |
| Millers Home Stead | Small PRV | 2 | Cla-Val | 90G-01YS | 312 | 48 | 423 |
| | Large PRV | 6 | Cla-Val | 90G-01YBS | 312 | 43 | 411 |
| Bruett Road | Small PRV | 2-1/2 | Cla-Val | 90G-01YCS | 315 | 43 | 414 |
| | Large PRV | 8 | Cla-Val | 90G-01YBC | 315 | 38 | 403 |
| Kasper Heights | Small PRV | 3 | Cla-Val | 90G-01YS | 355 | 56 | 484 |
| | Large PRV | 8 | Cla-Val | 90G-01YBC | 355 | 46 | 461 |
| 275th & 141st | Small PRV | 2 | Cla-Val | 90G-01AS | 331 | 62 | 474 |
| | Large PRV | 6 | Cla-Val | 90G-01ABC | 331 | 52 | 451 |
| 150th & 278th | Small PRV | 2-1/2 | Cla-Val | 90G-01CSY | 431 | 28 | 496 |
| | Large PRV | 8 | Cla-Val | 90G-01BCY | 431 | 25 | 489 |
| Manion & 156th | Small PRV | 2 | Cla-Val | 90G-01YCS | 429 | 30 | 498 |
| | Large PRV | 6 | Cla-Val | 90G-01BCY | 429 | 27 | 491 |
| 282nd & 140th | Small PRV | 3 | Cla-Val | 90G-01ABCS | 401 | 42 | 498 |
| | Large PRV | 8 | Cla-Val | 90G-01ABCS | 401 | 39 | 491 |

# Appendix E

## Consistency Statement Checklist

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Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

# Local Government Consistency Determination Form

Water System Name: City of Duvall PWS ID: 207508

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: March 2021

Local Government with Jurisdiction Conducting Review: _____

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

| | For use by water system | For use by local government |
|---|---|---|
| **Local Government Consistency Statement** | **Identify the page(s) in submittal** | **Yes or Not Applicable** |
| a) The water system service area is consistent with the adopted land use and zoning within the service area. | Pg 3-4 to 3-6 | Yes |
| b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology. | Pg 3-7 to 3-9 | Yes |
| c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances. | Pg 5-2 to 5-4 | Yes |
| d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area. | Pg 5-4 to 5-12 | Yes |
| e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans. | Pg 3-1 to 3-4 | Yes |

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

_____ _____

Signature Date

Steven Leniszewski, P.E., Public Works Director, City of Duvall

Printed Name, Title, & Jurisdiction

## Consistency Review Guidance

### *For Use by Local Governments and Municipal Water Suppliers*

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the service area and any additional areas where a municipal water supplier wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a municipal water supplier wants to expand its water right's place-of-use. If no water right place-of-use expansion is requested, a consistency review is not required.

For **engineering documents,** a consistency review is required for areas where a municipal water supplier wants to expand its water right's place-of-use (water system plan amendment is required). For noncommunity water systems, a consistency review is required when requesting a place-of-use expansion. All engineering documents must be submitted with a service area map (WAC 246-290-110(4)(b)(ii)).

**A) Documenting Consistency:** The planning or engineering document must include the following when applicable.

a) A copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that relate to water supply planning.

b) A copy of the **growth projections** that correspond to the service area. If the local population growth projections are not used, explain in detail why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. *This applies to cities and towns only.*

d) All **service area policies** for how new water service will be provided to new customers.

e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

**B) Documenting an Inconsistency:** Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.

**C) Documenting a Lack of Local Review for Consistency:** Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

# Appendix F

## SEPA Checklist

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Reviewed by Lara Thomas
10/19/21

DEPARTMENT OF ECOLOGY
State of Washington

# SEPA ENVIRONMENTAL CHECKLIST

### *Purpose of checklist:*

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

### *Instructions for applicants:*

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

### *Instructions for Lead Agencies:*

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

### *Use of checklist for nonproject proposals:*

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

## *A. Background* [HELP]

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| 1. Name of proposed project, if applicable: | Comprehensive Water System Plan 2021 (Plan) | |
| 2. Name of applicant: | City of Duvall | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| 3. Address and phone number of applicant and contact person: | City of Duvall – Shaun Tozer<br>PO Box 1300<br>Duvall, WA 98019<br>425-939-8046 | |
| 4. Date checklist prepared: | August 23rd 2021 | |
| 5. Agency requesting checklist: | City of Duvall | |
| 6. Proposed timing or schedule (including phasing, if applicable): | This submittal is a non-project action. The Plan is anticipated to be adopted in October of 2021. The capital improvement program in the Plan will be implemented and constructed between 2020 and 2030. | |
| 7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. | Non-project action. The plan will be updated per State requirements, every 10 years or as necessary due to changing conditions, requirements, or law. | |
| 8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. | None as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. | This is a non-project proposal. The Department of Health, King County, and adjacent purveyors are proviging peer review of the plan. | |
| 10. List any government approvals or permits that will be needed for your proposal, if known. | Washington Department of Health, Washington Department of Ecology, King County, City of Duvall | |
| 11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional | The purpose of this update is to: evulate historical growth and water usage for use in future water demands; inventory, describe and analyze the existing water system to determine if it meets minimum requirements mandated by DOH standards and City policies; perform a capital improvements program (CIP) that identifies water system improvements which resolve existing system deficiencies and accommodate future needs of the | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| specific information on project description.) | system for at least 20 years into the future, prepare an implemenatation schedule of improvements and financing plans that meet the goals of the financial program; review and update the water use efficiency program; document operations and maintence program and comply with all other water system plan requirements of DOH. | |
| 12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. | City wide, see: Figure 2-1 Existing Water System | |

## *B. Environmental Elements* [HELP]

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| ***1. Earth*** [help] | | |
| a. General description of the site: (circle one): Flat, rolling, hilly, steep slopes, mountainous, other | The City of Duvall is located on the east slope of the Snoqualmie River Valley and generally slopes down to the west from an upland plateau situated at approximate elevation 500 ft to the Snoqualmie River at approximate elevation at 30 ft. | |
| b. What is the steepest slope on the site (approximate percent slope)? | Slopes vary within the City but do not generally exceed 20% in any of the proposed project areas. | |
| c. What general types of soils are found on the site (for | Topsoil, weathered glacial soils, and glacially consolidated till and | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. | outwash are generally present within the City. No agricultural or farmlands are present within the proposed project areas. | |
| d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. | None known as part of this planning project. This issue will be individually addressed at the time of each capital improvement. | |
| e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. | This submittal is a non-project action.<br>Project quantities will vary greatly. This issue will be individually addressed at the time of each capital improvement. | |
| f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. | Erosion can occur in conjunction with construction activity. The individual requirements for any given project will be addressed at the time the project is permitted. | |
| g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? | This is a non-project action. The individual requirements for any given project will be addressed at the time the project is permitted. | |
| h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: | This is a non-project action. The individual requirements for any given project will be addressed at the time the project is permitted. | |
| ***2. Air*** [help] | | |
| a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| c. Proposed measures to reduce or control emissions or other impacts to air, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***3. Water*** [help] | | |
| a. Surface Water: [help] | | |
| 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. | A list of the proposed projects is defined in Chapter 9 of the Plan. Individual evalutions and permits will be completed prior to any construction activity. | |
| 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. | None of the proposed projects discharge of waste material to surface waters. | |
| b. Ground Water: [help] | | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. | This plan proposes to maintain water rights to a well location at Taylor's Landing in Duvall. The site can be used for non-potable purposes and historically has provided a source for irrigation by Public Works. The site is permitted by the Department of Health and fully described in this plan. | |
| 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. | None of the proposed projects discharge waste material to groundwater. | |
| c. Water runoff (including stormwater): | | |
| 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 2) Could waste materials enter ground or surface waters? If so, generally describe. | This Plan does not anticipate waste materials entering ground or surface waters. Individual evaluations and permits will be completed prior to any construction activity. | |
| 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. | No. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: | This is a planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***4. Plants*** [help] | | |
| a. Check the types of vegetation found on the site: deciduous tree: alder, maple, aspen, other; evergreen tree: fir, cedar, pine, other; shrubs; grass; pasture; crop or grain; orchards, vineyards or other permanent crops; wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other; water plants: water lily, eelgrass, milfoil, other; other types of vegetation | All types of vegetation can be found throughout the City limits and service area of the water utility. | |
| b. What kind and amount of vegetation will be removed or altered? | Project quantities will vary greatly. Individual evalutions and permits will be completed prior to any construction activity. | |
| c. List threatened and endangered species known to be on or near the site. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| e. List all noxious weeds and invasive species known to be on or near the site. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***5. Animals*** [help] | | |
| a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include: birds: hawk, heron, eagle, songbirds; mammals: deer, bear, elk, beaver; fish: bass, salmon, trout, herring, shellfish | All types of wildlife can be found throughout the City limits and service area of the water utility. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| b. List any threatened and endangered species known to be on or near the site. | Chinook Salmon are present in Coe Clemons, Thayer Creek, and the Snoqualmie River. If projects located in these areas will require additional environmental studies. | |
| c. Is the site part of a migration route? If so, explain. | Yes, the City of Duvall is located along the Pacific Flyway. | |
| d. Proposed measures to preserve or enhance wildlife, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| e. List any invasive animal species known to be on or near the site. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***6. Energy and Natural Resources*** [help] | | |
| a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. | None known as part of this planning project. | |
| b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. | None known as part of this planning project. | |
| c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: | None known as part of this planning project. | |
| ***7. Environmental Health*** [help] | | |
| a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 1) Describe any known or possible contamination at the site from present or past uses. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| 4) Describe special emergency services that might be required. | None known. | |
| 5) Proposed measures to reduce or control environmental health hazards, if any: | None known. | |
| b. *Noise* | | |
| 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? | None known. | |
| 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. | Typical noise associated with construction equipment used for water system construction. Hours will be addressed at the time of each capital improvement | |
| 3) Proposed measures to reduce or control noise impacts, if any: | Hours of construction are regulated to reduce impacts of nearby residence and business. | |
| ***8. Land and Shoreline Use*** [help] | | |
| a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby | Nearby landuse will vary by project. Almost all right-of-way projects are located in existing ROW. Individual evalutions and permits will be | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| or adjacent properties? If so, describe. | completed prior to any construction activity. | |
| b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? | No recent agricultural activity. | |
| 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: | None known affects as part of this planning project. | |
| c. Describe any structures on the site. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| d. Will any structures be demolished? If so, what? | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| e. What is the current zoning classification of the site? | This is a non-project action. Generally all projects are located within existing public-used right of way. | |
| f. What is the current comprehensive plan designation of the site? | This is a non-project action. Generally all projects are located within existing public-used right of way. | |
| g. If applicable, what is the current shoreline master program designation of the site? | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| h. Has any part of the site been classified as a critical area by the city or county? If so, specify. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| i. Approximately how many people would reside or work in the completed project? | None. | |
| j. Approximately how many people would the completed project displace? | None. | |
| k. Proposed measures to avoid or reduce displacement impacts, if any: | None. | |
| l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***9. Housing*** [help] | | |
| a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. | None. | |
| b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. | None. | |
| c. Proposed measures to reduce or control housing impacts, if any: | None. | |
| ***10. Aesthetics*** [help] | | |
| a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? | None, all anticipated projects in the Plan are underground or existing structures. | |
| b. What views in the immediate vicinity would be altered or obstructed? | None. | |
| c. Proposed measures to reduce or control aesthetic impacts, if any: | None. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| ***11. Light and Glare*** [help] | | |
| a. What type of light or glare will the proposal produce? What time of day would it mainly occur? | None. | |
| b. Could light or glare from the finished project be a safety hazard or interfere with views? | No lighting is proposed. | |
| c. What existing off-site sources of light or glare may affect your proposal? | None. | |
| d. Proposed measures to reduce or control light and glare impacts, if any: | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***12. Recreation*** [help] | | |
| a. What designated and informal recreational opportunities are in the immediate vicinity? | None of the proposed projects will cause land term impact to recreational opportunities. | |
| b. Would the proposed project displace any existing recreational uses? If so, describe. | No. | |
| c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: | None. | |
| ***13. Historic and cultural preservation*** [help] | | |
| a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |

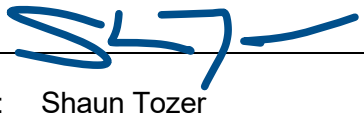
| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. | | |
| c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required. | None known as part of this planning project. Individual evalutions and permits will be completed prior to any construction activity. | |
| ***14. Transportation*** [help] | | |
| a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. | Streets and highways vary by project. Individual evaluations will be completed prior to any construction activities. | |
| b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? | King County Metro and it's subsidiaries provide public transit to the City. This planning project will have no impacts on public transit. Individual evalutions and permits will be completed prior to any construction activity. | |
| c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? | None. | |
| d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not | Improvements will be necessary for some of the proposed projects as they involve removing roadway to install waterlines. Individual | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| including driveways? If so, generally describe (indicate whether public or private). | evaluations will be completed prior to any construction activity. | |
| e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. | No. | |
| f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? | This planning project will have no impacts on vehicular trips in the City. If an individual is expected to affect vehicular trips, evalutions and permits will be completed prior to any construction activity. | |
| g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. | No. | |
| h. Proposed measures to reduce or control transportation impacts, if any: | None proposed by this planning project. | |
| ***15. Public Services*** [help] | | |
| a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. | No. | |
| b. Proposed measures to reduce or control direct impacts on public services, if any. | None proposed by this planning project. | |
| ***16. Utilities*** [help] | | |
| a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other | All typical services are available within the City limits and the water utilities service area. | |

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. | Varies by location. Individual evaluations and permits will be completed prior to any construction activity. | |

## *C. Signature* [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of Signee: Shaun Tozer

Position and Agency/Organization: Project Manager / City of Duvall

Date Submitted: 8/24/2021

## *D. Supplemental sheet for nonproject actions* [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

| | APPLICANT RESPONSE | AGENCY RESPONSE |
|---|---|---|
| 1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise? | Air and noise pollution may occur during construction of individual projects. | Individual CIP projects will be reviewed and include a SEPA review. Mitigation measures will be identified and implemented as needed |
| a. Proposed measures to avoid or reduce such increases are: | Individual projects within the proposal will be evaluated with respect to discharge or emissions at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |
| 2. How would the proposal be likely to affect plants, animals, fish, or marine life? | The majority of the improvements will be constructed in existing developed ROW. Individual projects within the proposal will be evaluated with respect to plant and animal at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |
| a. Proposed measures to protect or conserve plants, animals, fish, or marine life are: | Individual projects within the proposal will be evaluated with respect to plant and animal at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |

| | | |
|---|---|---|
| 3. How would the proposal be likely to deplete energy or natural resources? | Individual projects within the proposal will be evaluated with respect to resource depletion at the planning and permitting stage and any or all impacts will be avoided or mititgated. | |
| a. Proposed measures to protect or conserve energy and natural resources are: | The City encourages water conservation through the distribution of low-flow showerheads and faucet fittings, as well as leak detection kits, and public information resources. | |
| 4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands? | This proposal is a non-project planning action and will not have any environmental impacts. Individual projects within the proposal will be evaluated with respect to environmental impacts at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |
| a. Proposed measures to protect such resources or to avoid or reduce impacts are: | The projects taking place in the vicinity of a sensitive area will require additional environmental evaluation (SEPA) and will be required to comply with the city's sensitive area code. | |
| 5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline | This Plan will not encourage incompatiable uses. The Plan is compatible with the City's land use elements of the | Compatibility with the Shoreline Master Program Watershed Plan, and Development Regulations will also be applied to CIP projects |

| | | |
|---|---|---|
| uses incompatible with existing plans? | Comprehensive Plan and Duvall Municipal Code. | |
| a. Proposed measures to avoid or reduce shoreline and land use impacts are: | The proposal is a non-project planning action and will not have any shoreline and land use impacts. Individual projects within the proposal will be evaluated with respect to shoreline and land use impacts at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |
| 6. How would the proposal be likely to increase demands on transportation or public services and utilities? | The Plan responds to an increased need for municipal water service in new annexed areas or replacement of existing lines. Individual projections within the proposal will be evaluated with respect to transportation, public service, or utility impacts at the planning and permitting stage and any or all impacts will be avoided or mitigated. | |
| a. Proposed measures to reduce or respond to such demand(s) are: | See above. | |
| 7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment. | The proposal is a requirement of state law. | |

# Appendix G

## Water Use Efficiency Program

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CITY OF DUVALL

# Water Use Efficiency Program

## 1.0 Introduction

The City of Duvall recognizes that water is a valuable and essential natural resource that needs to be used wisely. This Water Use Efficiency Program provides an approach to increase water use efficiency within the City's water service area. The City purchases all its water from Seattle Public Utilities (SPU) and participates in SPU's regional water use efficiency (WUE) program.

### 1.1 Water Use Efficiency Requirements

The 2007 Water Use Efficiency Rule came out of the 2003 Municipal Water Law and was finalized as WAC 246-290-800. The planning requirements for water use efficiency programs include

(1) data collection and reporting,
(2) demand forecasting,
(3) evaluation and selection of water use efficiency measures,
(4) evaluation of water rates, and
(5) evaluation of water reclamation opportunities.

In addition to these planning requirements, the WUE Rule requires municipal water systems to establish water saving goals through a public process, meet a distribution system leakage standard, and report annually on the progress of meeting goals and using water efficiently.

### 1.2 Regional Water Use Efficiency Planning

The City primarily works to promote water use efficiency on a regional basis in King County through groups like the Saving Water Partnership. The Saving Water Partnership is administered by SPU and is comprised of the City of Duvall and other local utilities that purchase wholesale water from SPU. The Saving Water Partnership encourages customers to conserve water through public education materials and programs, and by using resource efficient appliances, fixtures, and equipment. The Saving Water Partnership also conducts evaluations of their programs to ensure that they are meeting their water use efficiency goals. Additionally, the City also promotes programs like WaterSense from the United

States Environmental Protection Agency and from Washington State's Department of Ecology

# 2.0 Water Use Efficiency Program

Washington State's water conservation requirements are incorporated in the Water Use Efficiency Rule, which was finalized as WAC 246-290-800 in January 2007. DOH published the first Water Use Efficiency Guidebook (Guidebook) in July 2007; the latest (third) edition of this guidance was released in January 2017. The City's WUE program is consistent with the Guidebook and the WUE Rule.

Based on this Guidebook, municipal water suppliers must develop and implement WUE programs to achieve their goals by implementing cost-effective measures. It lists eleven items that must be included in WUE programs. **Table 1** shows where the required program elements can be found in this document.

## Table 1
## Required WUE Program Elements

| Water Use Efficiency Program Element | | Section[1] |
|---|---|---|
| 1a. | Describe current water conservation program. | 2.1 |
| 1b. | For systems with 1,000 or more connections, estimate of water saved over the last six years. | 2.5 |
| 2. | Describe the WUE goals that support your WUE program and how the goals were established. | 2.3 |
| 3. | Evaluate WUE measures for cost-effectiveness. | 2.3 |
| 4. | Describe the WUE measures you will implement to meet your established goals for the next 10 years. | 2.3 |
| 5. | Describe how you will educate customers to use water efficiently. | 2.3 |
| 6. | Estimate projected water savings from the selected WUE measures. | WSP 4.5.1 |
| 7. | Describe how you will evaluate the effectiveness of your WUE program. | 2.5 |
| 8. | Evaluate distribution system leakage. | 2.3 & WSP 4.3 |
| 9. | Evaluate rate structures that encourage water demand efficiency. | 2.3 |
| 10. | Evaluate reclaimed water opportunities. | 2.3 & 2.4 |
| 11. | Describe your water supply characteristics. | WSP 6.2 |

1. Sections shown as "WSP X.X" refers to sections of the City's 2021 Water System Plan.

## 2.1 Previous Water Use Efficiency Efforts

Most water use efficiency efforts in Duvall are currently implemented at the regional level by the Saving Water Partnership. From 2013-2018 the regional goal has been to reduce per capita water usage so that the total average annual retail water usage of the Saving Water Partnership members was less than 105 MGD from 2013 to 2018. The Saving Water Partnership publishes an annual report that monitors the performance of past conservation efforts to ensure the program is meeting its goals and is being managed efficiently. The annual reports are available at http://www.savingwater.org. The Saving Water Partnership's programs such as past plumbing and fixture rebates, landscaping audits, outreach and technical assistance, and water use efficiency

marketing continue to help the region achieve significant water savings consistent with its goals and will therefore continue to be supported.

## 2.2 Water Use Efficiency Program Goals and Objectives

The City's WUE Program supports goals established by regional partners. The 2019-2028 Water Use Efficiency Goal adopted through SPU's 2019 Water System Plan for the Saving Water Partnership consists of measures to promote efficient water use which includes public education to promote behavioral changes, customer incentives for installing water-efficient equipment, and price induced water savings from rates as detailed in SPU's 2019 WSP.

The goals and objectives of the City of Duvall Water Use Efficiency Program consist of formal goals established in its Regional Partnership with SPU, and adopted by Council resolution; such as *Resolution 20-23 adopted October 6th, 2020* which set the 2019 – 2028 goal:

- Keep the total average annual retail water use of Saving Water Partnership members under 110 MGD through 2028 despite forecasted population growth by reducing per capita water use.

And less formal objectives such as the following:

- Continue to increase awareness among all water users of the value and importance of conserving water and of the methods available to achieve reductions in water use.
- Continue to evaluate potential uses of reclaimed water from the City's Wastewater Treatment Plant for irrigation or other non-potable applications.

The City of Duvall will achieve these goals and objectives through the implementation of the water use efficiency program that follows.

## 2.3 Evaluation and Selection of Alternative Measures

The City's evaluation of water use efficiency measures and selected levels of implementation are presented in Table 2.

## Table 2
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| **PUBLIC EDUCATION** | |
| **School Outreach** - This water use efficiency measure is only required for large systems. This measure requires educational programs that increase awareness of local water resources and encourage water use efficiency. | *This measure is currently accomplished through the Saving Water Partnership's youth education program; therefore, the City will not duplicate this effort. Because resources to accomplish this water use efficiency measure are allocated at the regional level, rather than directly from Duvall, this measure is highly cost-effective for the City.* |
| **Speakers Bureau** - This water use efficiency measure is only required for large water systems and is described in the *Conservation Planning Requirements* as "Seeking speaking opportunities and making speakers available to a wide cross-section of services, community, and other groups." | *The City will encourage and make information available about upcoming water use efficiency speakers or meetings to City customers. At any time, as resources allow, the City will strive to schedule speakers or have City staff speak to residents regarding water use efficiency measures and benefits.* |

## Table 2 (continued)
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| PUBLIC EDUCATION (CONTINUED) | |
| **Program Promotion** - This item is a required element of all water use efficiency programs. The *Conservation Planning Requirements* provides the following definition for this measure: "Publicize the need for water conservation through news articles, public water systems' bill inserts, or other means. This includes promoting efficient indoor and outdoor water usage, distribution of Ecology/Health water use efficiency brochures of other printed material, informing customers, builders and contractors of new plumbing code regulations requiring efficient plumbing fixtures, and other efforts." | *The City will continue to support the regional water use efficiency promotion activities of the Saving Water Partnership. Water use efficiency information can also be accessed by Duvall customers via informational material created by the Saving Water Partnership. This includes newspaper articles, informational websites, displays at local fairs and mall shows, water-related conferences and seminars, community presentations, quarterly newsletters, water use efficiency education courses for children, and various water use efficiency programs for the elementary, middle, and high schools. The City will also provide water use efficiency brochures in water bills to further increase the promotion of water use efficiency programs* |
| **Theme Shows and Fairs** – The evaluation of this measure is not required for Duvall, because the *Conservation Planning Requirements* lists it as a recommended measure for large and regional systems only. This measure requires that a portable display be made, along with educational materials to be exhibited at local fairs and theme shows. | *This measure has been accomplished by the Saving Water Partnership in the past. Therefore, the City will not duplicate this effort. Because resources to accomplish this water use efficiency measure are allocated at the regional level, rather than directly from Duvall, this measure is highly cost-effective for the City.* |

## Table 2 (continued)
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| **TECHNICAL ASSISTANCE** | |
| **Purveyor Assistance** - This item is required for medium water systems such as Duvall and is described in the *Conservation Planning Requirements* as "assistance from wholesale suppliers to aide wholesale customers in developing and implementing conservation programs tailored to their needs, and in carrying out the wholesale suppliers conservation program." | *This measure will not be included in the City's water use efficiency program at this time, because the City currently does not have any wholesale customers. However, as a wholesale water purchaser, the City will continue to comply with SPU water use efficiency requirements.* |
| **Customer Assistance** - This water use efficiency measure is required for medium water systems such as Duvall. The *Conservation Planning Requirements* defines this water use efficiency measure as the utility providing "assistance and information to customers which facilitates water conservation." A great deal of the information on water use efficiency will be disseminated to customers in the distributed brochures, radio advertisements, and newspaper articles described above under "Program Promotion". | *The City will distribute water use efficiency information at the local level and coordinate with the Saving Water Partnership, as needed, on regional activities. The cost of this program and its predicted water savings are included in the program promotion measure section.* |
| **Bill Showing Consumption** History - This water use efficiency measure is required for medium water systems such as Duvall. According to the *Conservation Planning Requirements*, water billings should display a comparison of current water use with past water use from the same period of the previous year and show a percent increase or decrease. | *The City began providing this data to its customers on both electronic and paper bills beginning in 2007. Customers logging on to electronic billing can look at their consumption over various years and compare all of them at once. Additional resources outside of the meter reading and billing system upgrade project will not be necessary to implement this water use efficiency measure; therefore, this is a cost-effective measure for the City.* |

## Table 2 (continued)
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| **SYSTEM MEASURES** | |
| **Source Meters** - Metering of all sources is required for all new or expanding public water systems needing additional water rights. Periodic meter testing and meter repair program is also required under this measure. | *Both of the City's supply sources are currently equipped with meters and are recorded continuously by SPU and the City. The meters are periodically tested and repaired, or replaced, as necessary. While the City does not expect to receive any additional water savings from the program, the maintenance of source meters is vital to sustain current water use efficiency levels, for accurate unaccounted-for water calculations, to ensure accurate billing from SPU, and to maintain proper operation of the water system during SPU's demand metering periods.* |
| **Service Meters** - The *Conservation Planning Requirements* recommends that all utilities install individual service meters for all water users and maintain a periodic meter testing and repair program. | *All of the City's service connections are metered. As part of improvements that include the meter reading and billing system upgrade, all residential meters were replaced between 2006-2008 and commercial meters were replaced or upgraded in 2007. The City currently maintains a program in which meters are periodically tested and repaired or replaced, as necessary. While the City does not expect to receive any additional water savings from the program, the maintenance of service meters is vital to sustain current water use efficiency levels, for accurate unaccounted-for water calculations, and to ensure accurate customer billing.* |
| **Distribution System Leakage** - This water use efficiency measure is required for all public water systems. Starting with data collected in 2007, distribution leakage must not be more than 10 percent of supply, based on a 3-year rolling average. If the City is not able to meet this requirement in the future, a water loss control action plan must be prepared and implemented. This plan will need to identify steps and timelines for reducing leakage. | *The City will continue its water main replacement program to reduce the amount of older and potentially leaking water mains. The City will also require the metering of all non-revenue unaccounted-for water usage such as water main flushing and street cleaning. The City will also continue to implement its comprehensive leak detection/water main repair program to reduce the risk of future leaks..* |

## Table 2 (continued)
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| **INCENTIVES/OTHER MEASURES** | |
| **Single-Family/Multi-Family Kits** - This water use efficiency measure is required for medium-sized water systems. The *Conservation Planning Requirements* defines this measure as the following: "Distribute kits containing easily installed water saving devices to single-family residential homes and the owners and managers of apartment buildings and condominiums." These kits could include shower flow restrictors, toilet tank water displacement bags, leak detection dye tablets for toilets, and informational brochures. | *The City receives and makes available water use efficiency kits for water system customers. The City will support and promote other regional plumbing retrofit programs and will also enforce the use of low-flow plumbing fixtures through the building permit process.* |
| **Nurseries/Agriculture** - This item is also required for medium-sized water systems such as Duvall. The *Conservation Planning Requirements* defines this measure as the following: "Encourage and/or require the application of current technology to water use practices of large agriculture/irrigation operations. Examples include nurseries and commercial agriculture." | *The City will encourage agricultural landowners and large irrigation operations to utilize the latest technology available to help conserve water.* |
| **Landscape Management/Playfields - Xeriscaping** - This water use efficiency measure is required for medium-sized water systems. The *Conservation Planning Requirements* defines this measure as the following: "Promote low water demand landscaping in all retail customer classes (private, public, commercial, industrial, etc.)." The promotion of low water demand landscaping can be accomplished by (1) preparing a demonstration garden which can provide an example of this type of landscaping to interested customers and developers, (2) working with local nurseries to promote the availability of low water demand plants and/or (3) developing codes that require landscaping on new development that is of the low demand type. The Saving Water Partnership works with the landscape industry to promote water use efficiency practices within the industry and to its customers. The Saving Water Partnership has worked with the Washington Association of Landscape Professionals and the Washington State Nursery and Landscape Association to develop informational brochures on proper irrigation and landscaping practices. | *The City currently supports the water use efficiency efforts of these groups through the Saving Water Partnership's Free Savvy Gardner Classes. Because resources to accomplish this water use efficiency measure are allocated at the regional level, rather than directly from Duvall, this measure is highly cost-effective for the City.* |

## Table 2 (continued)
## Summary of Water Use Efficiency Program Measures

| PROGRAM MEASURE | EVALUATION |
|---|---|
| INCENTIVES/OTHER MEASURES (CONTINUED) | |
| **Water Use Efficiency Pricing** - This water use efficiency measure is also required for medium-sized water systems. All water use efficiency programs are required to consider the benefits and costs of implementing rate design techniques to provide economic incentives to conserve water. | *The City's rates are structured to emphasize the commodity charge more than the base charge to enable customers to have more control over their water bill and recognize the benefits of conserving water. The City will continue to establish an increasing block rate structure that provides economic incentives for conserving water. Future funds will not be required to continue to support this water use efficiency measure; therefore, this is a cost-effective measure for the City.* |
| **Utility Financed Retrofit** - This water use efficiency measure is only required for large systems. This measure requires that the City "install water efficient fixtures in existing residences and commercial/industrial facilities by: (a) providing fixtures at no cost, (b) giving a rebate for consumer purchased fixtures, or (c) arranging for suppliers to provide fixtures at a reduced price." | *Currently, the Saving Water Partnership has a rebate program for residential toilets and certain irrigation equipment and offers business rebates and technical assistance. The City will continue to support and promote the regional water fixture rebate program of the Saving Water Partnership. Because resources to accomplish this water use efficiency measure are allocated at the regional level, rather than directly from the City, this measure is highly cost-effective for the City.* |
| **Seasonal Demand Management** - This includes water use efficiency measures aimed at controlling peak seasonal demand. The evaluation of this measure is not required for Duvall, because the *Conservation Planning Requirements* lists it as a recommended measure for large and regional systems only. | *Although this is not a cost-effective measure, it is prudent in continuing to support the City's long-range efforts to conserve regional water resources.* |
| **Recycling/Reuse** – Ecology requires that the City "Examine opportunities for water reuse and recycling as an approach to providing additional water." The City currently operates its own Wastewater Treatment Plant that could be a source of reclaimed water for non-potable uses such as irrigation, commercial and/or other beneficial uses. A list of Duvall's largest water users in 2019 is shown in **Table 4-2** of the City of Duvall's Comprehensive Water System Plan. The use of reclaimed water by these customers may have the most impact on reducing overall water consumption; therefore, the City will continue to consider how water reclamation activities could target these large water users. | *The City will evaluate methods that would provide reclaimed water from the new Wastewater Treatment Plant for non-potable uses to City parks, the Riverview School District, Duvall Village or other water system customers for irrigation or other purposes. The City will also further consider reclaimed water use for large water users that have large potential water savings and will begin to implement reclaimed water use once it is deemed cost-effective at these locations.* |

## 2.4 Reclaimed Water Evaluation

The City has evaluated reclaimed water opportunities for the Riverview School District, City of Duvall, and Duvall Village. These evaluations are described below, and are followed by the City's

Reclamation Checklist, shown in Table 3.

### *Riverview School District*

Potential Use: Landscape irrigation at Cherry Valley Elementary School

Potential Water Savings: 320,000 gallons per year estimated

Operational Feasibility: The Cherry Valley Elementary School is located approximately one-mile northeast of the Wastewater Treatment Plant. Irrigation pipe and associated appurtenances will need to be constructed to convey reclaimed water to the school. Alternatively, water trucks may instead be used to haul water to the elementary school site as is currently done by the City to irrigate parks with water from the Taylor's Landing Well. Regular irrigation of all landscaping would require a significant effort from City or school district staff.

Financial Feasibility: Construction of approximately one-mile of irrigation pipe, most of which would be located in the City's business district, would be quite costly. Further financial analyses will need to be performed to determine potential cost sharing opportunities that may be achieved between the City, the school district, and other potential reclaimed water users that may be located along the proposed alignment. The City will need to perform a more detailed feasibility analysis to determine the cost effectiveness of constructing an irrigation system to the elementary school. The labor hours necessary to haul water to irrigate all landscaping is more than the cost savings that may be realized by using reclaimed water. However, it may be feasible to irrigate a portion of the school district's landscaping with reclaimed water to supplement the potable water supply from the existing irrigation system.

### *City of Duvall*

Potential Use: Landscape irrigation at city parks; street sweeping; washing sidewalks; dust control and other construction purposes.

Potential Water Savings: 100,000 gallons per year estimated

Operational Feasibility: Currently, the City has the ability to haul water in water trucks from the Taylor's Landing Well to irrigate some city parks. Utilizing reclaimed water from the Wastewater Treatment Plant, a similar program may be implemented with minimal impact to existing maintenance practices. Additionally, reclaimed water may be hauled for use by the City for street sweeping, dust control, and dust control at construction sites, which currently utilizes the City's potable water supply.

Financial Feasibility: This program could be implemented with minimal costs to the City. The cost savings that may be realized from limiting the use of potable water for landscape irrigation at city parks, street sweeping, washing sidewalks, dust control and other construction purposes have the potential to make this the most cost-effective option for the use of reclaimed water for the City to implement.

## Table 3
## Reclaimed Water Potential Checklist

| Reclaimed Water Potential Use Checklist | | Est. Future Annual Use | Est. Future Annual Savings |
|---|---|---|---|
| **Crop Irrigation** | ✓ | | |
| Trees | ☐ | N/A | N/A |
| Sod | ☐ | N/A | N/A |
| Nursery | ☐ | N/A | N/A |
| Pasture | ☐ | N/A | N/A |
| Irrigation of Food Crops | ☐ | N/A | N/A |
| **Landscape Irrigation** | | | |
| Cemeteries | ☐ | N/A | N/A |
| Freeway Landscapes | ☐ | N/A | N/A |
| Other Restricted Landscape Areas | ☐ | N/A | N/A |
| Golf Courses | ☐ | N/A | N/A |
| Parks | ☑ | 50,000 gal | $100 |
| Playgrounds | ☐ | N/A | N/A |
| Schoolyards | ☑ | 320,000 gal | $640/$1,200[1] |
| Other Open Access Areas | ☐ | N/A | N/A |
| Residential Landscapes | ☑ | 900,000 gal | $1,800/$3,400[1] |
| **Ponds** | | | |
| Landscape Impoundments | ☐ | N/A | N/A |
| Recreational Impoundments | ☐ | N/A | N/A |
| **Water Trucks** | | | |
| Street Sweeping | ☑ | 30,000 gal | $60 |
| Fire fighting & protection | ☐ | N/A | N/A |
| Washing of Corporation Yards, Lots, and Sidewalks | ☑ | 10,000 gal | $20 |
| Dust Control (Dampening Unpaved Roads, Other Surfaces) | ☑ | 10,000 gal | $20 |
| Dampening Soil for Compaction (Construction Sites, Landfills, Pipelines, etc.) | ☐ | N/A | N/A |
| **Other** | | | |
| Toilet and Urinal Flushing | ☐ | N/A | N/A |
| Lift Stations | ☐ | N/A | N/A |
| Ship Ballast | ☐ | N/A | N/A |
| Fish Hatchery Basins | ☐ | N/A | N/A |
| Washing Aggregate and Making Concrete | ☐ | N/A | N/A |
| Flushing of Sanitary Sewers | ☐ | N/A | N/A |
| Industrial Boiler Feed | ☐ | N/A | N/A |
| Industrial Cooling | ☐ | N/A | N/A |
| Industrial Process | ☐ | N/A | N/A |
| *Other uses not listed above | | | |
| Duvall Village Wetland Mitigation | ☑ | 100,000 gal | $200/$375[1] |

1 = Annual savings based on customer purchase price

## 2.5 Water Use Efficiency Program Results and Monitoring

Since adopting the water use efficiency goals and implementing its water use efficiency program the City has reduced its average per capita water consumption while its population has increased. Between 2013 and 2018 the population of the City increased approximately 7.5 percent, total water consumption increased by 6.0 percent, and per capita water consumption decreased by 1.4 percent. The reduction can be attributed to the increased awareness and interest in water use efficiency of our customers, and improved accounting and tracking methods.

The City will continue to monitor overall water use, per capita water use, and the amount of unaccounted-for water on an annual basis. The City will monitor the success or failure of its water use efficiency program by analyzing this data and determining the long-term trend in per capita water usage. The City will evaluate the effectiveness of water use efficiency methods, to determine if existing programs should be continued, or if new methods should be instituted. If the results of the program monitoring show that the water savings' goals for per capita water use are not being met, more rigorous program implementation or additional program items will be considered.

*For questions, call Kristina Westbrook,*
*King County Reclaimed Water Program Manager at (206) 296-5279*
*www.kingcounty.gov/reclaimedwater*

King County

# Water Reclamation Evaluation Checklist
# For Systems with 1,000 or more Connections

The County and State recognize that changing conditions could initiate a need to respond in new ways to future water quality standards, wastewater discharge requirements, take advantage of advances in treatment technologies and/or allow our region to be positioned to respond to changes associated with climate change and population growth.

In 2003, Chapter 90.46 of the Revised Code of Washington (RCW) was amended to require public water systems serving 1,000 or more connections to evaluate opportunities for reclaimed water when completing their water system plans. Please use this checklist to meet King County consistency requirements in responding to this legislation.

*Please use this checklist, including the inventory template, to ensure that your water system plan includes sufficient information about opportunities for reclaimed water and your system's efforts to develop those opportunities. If a question is not applicable or the information is unavailable, then answer, "unknown" or "n/a." King County will consider the checklist completed if each answer is filled in with the best available information, even if the utility states that it is not aware of any reclaimed water opportunities within its service area.*

**Water System Name:** City of Duvall
**Date:** November 8, 2021
**PWS ID#** 207508
**Contact:** Steve Leniszewski

1. **Identifying Potential Future Demand for Reclaimed Water:** King County maintains a database and map of potential reclaimed water users for evaluating future projects. Please use the template below, or similar table, to provide information to assist King County in further researching these potential uses.
   - **Large Utility Water Users** (choose one):
     - ☐ Attached is an inventory of twenty large (above 20,000 gallons/month on average), non single-family residential, water users served by our utility that have a potential for reclaimed water use, or
     - ☑ Attached is an inventory of our utility's top twenty water users, or
     - ☐ The information requested is unknown or not available.
       Additional Comments: _____
   - **Large Self Suppliers** (choose one):
     - ☐ Attached is an inventory of large, self-supplied water users within our water utility's service boundaries - especially those near wastewater treatment plants, mainlines, outfalls, and pump stations or similar reclaimed water facilities), or
     - ☑ The information requested is unknown or not available.
       Additional Comments: No large, self-supplied water users are within water utility's service area.
   - **Other** (choose one):
     - ☑ Attached is an inventory of other water users (such as those that are clustered near one another and could be served by a single system) that may be likely candidates for reclaimed water use, or
     - ☐ The information requested is unknown or not available.
       Additional Comments: Inventory is included in Section 2.4 of the City's Water Use Efficiency Plan.

2. **Environmental Commitment**: Are you a city/town, or providing water service to a city/town, that has made commitments within resource management plans, salmon recovery plans, or other environmental initiatives for which there is a potential opportunity for using reclaimed water to assist in meeting commitments? (choose one)

   ☑ Yes, here are plans that have potential for reclaimed water use in our service area to meet the above commitments:
   City of Duvall 2015 Comprehensive Plan Update: Environment and Sustainability Element
   City of Duvall Watershed Plan, adopted August 15, 2015;

   ☐ The information requested is unknown, not available.
   Additional Comments: _____

3. **Identifying Areas of Potential Use of Reclaimed Water for Environmental Benefit:**
   Below are ***examples*** of uses of reclaimed water ***that comply with State, Federal and other reclaimed water environmental, health and safety standards***. All of these uses are currently in effect somewhere in Washington State. To the best of your knowledge, are any of these potential uses for reclaimed water applicable to your area?

   **River Augmentation** (choose one):

   ☐ Yes, our water rights are limited by instream flows. For more information, King County may contact:
   _____
   _____

   ☑ The information requested is unknown, or not available.
   Additional Comments: City water system does not have surface water water right.

   **Groundwater Recharge** (choose one):

   ☐ Yes, we withdraw water from an aquifer that is in a groundwater management area, or from a declining aquifer, where water levels may need to be replenished or to maintain aquifer storage. For more information, King County may contact:
   _____

   ☑ The information requested is unknown, or not available.
   Additional Comments: City water system does not withdraw water for potable use.

   **Water Rights Mitigation** (choose one):

   ☐ Yes, our area is pursuing, or planning to pursue, new or additional water rights, and there may be an opportunity to use reclaimed water for mitigation of those new water rights. For more information, King County may contact:
   _____

   ☑ The information requested is unknown, or not available.
   Additional Comments: City does not plan on pursuing new or additional water rights.

   **Potential Areas of Environmental Need** (choose one):

   ☐ Yes, parts of our service area include potential environmental enhancement locations, such as wetlands enhancement, aquifer recharge, stream flow augmentation, that might be candidates for reclaimed water use. For more information, King County may contact:
   _____

   ☑ The information requested is unknown, or not available.
   Additional Comments: No existing environmental enhancement locations that are candiates for reclaimed water.

4. **Local Reclaimed Water Legislation**: If water reclamation is mandated for this water system through local government agreement, contract, local regulations, ordinances, or other mechanisms, please provide a copy of the governing mechanism (choose one).

   ☐ Yes, local legislation exists in our area in support of reclaimed water use. The following relevant legislation is attached (please list titles of documents):

   _____

   _____

   ☑ No water reclamation legislation exists, or is known to exist, at a local level in our service area.

5. **Coordination with Local Wastewater Utility:** Include a brief description of your interactions with any wastewater or reclaimed water utility (King County or other) adjacent to your service area to evaluate any potential opportunities to develop reclaimed water (choose one).

   ☑ Describe if applicable:
   The City continues to evaluate oppurtunities for reclaimed water with its wastewater treatment plant as described in its Water Use Efficiency Plan.

   ☐ None. Additional Comments: _____

**Template for**
**Inventory of Water Users and Identification of Potential Reclaimed Water Users**

| Site Owner or Site Name | Site Address (for general mapping purposes) | Estimated Annual Water Use | Water uses not requiring potable water[1] | Is this a Potential Reclaimed Water Customer? |
|---|---|---|---|---|
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[1] See Washington State Reclamation and Reuse Standards, September 1997, Section 1, Articles 1-5 for allowable uses of reclaimed water. http://www.ecy.wa.gov/PROGRAMS/WQ/reclaim/standards.html

City of Duvall

Small Town. Real Life.

# Utility Billing

## Top Users Report

Sort By: CONSUMPTION

Date Range: 1/1/2019 - 12/31/2019

| Rank | Name | Service Address | Consumption |
|---|---|---|---|
| 001 | Toll Bros Inc. | Hydrant | 1,497,372 |
| 002 | Riverview School Dist. | 29000 NE 150th St | 244,100 |
| 003 | Duvall Riverside Village Co-Op | 26220 NE Stella St | 221,700 |
| 004 | City of Duvall | 4-14525 Main St NE | 160,800 |
| 005 | Safeway Inc. | 14020 Main St NE | 160,300 |
| 006 | City of Duvall | 2-28430 NE Big Rock Rd | 154,900 |
| 007 | Cherry Valley Dairy | 26900 NE Cherry Valley Rd | 136,500 |
| 008 | Safeway Inc. | Safeway Irrigation | 120,300 |
| 009 | North Hill HOA-Tract 985 M-1 | Tract 985 M-1 | 116,900 |
| 010 | North Hill HOA-Tract 995 M-2 | Tract 995 M-2 | 99,800 |
| 011 | CC Edwards Construction | Hydrant | 92,200 |
| 012 | Copperhill Square | Irrigation-Copperhill Square | 87,900 |
| 013 | Ixtapa Restaurant | 15329 Brown Ave NE | 82,200 |
| 014 | Riverview School Dist | Cherry Valley Sprinkler | 77,800 |
| 015 | Toll Bros Inc. | Tract 989-Irrigation | 66,700 |
| 016 | 28000 Associates, LLC | 15321 Main St NE | 61,900 |
| 017 | Kassa & Woldemichael Rental Prop. LLC | 15420 Main St NE | 61,500 |
| 018 | Pickering Water Line | 28014 NE 124th St | 57,600 |
| 019 | City of Duvall | 3-SR 203 300' South of 145th | 55,300 |
| 020 | Copperhill Square | 14505 1st Lane NE | 53,600 |

# Appendix H

## Water System Construction Standards

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# Memorandum

**To:** Department of Health, File
**From:** Engineering Department
**Date:** ~~July 6, 2012~~ April 7, 2021 (updated)
**Re:** Comprehensive Water System Plan – Submittal Exception

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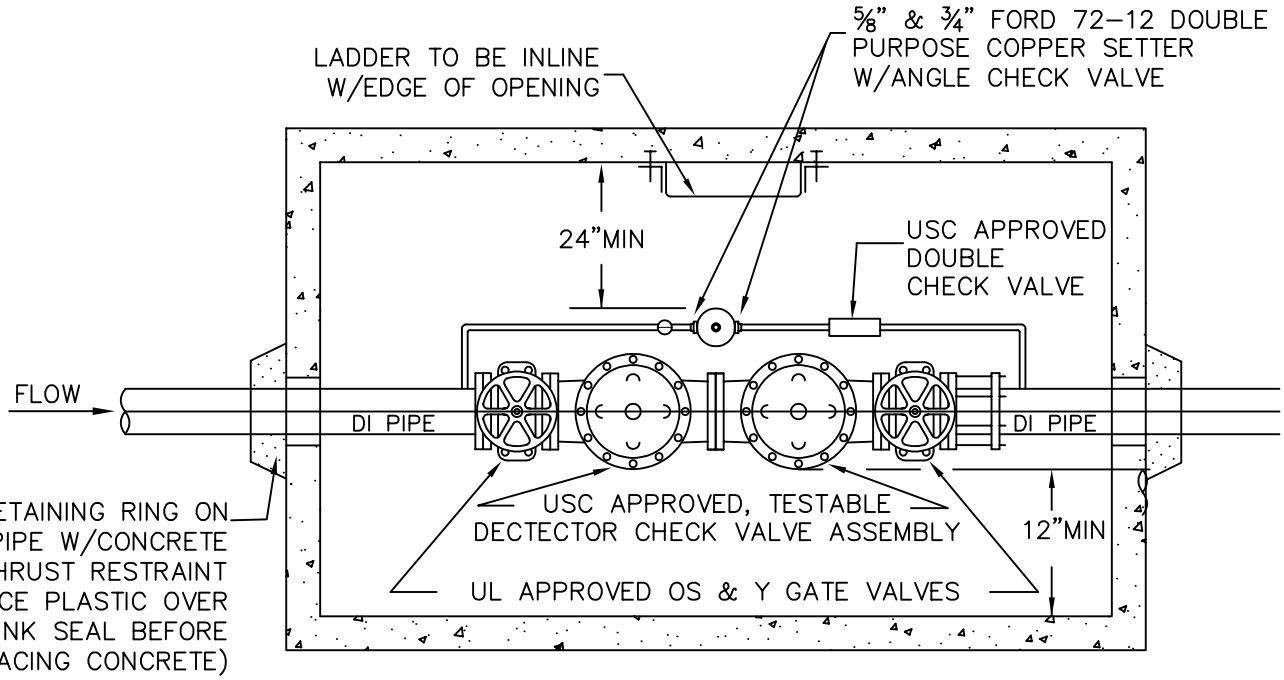
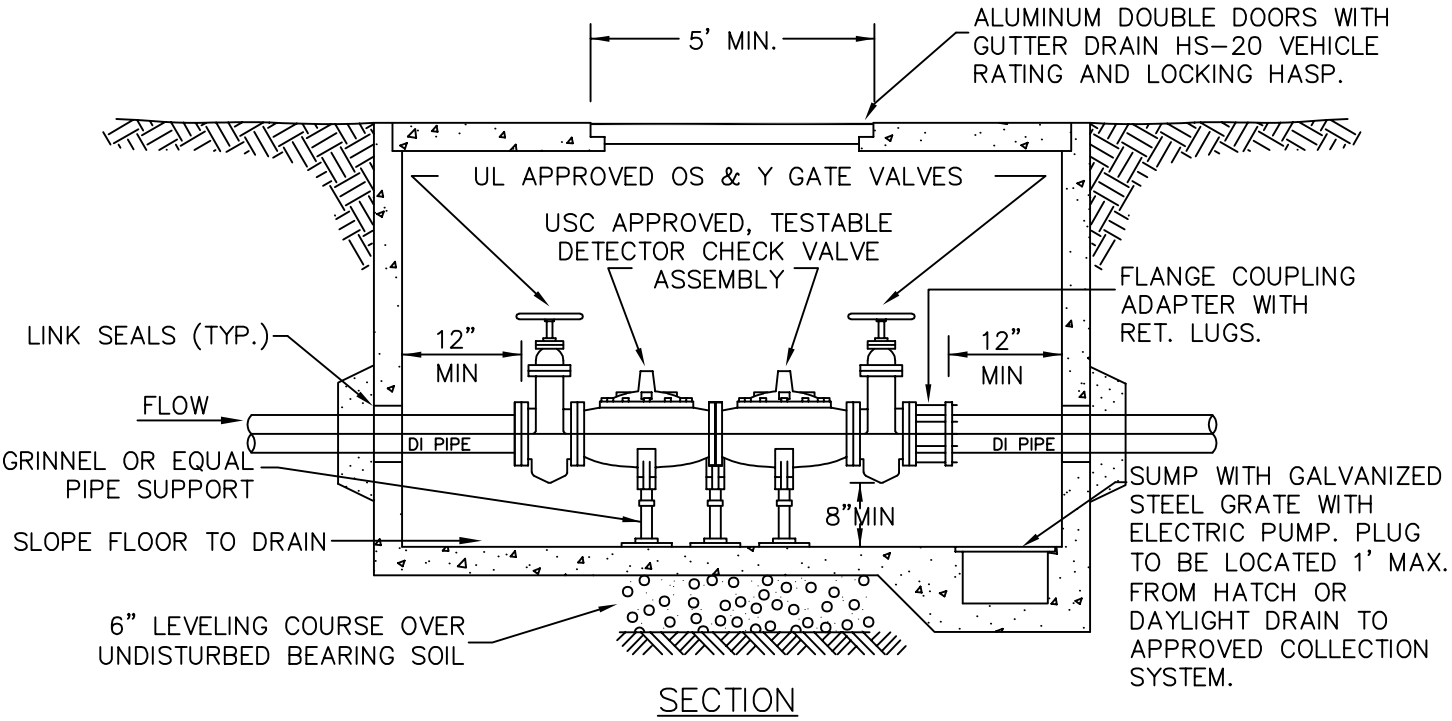
The City of Duvall requests a submittal exception in accordance with WAC 246-290-125. Included in Appendix H of the City's comprehensive water system plan are the City's standard water system details as well as standard construction and testing procedures for water system projects.

These standards can be found here:
https://www.duvallwa.gov/DocumentCenter/View/313/Development-Design-Standards-Details?bidId=




PLAN




SECTION

NOTES:

1. 5/8" METER TO BE SUPPLIED BY CITY
2. COVER SHALL EXTEND 6" ABOVE GRADE WHEN VAULT IS NOT IN TRAFFICS AREA AND SHALL BE FLUSH IN TRAFFIC AREA
3. SLOPE PAVEMENT AWAY FROM COVER WHEN VAULT IS IN TRAFFIC AREA
4. ALL BYPASSES TO BE SADDLED AND NOT DIRECT-TAPPED

NTS

**DEVELOPMENT DESIGN STANDARD DETAILS**

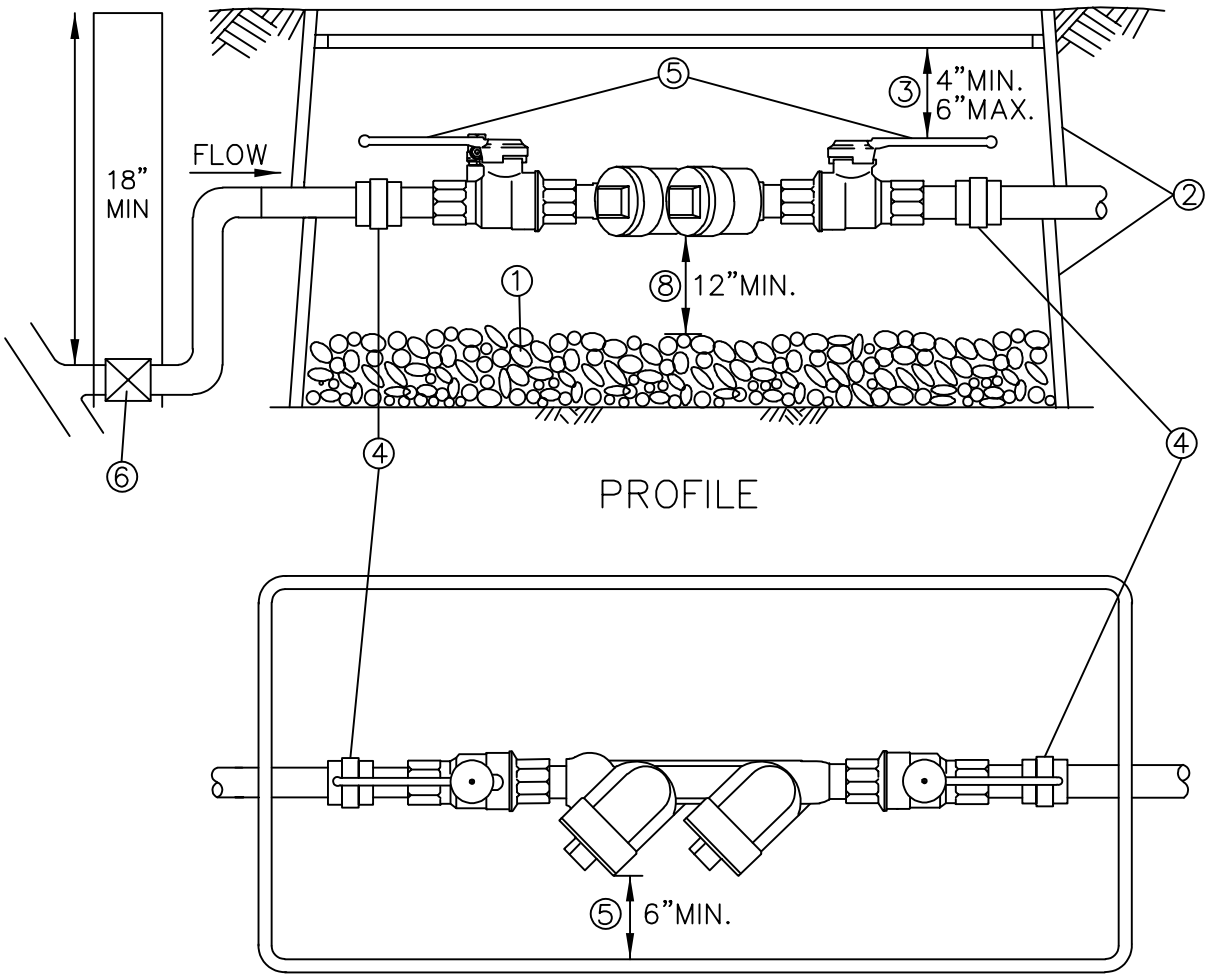
August 2021

City of Duvall

TITLE

**Double Detector Check Valve**

DRAWING NUMBER 2-153-001




① 1" ROUND WASHED ROCK, 6" DEEP ON BOTTOM OF BOX.

② ENCLOSE 2" & SMALLER D.C.V.A. ON TWO METER BOXES STACKED ON TOP OF EACH OTHER OR, OVERSIZED BOX. MUST HAVE REMOVABLE COVER. BOXES TO BE LOCATED IN SIDEWALK AND AREAS WITH VEHICULAR TRAFFIC SHALL BE METAL, EQUAL TO OLYMPIC FOUNDRY SM30. BOXES IN OTHER NON-TRAFFIC AREAS TO BE CARSON 1730 HDPE WITH COVER. MAXIMUM OF 6" DISTANCE BETWEEN UNDERSIDE OF LID AND HIGHEST POINT OF DEVICE.

③ (2) UNIONS.

④ WHEN TEST-COCKS ARE FACING SIDEWAYS THERE MUST BE A 6" MINIMUM CLEARANCE

⑤ BETWEEN THEM AND SIDE OF BOX.

⑥ IN ACCORDANCE WITH PLUMBING CODE REQUIREMENT, IRRIGATION SYSTEMS MUST HAVE SHUT OFF INSTALLED AS SHOWN. FEMALE FITTINGS ARE PROHIBITED IN CONJUNCTION WITH METALLIC MALE FITTINGS.

NOTES:

1. ALL INSTALLATIONS MUST MEET MINIMUM STANDARDS OF THE UNIFORM PLUMBING CODE AND WSDOH APPROVED INSTALLATIONS LIST.
2. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER.
3. ASSEMBLY TO BE MAINTAINED BY OWNER.

NTS

**DEVELOPMENT DESIGN STANDARD DETAILS**

August 2021

City of Duvall

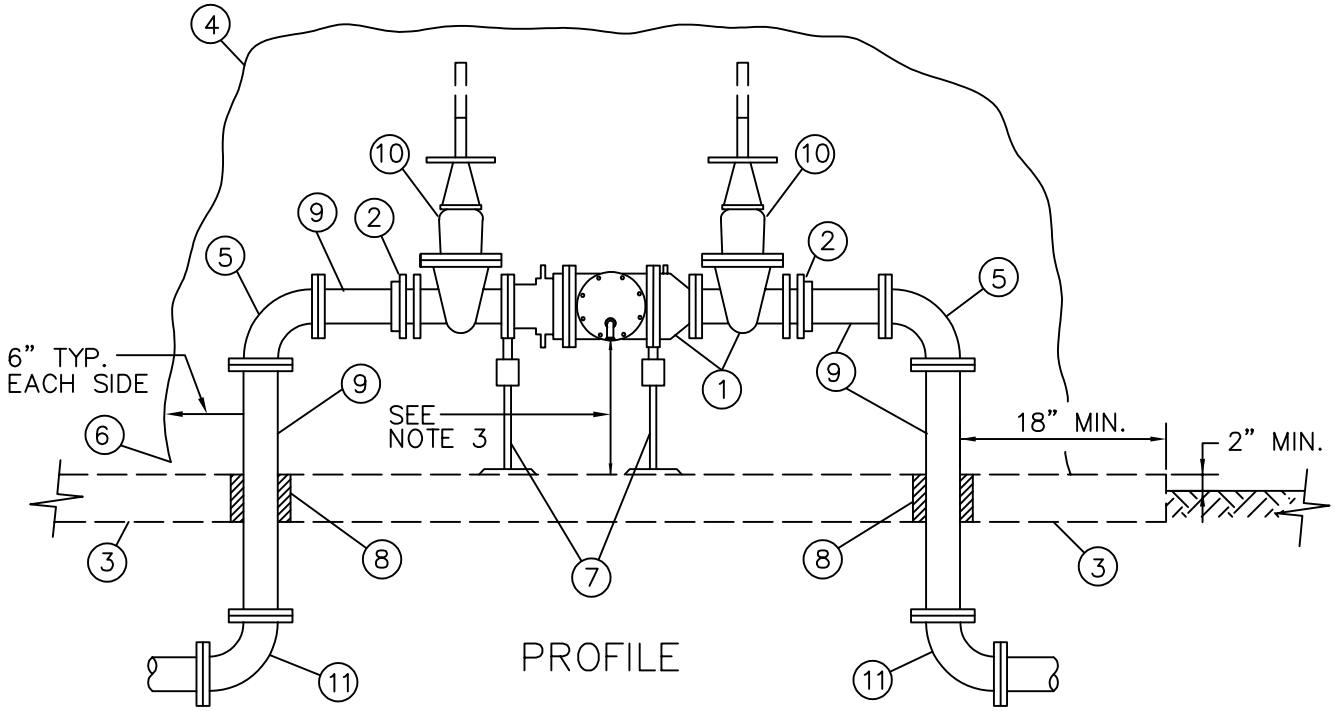
TITLE

**Double Check Valve Outside**

DRAWING NUMBER 2-153-002

NOTICE:

OUTSIDE – INSTALLED RPBA IS NOT ALLOWED IN BURIED VAULTS. DEVELOPER SHALL PROVIDE UTILITIES WITH A DESIGN FOR AN ABOVE-GROUND ENCLOSURE THAT DRAINS TO DAY LIGHT FOR APPROVAL. CLEARANCES SHOWN BELOW SHALL APPLY TO THE ENCLOSURE.




1. STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y GATE VALVES AND (4) RESILIENT SEATED TEST COCKS.
2. MEGAFLANGE.
3. 4" CONCRETE, 2000 PSI, SLAB EXTENDED 6" BEYOND ENCLOSURE (ALL DIRECTIONS). REINFORCED WITH 6"x6" W2.9xW2.9 WWF.
4. APPROVED ENCLOSURE. CONTRACTOR TO VERIFY REQUIRED SIZE.
5. 90 DEGREE BEND, FL.
6. ENCLOSURE DRAIN. SIZED IN ACCORDANCE WITH PNWS-AWWA CROSS CONNECTION CONTROL MANUAL (7TH ADDITION) FIGURE 6-1.
7. TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO SLAB.
8. PVC SLEEVE THROUGH SLAB.
9. CL 52 DI PExFL
10. EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.
11. 90 DEGREE BEND, RESTRAINED JOINT.

NOTES:

1. PROVIDE ELECTRICAL HEAT TAPE FREEZE PROTECTION.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ALL 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR. ALSO PROVIDE 12" MINIMUM AIR GAP CLEARANCE FROM TOP OF DRAIN.
4. REDUCED PRESSURE BACKFLOW ASSEMBLY WILL BE ALLOWED TO BE INSTALLED IN VAULTS ONLU IN CASES WHERE NO OTHER MEANS OF INSTALLATION IS AVAILABLE AND AS APPROVED BY THE CITY OF DUVALL.
5. TESTING IN REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER.
6. ASSEMBLY TO BE MAINTAINED BY OWNER.
7. ENCLOSURES SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
8. TEE AND GATE VALVES REQUIRED ON MAIN.
9. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND ENCLOSURES.
10. RPBA INSTALLATIONS THAT DIFFER FROM THIS STANDARD DETAIL MUST BE APPROVED BY THE CROSS CONNECTION CONTROL PROGRAM ADMINISTRATOR AND WILL BE REVIEWED ON A CASE BY CASE BASIS TO ENSURE THEY MEET CURRENT REQUIREMENTS FOR INSTALLATION AND FREEZE PROTECTION.

NTS

**DEVELOPMENT DESIGN STANDARD DETAILS**

August 2021

City of Duvall

TITLE

**Reduced Pressure Backflow Assembly**

DRAWING NUMBER 2-153-003

# Appendix I

## Cross Connection Control Program

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*CITY OF DUVALL*

# Cross-Connection Control Program

**Program Administration, Requirements, and Implementation**

**March 2021**

This document contains the 10 minimum elements required under *WAC 246-290-490 Cross Connection Control*.

# *INTRODUCTION*

## PURPOSE AND SCOPE

This Cross Connection Control Procedures Program, used in conjunction with *Duvall Municipal Code (DMC) 9.02.040* and state regulations *WAC 246-290-490*, outlines the framework for implementing cross connection control requirements for the City of Duvall. All public water systems in Washington State are required to implement a cross-connection control program. To be acceptable to the Washington State Department of Health (DOH) the cross connection control program must include 10 minimum program elements listed in *WAC 246-290-490(3*).

The ten minimum required elements in a CCC program are as follows:

**ELEMENT 1**: Adopt a local ordinance, resolution or code that establishes the purveyor's legal authority, describes operating policies and the corrective actions of a CCC program.

**ELEMENT 2**: Develop and implement procedures and schedules for evaluating new and existing service connections to assess hazards.

**ELEMENT 3**: Develop and implement procedures and schedules that eliminate or control cross-connections and ensure approved backflow preventers are properly installed.

**ELEMENT 4**: Ensure that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided to develop and implement the CCC program.

**ELEMENT 5**: Develop and implement procedures to ensure approved backflow preventers are properly inspected and tested.

**ELEMENT 6**: Develop and implement a backflow prevention assembly testing quality control assurance program.

**ELEMENT 7**: Develop and implement procedures for backflow incident response.

ELEMENT 8: Include cross-connection control program information in customer education materials.

**ELEMENT 9**: Develop and maintain CCC program records.

**ELEMENT 10**: Meet any additional CCC requirements if reclaimed water is distributed or received in the water service area.

This cross-connection control (CCC) program is a proactive and ongoing effort of the City to protect the health of its customers by preventing contamination to the municipal water supply that it supplies by preventing backflow of contaminants through cross-connection. This program provides direction to staff on implementation activities, describes policies and procedures, and summarizes current City, State, and Federal requirements regarding cross connection control. The program is structured so that it may be supplemented with updated documents and materials developed by Public Works for its specific use. The authority to enforce these practices and policies is established in *DMC 9.02.040* and *Ordinance 1071 (April 24, 2008)*.

Cross connection control is an integral part of the multiple-barrier approach to ensure safe drinking water. This concept includes providing protection to the City's water supply through source protection programs like wellhead protection areas, providing treatment (disinfection),

covered storage tanks, using good engineering design and practices, implementation of a cross connection control program compliance, and surveillance water quality monitoring programs, having certified operators, and emergency planning.

Implementation of this program results in protecting the City's water system from contamination from the customers plumbing supply / system through proper installation of the right backflow prevention assembly and annual testing of these assemblies by a DOH certified Backflow Assembly Tester (BAT).

## DEFINITIONS

**Air Gap (AG):** means a physical separation between the free flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel. This separation must be at least:

- Twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case be less than one inch, when unaffected by vertical surfaces (sidewalls); and
- Three times the diameter of the supply piping if the horizontal distance between the supply pipe and a vertical surface (sidewall) is less than or equal to three times the diameter of the supply pipe, or if the horizontal distance between the supply pipe and intersecting vertical surfaces (sidewalls) is less than or equal to four times the diameter of the supply pipe and in no case less than one and one-half inches.

**Approved**: depending upon the context, City of Duvall-approved or Washington State Department of Health-approved.

**Approved backflow prevention assembly:** means a reduced pressure backflow assembly (RPBA), a reduced pressure detector assembly (RPDA), a double check valve assembly (DCVA), a double check detector assembly (DCDA), a pressure vacuum breaker assembly (PVBA), or a spill resistant vacuum breaker (SVBA) of make, model, and size that is approved by DOH. Assemblies that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research or other entity acceptable to the DOH are considered approved by the DOH.

**Atmospheric Vacuum Breaker (AVB):** means an AVB or make, model, and size that is approved by the DOH. AVBs that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research or that are listed or approved by other nationally recognized testing agencies (such as IAPMO, ANSI, or UL) acceptable to the authority having jurisdiction are considered approved by the DOH.

**Authority having jurisdiction:** (formerly known as local administrative authority) means the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted under chapter 19.27 RCW.

**Backflow:** means 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 Prevention Assembly**: an assembly to prevent backflow; an assembly that, when

installed, controls cross connections.

**BAT:** a Washington State certified Backflow Assembly Tester holding a valid, State of Washington-issued, certificate in accordance with chapter WAC 246-290.

**Category of contaminant:** means a communicable disease, chemical, or physical hazard. Communicable diseases and chemical hazards can cause illness and in some cases death and are high health hazards. Physical hazards such as gasoline, propane, hot water and steam are examples of both low and high health hazards.

**CCC**: Cross Connection Control; a program to control or eliminate cross connections; the act of controlling or eliminating cross connections.

**CCS:** Cross Connection Control Specialist; one who is certified by the State of Washington to execute the City's Cross Connection Control Program.

**City**: The City of Duvall, City personnel or designee, having the authority to perform the associated duties described herein.

**Cross connection:** means any actual or potential physical connection between a public water system or the consumer's water system and any source of nonpotable liquid, solid, or gas that could contaminant the potable water supply by backflow.

**DCDA**: Double Check Detector Assembly; a type of backflow prevention assembly used to protect against low-health hazard. Generally installed on fire systems that require metering.

**DCVA**: Double Check Valve Assembly; a type of backflow prevention assembly used to protect against low-health hazard.

**Degree of hazard:** means either a low cross connection hazard or a high health cross connection hazard.

**DMC**: Duvall Municipal Code; the body of law for the City of Duvall.

**DOH**: the Washington State Department of Health, Division of Drinking Water, the authoritative body for public drinking water systems.

**High health cross connection hazard (HHH):** means a cross connection involving any substance that could impair the quality of potable water and create and actual public health hazard through injury, poisoning, or spread of disease. WAC 246-290-490 refers to these types of hazards as Table 9 hazards.

**In-premises protection:** means a method of protecting the health of consumers served by the consumer's potable water system, located within the property lines of the consumer's premises by the installation of an approved air gap or backflow prevention assembly at the point of hazard, which is generally a plumbing fixture.

**Low cross connection hazard:** means a cross connection that could impair the quality of potable water to a degree that does not create a hazard to the public health, but does adversely and unreasonably affect the aesthetic qualities of potable waters for domestic use.

**Potable:** water suitable for drinking by the public.

**Premises isolation:** means a method of protecting a public water system by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the consumer's water system from the purveyor's distribution system.

**Purveyor:** means an agency, subdivisions 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 or these entities.

**RCW**: The Revised Code of Washington; the compilation of all permanent laws now in force.

**RPBA**: Reduced Pressure Backflow Assembly; a type of backflow prevention assembly used to protect against high-health hazard.

**RPDA:** Reduced Pressure Detector Assembly; a type of backflow prevention assembly used to protect against high-health hazard. Generally installed on fire systems that require metering.

Table 9 hazards:

**Test Report:** a report completed by a BAT that denotes the current condition of a backflow prevention assembly.

**WAC:** the Washington Administrative Code; rules and regulations adopted by State agencies.

## CITY, STATE, AND FEDERAL PROGRAM HISTORY

The requirement for the City to have a Cross Connection control Program (Program) is not something new. State regulations administered by DOH, dating back to 1970, require the City's water system be protected from backflow and cross connection contamination. Though the federal Safe Drinking Water Act (SDWA) passed by Congress in 1974 does not specifically address the topic of cross connection control, it does state water purveyors are responsible for the water quality delivered to the customer's meter. The Environmental Protection Agency, which administers the SDWA, developed a series of nine "white papers" (2001) on distribution system issues of potentially significant public health concern. One of the papers is titled *Potential Contamination Due to Cross Connections and Backflow and the Associated Health Risks*. Water industry experts expect future federal rule making will require water purveyors to develop and implement a cross connection control program. The City is well positioned to meet any future federal requirements pertaining to having a Program given the years DOH has had state regulations requiring one.

The City's Program was developed in the mid-1990s. The City has made great progress over the last few years in our efforts to develop and implement an effective Program. These efforts include updating DMC, creating and implementing a backflow device tracking system, having dedicated administrative support, and protecting against the most severe and high health risk premises.

## AUTHORITY

### Legal Authority to Establish a Program (ELEMENT 1)

The control or elimination of cross connections is done according to the most current revisions of state and local rules and regulations. State regulations include:

- Chapters 51-56 and 51-57 WAC, Uniform Plumbing Code and Uniform Plumbing Code RCW 18.106,
- Washington State Plumbers Code,
- RCW 19.27, Washington State Building Code,

- RCW 43.20.050, Washington State Powers and Duties of the State Board of Health,
- RCW 70.119A.060, Washington State Public Water Systems Mandate, and
- WAC 246-290-490, Cross Connection Control (Appendix A).

The City has an adopted cross-connection control ordinance in *Section 9.02.040(c), Water Systems, Cross Connections and Back Flow Prevention* of the DMC (Ordinance 1071, adopted in 2008) (Appendix B). This code establishes the City's authority in implementing a cross-connection program, prohibits cross-connections, gives the City authority to discontinue water service until correction is made, and details penalties for non-compliance. Where cross connections cannot be eliminated, they are controlled by installation of an approved backflow assembly preventer(s) which are appropriate to the degree of hazard it is protecting against.

## ROLES AND RESPONSIBILTY

The City has the responsibility for cross connection control and it shall begin at the water supply source, include all the public water treatment, storage, and distribution facilities, and end at the point of delivery to the consumer's water system, which begins at the downstream end of the service connection or water meter (e.g. premises isolation). The City is responsible for protecting its public water supply from contamination from backflow of pollutants through water service connections. If the City determines that a backflow prevention device is necessary at a customer's premise, the City will notify the customer to install an approved backflow device on the premise. Installation of said backflow device(s) shall be a condition of continued water service from the City.

The water customer is responsible for providing the necessary information, scheduling, and providing access for inspection of cross connection potential and the necessary control methods. The water customer is responsible for notifying the City's Cross Connection Control Specialist (CCS) of any assembly the customer believes is no longer required. Finally, the water customer is responsible for all costs associated with the inspection, testing, repair, and replacement of backflow prevention assemblies. Upon installation, the customer shall provide the City with a "Backflow Prevention Assembly Inspection Report" completed by a certified Backflow Assembly Tester (BAT) showing satisfactory inspection and testing of said device(s). The customer will be responsible for all applicable testing and inspection fees.

The City's Program consists of premises isolation to protect the City's water system from contamination. The functions of the Program are primarily carried out by the City's CCS and include survey, inspection, notification, enforcement, and record keeping. The minimum City certification requirements for the position include DOH certifications as a CCS.

The inspection, repair, and annual testing of backflow prevention assemblies for all City facilities is contracted out with a certified BAT.

## FAILURE TO COMPLY

Any person, firm, or corporation who violates any of the provisions of this document or *DMC Section 9.02.040(c)*, may be punished in accordance with the rules stated in the DMC. Any person, firm or corporation who violates any provisions and requirements of this document shall

be subject to discontinuance of supply of City water to the premise. Discontinuance of the City potable supply to the premise shall remain in effect until corrective action, as required by the City, is completed, tested and approved.

# *CROSS-CONNECTION CONTROL PROGRAM*

## PROGRAM IMPLEMENTATION

### Procedures and Schedule for Hazard Evaluations, Eliminating or Controlling Cross Connections (ELEMENTS 2 AND 3)

Several guidance, policies, and procedures exist for determining the appropriate level of protection. The evaluation for the appropriate level of protection shall be in accordance with the most current editions of the following:

- *Cross Connection Control Manual, Accepted Procedure and Practice* published by the Cross Connection Control Committee of the Pacific Northwest Section of the American Water Works Association,
- *Manual of Cross Connection Control* published by the Foundation for Cross Connection Control and Hydraulic Research, University of Southern California,
- *Recommended Practice for Backflow Prevention and Cross Connection Control, AWWA M14*, published by the American Water Works Association,
- *Development Design Standards Manual, Chapter 2 (Water),* City of Duvall, and
- *Group A Design Standards*, Washington State Department of Health.

The City also enacted various policies to ensure the safety and quality of drinking water for all its customers. Many of these policies are referenced in the approved 2012 Water Comprehensive Plan.

The City prioritizes its backflow prevention efforts based on acceptable risk (probability of occurrence), category of contaminant, degree of hazard, and the reliability of the backflow preventer. The City developed an action plan in 2008, identifying unprotected Table 9 hazards and inspected these water customers of backflow prevention requirements.

For customers requesting new service connections, an initial evaluation of the premises' planned or future water service is done by the City's CCS during the plan review process. Proper selection and installation of a backflow prevention assembly, as determined by the City's CCS, shall be a condition of allowing new water service connection. Installation and testing by a certified BAT is required. If the initial test fails, it is the responsibility of the applicant/contractor/customer to immediately have the assembly repaired and retested by a certified BAT. All assemblies must be tested at least annually thereafter by a certified BAT.

Approved backflow prevention assemblies are those which appear on DOH's Approved Assemblies List, developed by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research. This institute is currently the only one which the

DOH recognizes as having the authority to approve backflow prevention assemblies. The backflow prevention assemblies include:

1. Atmospheric Vacuum Breakers (AVB),
2. Reduced Pressure Principle Backflow Assembly (RPBA),
3. Double Check Valve Assembly (DCVA),
4. Pressure Vacuum Breaker Assembly (PVBA), and
5. Spill-Resistant Vacuum Breakers (SVBA).

All backflow assemblies shall operate as designed and approved by the approval agency having jurisdiction. Assemblies not meeting design standards shall be considered unapproved and will require repair or replacement.

The City's CCS becomes aware of possible cross connections associated with existing service connections through the course of doing City business. Periodic reevaluations are done by the City's CCS in response to remodels, notification by city inspectors, fire department personnel, or water quality complaints. An emphasis is placed on severe and high health premises (Table 9) followed by low hazard premises. The City notifies the customer of the outcome of the hazard assessment by letter and in some cases by email. Timelines for corrections are based on the degree of hazard and are generally completed within 30 days. Larger and more complex premises can require additional time (six months or longer) due to securing adequate funding to complete the installation(s). The assemblies must also be on DOH's Approved Assemblies List and be installed in the correct orientation, and by a certified BAT.

Unless otherwise approved by the City's CCS, installation of the appropriate type of backflow prevention assembly or air gap system for premises isolation is required at the meter (e.g. premises isolation). Any deviation from this must be pre-approved by the City's CCS. Below is a summary of requirements based on the evaluation of acceptable risk, degree of hazard, and the reliability of the backflow preventer:

**Commercial/Industrial Service:** The degree of hazard for these types of services is a high health cross connection hazard. An approved premise isolation cross connection control assembly of a RPBA, RPDA or approved AG.

**Multi-Family Service:** The degree of hazard for this type of service is a high health cross connection hazard. A residential development having one or more metered connections serving more than two living units per meter will be treated as a commercial service.

**Fire Service:** The degree of hazard for this type of service may be high or low, depending on the type of system installed. For example, backflow protection is not required for residential flow through or combination fire protection systems. However, dry fire suppression systems require a DCDA while a fire suppression system using chemicals requires an RPDA.

**Single-Family Residential Service:** The degree of hazard for this type of service is generally low. However, premises isolation with a RPBA is required if high health hazards exists.

**Irrigation Only Service:** The degree of hazard for this type of service is generally low. An approved DCVA is required as long as no chemicals are involved, otherwise an RPBA is required.

## Designate at Least One Person Certified as a CCS (Element 4)

*WAC 246-290-490* requires that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided by the purveyor to develop and implement a CCC program. The certified operator in "responsible charge" as the CCS for the City's Program currently resides in the Public Works Department and includes the Public Works Director, Public Works Superintendent, and City Engineer. These individuals have the authority and responsibility to develop and implement the Program. There are 3 additional City personnel who also hold CCS certifications.

## Procedures and Schedules for Backflow Preventer Inspection, Testing and Repairs (Element 5)

There are over 228 backflow assemblies installed in the City's service area which require annual testing. The yearly due date for testing is September 1. Notification of annual testing is sent out approximately June 1st and reminders to those not received again August 1.

The Program developed a tracking system utilizing Excel in 2010 to maintain an inventory of all these assemblies and test history data. This data also generates custom reports (e.g., DOH Annual Summary Report), annual testing notification letters, and repair letters to customers. The testing frequency of backflow assemblies and approved air gaps, used in place of assemblies, are done:

- At Initial installation,
- After the assembly is repaired or moved,
- Immediately after a backflow incident occurs,
- Annually after the initial installation, and
- As required by the CCS, if testing indicates repeated failures.

The test procedures used are those specified in the most recent edition of the Manual of Cross Connection Control, published by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research, currently the 10th edition, and approved by DOH. There are no alternate test procedures allowed.

The testing notification to customers are done by mailing notification letters annually by June 1. Customers are sent up to three notification letters (first notice – 30 days; second notice – 30 days, final notice – 14 days) informing them annual testing is due. Prior to shut off of water, courtesy phone calls are made and where necessary, a site visit is made. This same notification process is used for dealing with installations and repairs.

The majority of completed test reports are emailed within 10 days from the date the test was performed. If the premises involves a separate irrigation line, the meter shall be locked, or the hazard eliminated by removing piping so a connection is not possible. The City's notification letters provide the website address to Washington Certification Services, where customers can obtain a public listing of certified BATs to have their testing completed by.

No appeals process is necessary prior to turning off water service because customers are given adequate notification of testing requirements and staff is flexible in working out schedules with them.

BATs can use their own test report form provided it includes the minimum test reporting elements found in the City of Duvall's Form (Appendix C). If the minimum test reporting elements are not provided, then the test report will be denied, and the City's CCS may require the re-testing of the assembly utilizing the City of Duvall's Form or the testing be completed in front of him / her. Test results are to be emailed, mailed or faxed to the CCS within 10 days and contain the signature and printed name of the BAT. The results are then hand entered into the excel database. When the field test report shows an assembly has failed its test, the City requires the customer to repair the assembly and return it to proper working condition in an amount of time to be determined on a case-by-case basis, depending on the hazard.

Multiple assembly failures of an assembly will result in the property owner having the assembly repaired or replaced by a certified BAT with an assembly appropriate for the degree of hazard.

The City will notify the DOH, Office of Drinking Water when it suspects a test report is falsified for their follow-up.

Retesting may be required, at the City's discretion, on backflow assemblies which have questionable test results or on assemblies which have test report information which has changed (e.g., the serial number, model number, location, or other information does not match information provided at the time of installation) and no prior notice was given.

## QUALITY ASSURANCE PROGRAM (ELEMENT 6)

BATs are required to submit in a copy of their current certification card and current test kit calibration information annually. BAT certifications are also verified prior to entering test results into the Excel tracking spreadsheet. The BAT certification information is checked against information provided from Washington Certification Services.

BATs are notified immediately if the test report contents are incomplete or incorrect. Correction generally occurs within a week.

The City requires BATs to submit current copies of their DOH certification (or renewal) and test kit verification of accuracy every January. The City also requires minimum test report content, which can be found in Appendix C.

## RESPONDING TO BACKFLOW INCIDENTS (ELEMENT 7)

In the event of a cross connection incident, which contaminates the City's water supply, or occurs within the premises of a consumer served by the City, the City will notify DOH, and the King County Health Department as soon as possible after the incident, but no later than the end of the next business day. The City's response includes an onsite inspection to determine the extent of the backflow event and depending on the nature of the event, samples may be taken, the water line flushed, or the water turned off to contain the contamination. If the incident occurs after hours, staff will contact DOH using their emergency after hours phone number (1-877-481-4901). The City will document the details of the backflow incident using DOH's Backflow Incident Report Form found in Appendix D. Additional supporting information such as photographs and sampling results (if taken) are attached to the report. Generally, there is a follow-up meeting with DOH staff to discuss the incident and actions taken. Also, the City will include all backflow incident report(s) as part of the Annual Summary Report (ASR).

**Outline of City response to a backflow incident:**

Emergency Condition: Water System Contamination Due to a Backflow Incident
Impact on System: Potentially major impact. Water not suitable for potable use - loss of supply.

Emergency Response:

1. Notify the City CCS personnel of the incident.
2. Shut down the affected mains, if possible, to contain the affected contaminants.
3. Notify DOH of the backflow incident.
4. Notify all customers of the problem and instruct them to boil all water to be used for consumption and cooking or issue a no-drinking warning.
5. Flush affected water mains to remove contaminants.
6. Disinfect reservoirs and water mains, as necessary, to remove contaminated residuals.
7. Analyze water quality in other parts of the distribution system to ensure that all contaminants were contained.

## PUBLIC EDUCATION (ELEMENT 8)

The City's primary educational effort involves using the annual Consumer Confidence Report to convey the importance of preventing cross connections and maintaining backflow prevention assemblies through annual testing. The City's website and occasionally reminders in the City's monthly newsletter is also another avenue used to inform the public about the importance of preventing cross connections. Lastly the City has brochures available to contractors, businesses, and used at various City events promoting water conservation and backflow prevention. The City will continue to provide CCC program information with bill inserts, handouts distributed to customers, or other CCC program handouts.

## RECORD KEEPING AND REPORTING (ELEMENT 9)

Original records, such as project submittals, correspondence, plans, etc., are kept on file, either directly with the City's CCS, or if in conjunction with a larger project, on file with Building Department. Eventually these files are archived according to retention schedules set forth in chapter 40.14 RCW and chapter 246-290 WAC. Records are kept both in paper and electronic format. As mentioned previously, annual test results are emailed, faxed or mailed, and results entered into the Excel database. Notification and violation letters along with emails are records which are also kept. These records will form the basis of any enforcement action or legal defense by the City. The master list, inventory information, list of approved AVBs, and ASR records are available to DOH upon request.

### Master List

The Excel database maintains a master list of service connections of severe, high and low hazards for as long as the hazard exists. It is from this database the annual notification letters are generated and sent.

### Inventory of Backflow Prevention Assemblies

The Excel database maintains the inventory of active and inactive assemblies including the exact assembly location, assembly description (type, manufacturer, model, size and serial number), and the assessed degree of hazard, the installation date, history or inspection, tests and repairs, test results and the person performing the inspection. Approved air gaps installed in lieu of approved

assemblies will include the same information as that of mechanical backflow prevention assemblies. The City does not allow atmospheric vacuum breakers (AVBs) for irrigation protection, therefore, there is no record keeping associated with AVBs. However, AVBs are allowed for in-premise use but a higher form of backflow protection is required upstream at the meter.

**Annual Test Report Results Retention:** State regulations require retention of all test results for five years.

## SPECIAL REQUIREMENTS FOR RECLAIMED WATER (ELEMENT 10)

Additional cross-connection control requirements may be imposed by DOH for systems that distribute or receive reclaimed water within their water service area in accordance with Chapter 90.46 RCW. The City currently does not distribute or receive reclaimed water within its service area; therefore, these requirements are not applicable. However, if reclaimed water is used in the future, then the City will follow all requirements of the permits issued under Chapter 90.46 RCW.

The degree of hazard for this type of service is a high health hazard. A RPBA will be required on the water service to properties which both potable and reclaimed water are present. Where potable water is being used for makeup water for reclaimed water uses, the potable water supply must be protected with an air gap system.

APPENDIX A: DOH Cross Connection Control Requirements

March 2011
DOH 331-355
Revised

# Cross-connection control rules and definitions

***Extracts from Group A Public Water Supplies, chapter 246-290 WAC***
**The full rule is online at http://www.doh.wa.gov/ehp/dw/publications/331-010.pdf**

## WAC 246-290-010 Definitions.

**"Approved air gap"** means a physical separation between the free-flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel. To be an air gap approved by the department, the separation must be at least:

- Twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case be less than one inch, when unaffected by vertical surfaces (sidewalls); and:
- Three times the diameter of the supply piping, if the horizontal distance between the supply pipe and a vertical surface (sidewall) is less than or equal to three times the diameter of the supply pipe, or if the horizontal distance between the supply pipe and intersecting vertical surfaces (sidewalls) is less than or equal to four times the diameter of the supply pipe and in no case less than one and one-half inches.

### Acronyms

| | |
|---|---|
| **AG** | air gap |
| **AVB** | atmospheric vacuum breaker |
| **AWWA** | American Water Works Association |
| **BAT** | backflow assembly tester |
| **CCS** | cross-connection control specialist |
| **DCDA** | double check detector assembly |
| **DCVA** | double check valve assembly |
| **EPA** | U.S. Environmental Protection Agency |
| **IAPMO** | International Association of Plumbing and Mechanical Officials |
| **PVBA** | pressure vacuum breaker assembly |
| **RPBA** | reduced pressure backflow assembly |
| **RPDA** | reduced pressure detector assembly |
| **SVBA** | spill resistant vacuum breaker assembly |
| **UPC** | Uniform Plumbing Code |
| **WAC** | Washington Administrative Code |

**"Approved atmospheric vacuum breaker (AVB)"** means an AVB of make, model, and size that is approved by the department. AVBs that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research or that are listed or approved by other nationally recognized testing agencies (such as IAPMO, ANSI, or UL) acceptable to the authority having jurisdiction are considered approved by the department.

**"Approved backflow preventer"** means an approved air gap, an approved backflow prevention assembly, or an approved AVB. The terms "approved backflow preventer," "approved air gap," or "approved backflow prevention assembly" refer only to those approved backflow preventers relied upon by the purveyor for the protection of the public water system. The requirements of WAC 246-290-490 do not apply to backflow preventers installed for other purposes.

**"Approved backflow prevention assembly"** means an RPBA, RPDA, DCVA, DCDA, PVBA, or SVBA of make, model, and size that is approved by the department. Assemblies that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research or other entity acceptable to the department are considered approved by the department.

**"Authority having jurisdiction"** (formerly known as local administrative authority) means the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted under chapter 19.27 RCW.

**"Backflow"** means 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"** means a person holding a valid BAT certificate issued under chapter 246-292 WAC.

**"Backpressure"** means a pressure (caused by a pump, elevated tank or piping, boiler, or other means) on the consumer's side of the service connection that is greater than the pressure provided by the public water system and which may cause backflow.

**"Backsiphonage"** means backflow due to a reduction in system pressure in the purveyor's distribution system and/or consumer's water system.

**"Combination fire protection system"** means a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection; and
- Is constructed of approved potable water piping and materials that serve both the fire sprinkler system and the consumer's potable water system.

**"Consumer"** means any person receiving water from a public water system from either the meter, or the point where the service line connects with the distribution system if no meter is present. For purposes of cross-connection control, "consumer" means the owner or operator of a water system connected to a public water system through a service connection.

**"Consumer's water system"** as used in WAC 246-290-490, means any potable or industrial water system that begins at the point of delivery from the public water system and is located on the consumer's premises. The consumer's water system includes all auxiliary sources of supply, storage, treatment, and distribution facilities, piping, plumbing, and fixtures under the control of the consumer.

**"Contaminant"** means a substance present in drinking water that may adversely affect the health of the consumer or the aesthetic qualities of the water.

**"Council"** means the Washington state building code council under WAC 51-04-015(2).

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

**"Cross-connection control program"** means the administrative and technical procedures the purveyor implements to protect the public water system from contamination via cross-connections as required in WAC 246-290-490.

**"Cross-connection control specialist"** means a person holding a valid CCS certificate issued under chapter 246-292 WAC.

**"Cross-connection control summary report"** means the annual report that describes the status of the purveyor's cross-connection control program.

**"Department"** means the Washington state department of health or health officer as identified in a joint plan of operation under WAC 246-290-030(1).

**"Distribution system"** means 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.

**"Emergency"** means an unforeseen event that causes damage or disrupts normal operations and requires immediate action to protect public health and safety.

**"Flow-through fire protection system"** means a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection;
- Is constructed of approved potable water piping and materials to which sprinkler heads are attached; and
- Terminates at a connection to a toilet or other plumbing fixture to prevent stagnant water.

**"High health cross-connection hazard"** means a cross-connection involving any substance that could impair the quality of potable water and create an actual public health hazard through injury, poisoning, or spread of disease.

**"In-premises protection"** means a method of protecting the health of consumers served by the consumer's potable water system, located within the property lines of the consumer's premises by the installation of an approved air gap or backflow prevention assembly at the point of hazard, which is generally a plumbing fixture.

**"Low cross-connection hazard"** means a cross-connection that could impair the quality of potable water to a degree that does not create a hazard to the public health, but does adversely and unreasonably affect the aesthetic qualities of potable waters for domestic use.

**"Potable"** means water suitable for drinking by the public.

**"Premises isolation"** means a method of protecting a public water system by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the consumer's water system from the purveyor's distribution system.

**"Public water system"** is defined and referenced under WAC 246-290-020.

**"Purveyor"** means 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 these entities.

**"Reclaimed water"** means 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.

**"Severe health cross-connection hazard"** means a cross-connection which could impair the quality of potable water and create an immediate, severe public health hazard through poisoning or spread of disease by contaminants from radioactive material processing plants, nuclear reactors, or wastewater treatment plants.

**"State building code"** means the codes adopted by and referenced in chapter 19.27 RCW; the state energy code; and any other codes so designated by the Washington state legislature as adopted and amended by the council.

**"Unapproved auxiliary water supply"** means a water supply (other than the purveyor's water supply) on or available to the consumer's premises that is either not approved for human consumption by the health agency having jurisdiction or is not otherwise acceptable to the purveyor.

**"Uniform Plumbing Code (UPC)"** means the code adopted under RCW 19.27.031(4) and implemented under chapter 51-56 WAC. This code establishes statewide minimum plumbing standards applicable within the property lines of the consumer's premises.

**"Used water"** means water which has left the control of the purveyor.

## WAC 246-290-490 Cross-connection control.

### (1) Applicability, purpose, and responsibility.

(a) All community water systems shall comply with the cross-connection control requirements specified in this section.

(b) All non-community water systems shall apply the principles and provisions of this section, including subsection (4)(b) of this section, as applicable to protect the public water system from contamination via cross-connections. Noncommunity systems that comply with subsection (4)(b) of this section and the provisions of WAC 51-56-0600 of the UPC (which addresses the installation of backflow preventers at points of water use within the potable water system) shall be considered in compliance with the requirements of this section.

(c) The purpose of the purveyor's cross-connection control program shall be to protect the public water system, as defined in WAC 246-290-010, from contamination via cross-connections.

(d) The purveyor's responsibility for cross-connection control shall begin at the water supply source, include all the public water treatment, storage, and distribution facilities, and end at the point of delivery to the consumer's water system, which begins at the downstream end of the service connection or water meter located on the public right of way or utility-held easement.

(e) Under this section, purveyors are not responsible for eliminating or controlling cross-connections within the consumer's water system. Under chapter 19.27 RCW, the responsibility for cross-connection control within the consumer's water system, i.e., within the property lines of the consumer's premises, lies with the authority having jurisdiction.

## (2) General program requirements.

(a) The purveyor shall develop and implement a cross-connection control program that meets the requirements of this section, but may establish a more stringent program through local ordinances, resolutions, codes, bylaws, or operating rules.

(b) Purveyors shall ensure that good engineering and public health protection practices are used in the development and implementation of cross-connection control programs. Department publications and the most recently published editions of references, such as, but not limited to, those listed below, may be used as guidance for cross-connection program development and implementation:

(i) *Manual of Cross-Connection Control* published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California (USC Manual);

(ii) *Cross-Connection Control Manual, Accepted Procedure and Practice* published by the Pacific Northwest Section of the American Water Works Association (PNWS-AWWA Manual); or

(iii) Guidance document: *Cross-Connection Control for Small Water Systems* published by the department.

(c) The purveyor may implement the cross-connection control program, or any portion thereof, directly or by means of a contract with another agency or party acceptable to the department.

(d) The purveyor shall coordinate with the authority having jurisdiction in all matters concerning cross-connection control. The purveyor shall document and describe the coordination, including delineation of responsibilities, in the written cross-connection control program required in (e) of this subsection.

(e) The purveyor shall include a written description of the cross-connection control program in the water system plan required under WAC 246-290-100 or the small water system management program required under WAC 246-290-105. The cross-connection control program shall include the minimum program elements described in subsection (3) of this section.

(f) The purveyor shall ensure that cross-connections between the distribution system and a consumer's water system are eliminated or controlled by the installation of an approved backflow preventer commensurate with the degree of hazard. This can be accomplished by implementation of a cross-connection program that relies on:

(i) Premises isolation as defined in WAC 246-290-010; or

(ii) Premises isolation and in-premises protection as defined in WAC 246-290-010.

(g) Purveyors with cross-connection control programs that rely both on premises isolation and in-premises protection:

(i) Shall comply with the premises isolation requirements specified in subsection (4)(b) of this section; and

(ii) May reduce premises isolation requirements and rely on in-premises protection for premises other than the type addressed in subsection (4)(b) of this section, only if the following conditions are met:

(A) The in-premises backflow preventers provide a level of protection commensurate with the purveyor's assessed degree of hazard;

(B) Backflow preventers which provide the in-premises backflow protection meet the definition of approved backflow preventers as described in WAC 246-290-010;

(C) The approved backflow preventers are installed, inspected, tested (if applicable), maintained, and repaired in accordance with subsections (6) and (7) of this section;

(D) Records of the backflow preventers are maintained in accordance with subsections (3)(j) and (8) of this section; and

(E) The purveyor has reasonable access to the consumer's premises to conduct an initial hazard evaluation and periodic reevaluations to determine whether the in-premises protection is adequate to protect the purveyor's distribution system.

(h) The purveyor shall take appropriate corrective action as authorized by the legal instrument required by subsection (3)(b) of this section, when:

(i) A cross-connection exists that is not controlled commensurate to the degree of hazard assessed by the purveyor; or

(ii) A consumer fails to comply with the purveyor's requirements regarding the installation, inspection, testing, maintenance or repair of approved backflow preventers required by this chapter.

(i) The purveyor's corrective action may include, but is not limited to:

(i) Denying or discontinuing water service to a consumer's premises until the cross-connection hazard is eliminated or controlled to the satisfaction of the purveyor;

(ii) Requiring the consumer to install an approved backflow preventer for premises isolation commensurate with the degree of hazard; or

(iii) The purveyor installing an approved backflow preventer for premises isolation commensurate with the degree of hazard.

(j) Except in the event of an emergency, purveyors shall notify the authority having jurisdiction prior to denying or discontinuing water service to a consumer's premises for one or more of the reasons listed in (h) of this subsection.

(k) The purveyor shall prohibit the intentional return of used water to the purveyor's distribution system. Used water includes, but is not limited to, water used for heating, cooling, or other purposes within the consumer's water system.

### (3) Minimum elements of a cross-connection control program.

(a) To be acceptable to the department, the purveyor's cross-connection control program shall include the minimum elements identified in this subsection.

(b) **Element 1:** The purveyor shall adopt a local ordinance, resolution, code, bylaw, or other written legal instrument that:

(i) Establishes the purveyor's legal authority to implement a cross-connection control program;

(ii) Describes the operating policies and technical provisions of the purveyor's cross-connection control program; and

(iii) Describes the corrective actions used to ensure that consumers comply with the purveyor's cross-connection control requirements.

(c) **Element 2:** The purveyor shall develop and implement procedures and schedules for evaluating new and existing service connections to assess the degree of hazard posed by the consumer's premises to the purveyor's distribution system and notifying the consumer within a reasonable time frame of the hazard evaluation results. At a minimum, the program shall meet the following:

(i) For connections made on or after April 9, 1999, procedures shall ensure that an initial evaluation is conducted before water service is provided;

(ii) For all other connections, procedures shall ensure that an initial evaluation is conducted in accordance with a schedule acceptable to the department; and

(iii) For all service connections, once an initial evaluation has been conducted, procedures shall ensure that periodic reevaluations are conducted in accordance with a schedule acceptable to the department and whenever there is a change in the use of the premises.

(d) **Element 3:** The purveyor shall develop and implement procedures and schedules for ensuring that:

(i) Cross-connections are eliminated whenever possible;

(ii) When cross-connections cannot be eliminated, they are controlled by installation of approved backflow preventers commensurate with the degree of hazard; and

(iii) Approved backflow preventers are installed in accordance with the requirements of subsection (6) of this section.

(e) **Element 4:** The purveyor shall ensure that personnel, including at least one person certified as a CCS, are provided to develop and implement the cross-connection control program.

(f) **Element 5:** The purveyor shall develop and implement procedures to ensure that approved backflow preventers relied upon to protect the public water system are inspected and/or tested (as applicable) under subsection (7) of this section.

(g) **Element 6:** The purveyor shall develop and implement a backflow prevention assembly testing quality control assurance program, including, but not limited to, documentation of BAT certification and test kit calibration, test report contents, and time frames for submitting completed test reports.

(h) **Element 7:** The purveyor shall develop and implement (when appropriate) procedures for responding to backflow incidents.

(i) **Element 8:** The purveyor shall include information on cross-connection control in the purveyor's existing program for educating consumers about water system operation. The public education program may include periodic bill inserts, public service announcements, pamphlet distribution, notification of new consumers and consumer confidence reports.

(j) **Element 9:** The purveyor shall develop and maintain cross-connection control records including, but not limited to, the following:

(i) A master list of service connections and/or consumer's premises where the purveyor relies upon approved backflow preventers to protect the public water system from contamination, the assessed hazard level of each, and the required backflow preventer(s);

(ii) Inventory information on backflow preventers that protect the public water system including:

(A) Approved air gaps installed in lieu of approved assemblies including exact air gap location, assessed degree of hazard, installation date, history of inspections, inspection results, and person conducting inspections;

(B) Approved backflow assemblies including exact assembly location, assembly description (type, manufacturer, model, size, and serial number), assessed degree of hazard, installation date, history of inspections, tests and repairs, test results, and person performing tests; and

(C) Approved AVBs used for irrigation system applications including location, description (manufacturer, model and size), installation date, history of inspection(s), and person performing inspection(s).

(iii) Cross-connection program summary reports and backflow incident reports required under subsection (8) of this section.

**(k) Element 10**: Purveyors who distribute and/or have facilities that receive reclaimed water within their water service area shall meet any additional cross-connection control requirements imposed by the department in a permit issued under chapter 90.46 RCW.

## (4) Approved backflow preventer selection.

(a) The purveyor shall ensure that a CCS:

(i) Assesses the degree of hazard posed by the consumer's water system upon the purveyor's distribution system; and

(ii) Determines the appropriate method of backflow protection for premises isolation as described in Table 8.

### TABLE 8

### APPROPRIATE METHODS OF BACKFLOW PROTECTION FOR PREMISES ISOLATION

| Degree of Hazard | Application Condition | Appropriate Approved Backflow Preventer |
|---|---|---|
| High health cross-connection hazard | Backsiphonage or backpressure backflow | AG, RPBA, or RPDA |
| Low cross-connection hazard | Backsiphonage or backpressure backflow | AG, RPBA, RPDA, DCVA, or DCDA |

(b) Premises isolation requirements.

(i) The purveyor shall ensure that an approved air gap, RPBA, or RPDA is installed for premises isolation for service connections to premises posing a high health cross-connection hazard including, but not limited to, those premises listed in Table 9, except those premises identified as severe in (b)(ii) of this subsection.

(ii) For service connections to premises posing a severe health cross-connection hazard including wastewater treatment plants, radioactive material processing plants, and nuclear reactors, the purveyor shall ensure that either an:

(A) Approved air gap is installed for premises isolation; or

(B) Approved RPBA or RPDA is installed for premises isolation in combination with an in-plant approved air gap.

(iii) If the purveyor's CCS determines that no hazard exists for a connection serving premises of the type listed in Table 9, the purveyor may grant an exception to the premises isolation requirements of (b)(i) of this subsection.

(iv) The purveyor shall document, on a case-by-case basis, the reasons for granting an exception under (b)(i) of this subsection and include the documentation in the cross-connection control program annual summary report required in subsection (8) of this section.

## TABLE 9

## SEVERE* AND HIGH HEALTH CROSS-CONNECTION HAZARD PREMISES REQUIRING PREMISES ISOLATION BY AG OR RPBA

Agricultural (farms and dairies)

Beverage bottling plants

Car washes

Chemical plants

Commercial laundries and dry cleaners

Premises where both reclaimed water and potable water are provided

Film processing facilities

Food processing plants

Hospitals, medical centers, nursing homes, veterinary, medical and dental clinics, and blood plasma centers

Premises with separate irrigation systems using the purveyor's water supply and with chemical addition[+]

Laboratories

Metal plating industries

Mortuaries

Petroleum processing or storage plants

Piers and docks

Radioactive material processing plants or nuclear reactors[*]

Survey access denied or restricted

Wastewater lift stations and pumping stations

Wastewater treatment plants[*]

Premises with an unapproved auxiliary water supply interconnected with the potable water supply

[+] For example, parks, playgrounds, golf courses, cemeteries, estates, etc.

[*] RPBAs for connections serving these premises are acceptable only when used in combination with an in-plant approved air gap; otherwise, the purveyor shall require an approved air gap at the service connection.

(c) Backflow protection for single-family residences.

(i) For single-family residential service connections, the purveyor shall comply with the premises isolation requirements of (b) of this subsection when applicable.

(ii) If the requirements of (b) of this subsection do not apply and the requirements specified in subsection (2) (g)(ii) of this section are met, the purveyor may rely on backflow protection provided at the point of hazard in accordance with WAC 51-56-0600 of the UPC for hazards such as, but not limited to:

(A) Irrigation systems;

(B) Swimming pools or spas;

(C) Ponds; and

(D) Boilers.

For example, the purveyor may accept an approved AVB on a residential irrigation system, if the AVB is properly installed under the UPC.

(d) Backflow protection for fire protection systems.

(i) Backflow protection is not required for residential flow-through or combination fire protection systems constructed of potable water piping and materials.

(ii) For service connections with fire protection systems other than flow-through or combination systems, the purveyor shall ensure that backflow protection consistent with WAC 51-56-0600 of the UPC is installed. The UPC requires minimum protection as follows:

(A) An RPBA or RPDA for fire protection systems with chemical addition or using unapproved auxiliary water supply; and

(B) A DCVA or DCDA for all other fire protection systems.

(iii) For connections made on or after April 9, 1999, the purveyor shall ensure that backflow protection is installed before water service is provided.

(iv) For existing fire protection systems:

(A) With chemical addition or using unapproved auxiliary supplies, the purveyor shall ensure that backflow protection is installed within ninety days of the purveyor notifying the consumer of the high health cross-connection hazard or in accordance with an alternate schedule acceptable to the purveyor.

(B) Without chemical addition, without on-site storage, and using only the purveyor's water (i.e., no unapproved auxiliary supplies on or available to the premises), the purveyor shall ensure that backflow protection is installed in accordance with a schedule acceptable to the purveyor or at an earlier date if required by the code official administering the State Building Code as defined in chapter 51-04 WAC.

(C) When establishing backflow protection retrofitting schedules for fire protection systems that have the characteristics listed in (d)(iv)(B) of this subsection, the purveyor may consider factors such as, but not limited to, impacts of assembly installation on sprinkler performance, costs of retrofitting, and difficulty of assembly installation.

(e) Purveyors may require approved backflow preventers commensurate with the degree of hazard as determined by the purveyor to be installed for premises isolation for connections serving premises that have characteristics such as, but not limited to, the following:

(i) Complex plumbing arrangements or plumbing potentially subject to frequent changes that make it impracticable to assess whether cross-connection hazards exist;

(ii) A repeated history of cross-connections being established or reestablished; or

(iii) Cross-connection hazards are unavoidable or not correctable, such as, but not limited to, tall buildings.

### (5) Approved backflow preventers.

(a) The purveyor shall ensure that all backflow prevention assemblies relied upon by the purveyor are models included on the current list of backflow prevention assemblies approved for use in Washington state. The current approved assemblies list is available from the department upon request.

(b) The purveyor may rely on testable backflow prevention assemblies that are not currently approved by the department, if the assemblies:

(i) Were included on the department and/or USC list of approved backflow prevention assemblies at the time of installation;

(ii) Have been properly maintained;

(iii) Are commensurate with the purveyor's assessed degree of hazard; and

(iv) Have been inspected and tested at least annually and have successfully passed the annual tests.

(c) The purveyor shall ensure that an unlisted backflow prevention assembly is replaced by an approved assembly commensurate with the degree of hazard, when the unlisted assembly:

(i) Does not meet the conditions specified in (b)(i) through (iv) of this subsection;

(ii) Is moved; or

(iii) Cannot be repaired using spare parts from the original manufacturer.

(d) The purveyor shall ensure that AVBs meet the definition of approved atmospheric vacuum breakers as described in WAC 246-290-010.

### (6) Approved backflow preventer installation.

(a) The purveyor shall ensure that approved backflow preventers are installed in the orientation for which they are approved (if applicable).

(b) The purveyor shall ensure that approved backflow preventers are installed in a manner that:

(i) Facilitates their proper operation, maintenance, inspection, in-line testing (as applicable), and repair using standard installation procedures acceptable to the department such as those in the USC Manual or PNWS-AWWA Manual;

(ii) Ensures that the assembly will not become submerged due to weather-related conditions such as flooding; and

(iii) Ensures compliance with all applicable safety regulations.

(c) The purveyor shall ensure that approved backflow assemblies for premises isolation are installed at a location adjacent to the meter or property line or an alternate location acceptable to the purveyor.

(d) When premises isolation assemblies are installed at an alternate location acceptable to the purveyor, the purveyor shall ensure that there are no connections between the point of delivery from the public water system and the approved backflow assembly, unless the installation of the connection meets the purveyor's cross-connection control requirements and is specifically approved by the purveyor.

(e) The purveyor shall ensure that approved backflow preventers are installed in accordance with the following time frames:

(i) For connections made on or after April 9, 1999, the following conditions shall be met before service is provided:

(A) The provisions of subsection (3)(d)(ii) of this section; and

(B) Satisfactory completion of the requirements of subsection (7) of this section.

(ii) For existing connections where the purveyor identifies a high health cross-connection hazard, the provisions of (3)(d)(ii) of this section shall be met:

(A) Within ninety days of the purveyor notifying the consumer of the high health cross-connection hazard; or

(B) In accordance with an alternate schedule acceptable to the purveyor.

(iii) For existing connections where the purveyor identifies a low cross-connection hazard, the provisions of subsection (3)(d)(ii) of this section shall be met in accordance with a schedule acceptable to the purveyor.

(f) The purveyor shall ensure that bypass piping installed around any approved backflow preventer is equipped with an approved backflow preventer that:

(i) Affords at least the same level of protection as the approved backflow preventer that is being bypassed; and

(ii) Complies with all applicable requirements of this section.

### (7) Approved backflow preventer inspection and testing.

(a) For backflow preventers that protect the public water system, the purveyor shall ensure that:

(i) A CCS inspects backflow preventer installations to ensure that protection is provided commensurate with the assessed degree of hazard;

(ii) Either a BAT or CCS inspects:

(A) Air gaps installed in lieu of approved backflow prevention assemblies for compliance with the approved air gap definition; and

(B) Backflow prevention assemblies for correct installation and approval status.

(iii) A BAT tests approved backflow prevention assemblies for proper operation.

(b) The purveyor shall ensure that inspections and/or tests of approved air gaps and approved backflow assemblies that protect the public water system are conducted:

(i) When any of the following occur:

(A) Upon installation, repair, reinstallation, or relocation of an assembly;

(B) Upon installation or replumbing of an air gap;

(C) After a backflow incident involving the assembly or air gap; and

(ii) Annually thereafter, unless the purveyor requires more frequent testing for high hazard premises or for assemblies that repeatedly fail.

(c) The purveyor shall ensure that inspections of AVBs installed on irrigation systems are conducted:

(i) At the time of installation;

(ii) After a backflow incident; and

(iii) After repair, reinstallation, or relocation.

(d) The purveyor shall ensure that approved backflow prevention assemblies are tested using procedures acceptable to the department, such as those specified in the most recently published edition of the USC Manual. When circumstances, such as, but not limited to, configuration or location of the assembly, preclude the use of USC test procedures, the purveyor may allow, on a case-by-case basis, the use of alternate (non-USC) test procedures acceptable to the department.

(e) The purveyor shall ensure that results of backflow prevention assembly inspections and tests are documented and reported in a manner acceptable to the purveyor.

(f) The purveyor shall ensure that an approved backflow prevention assembly or AVB, whenever found to be improperly installed, defective, not commensurate with the degree of hazard, or failing a test (if applicable) is properly reinstalled, repaired, overhauled, or replaced.

(g) The purveyor shall ensure that an approved air gap, whenever found to be altered or improperly installed, is properly replumbed or, if commensurate with the degree of hazard, is replaced by an approved RPBA.

### (8) Recordkeeping and reporting.

(a) Purveyors shall keep cross-connection control records for the following time frames:

(i) Records pertaining to the master list of service connections and/or consumer's premises required in subsection (3)(j)(i) of this section shall be kept as long as the premises pose a cross-connection hazard to the purveyor's distribution system;

(ii) Records regarding inventory information required in subsection (3)(j)(ii) of this section shall be kept for five years or for the life of the approved backflow preventer whichever is shorter; and

(iii) Records regarding backflow incidents and annual summary reports required in subsection (3)(j)(iii) of this section shall be kept for five years.

(b) Purveyors may maintain cross-connection control records in original form or transfer data to tabular summaries.

(c) Purveyors may maintain records or data in any media, such as paper, film, or electronic format.

(d) The purveyor shall complete the cross-connection control program summary report annually. Report forms and guidance on completing the report are available from the department.

(e) The purveyor shall make all records and reports required in subsection (3)(j) of this section available to the department or its representative upon request.

(f) The purveyor shall notify the department, authority having jurisdiction, and local health jurisdiction as soon as possible, but no later than the end of the next business day, when a backflow incident is known by the purveyor to have:

(i) Contaminated the public water system; or

(ii) Occurred within the premises of a consumer served by the purveyor.

(g) The purveyor shall:

(i) Document details of backflow incidents contaminating the public water system on a backflow incident report form available from the department; and

(ii) Include all backflow incident report(s) in the annual cross-connection program summary report referenced in (d) of this subsection, unless otherwise requested by the department.

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## For more information

Our publications are online at https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm

Call the Office of Drinking Water Cross-Connection Control Program staff at (360) 236-3133 or toll-free (800) 521-0323.

PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND HEALTHIER WASHINGTON

APPENDIX B: DMC *Section 9.02.040(c)* Ordinance No. 1071

**APPENDIX B: DMC Section 9.02.040(c) Ordinance No. 1071**

# CITY OF DUVALL
## WASHINGTON

**ORDINANCE NO.** 1071

**AN ORDINANCE OF THE CITY OF DUVALL, WASHINGTON, AMENDING DUVALL MUNICIPAL CODE CHAPTERS 9.02, 9.03 AND 9.04 TO UPDATE UTILITY BILLING PROCEDURES**

WHEREAS, the City of Duvall Municipal Code prescribes the policies and procedures for billing of the water and sewer utilities in Chapters 9.02, 9.03 and 9.04; and

WHEREAS, employee titles and minor procedures within these Code chapters have been revised to promote efficiency and improved customer service, and such revisions should be incorporated into the City Code; and

WHEREAS, some spelling and grammatical errors have been identified in these Code chapters and need to be corrected;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF DUVALL, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. Amend Duvall Municipal Code. The Duvall Municipal Code Chapters 9.02, 9.03 and 9.04 are hereby amended as shown in the attached Exhibits A and B.

Section 2. Severability. Should any section, paragraph, sentence, clause or phrase of this Ordinance, or its application to any person or circumstance, be declared unconstitutional or otherwise invalid for any reason, or should any portion of this Ordinance be pre-empted by state or federal law or regulation, such decision or pre-emption shall not affect the validity of the remaining portions of this Ordinance or its application to other persons or circumstances.

Section 3. Effective Date. This Ordinance shall be published in the official newspaper of the City, and shall take effect and be in full force five (5) days after the date of publication.

**ADOPTED** BY THE CITY COUNCIL AT A REGULAR MEETING THEREOF ON THE 24th DAY OF APRIL, 2008.

CITY OF DUVALL

Mayor Will Ibershof

Approved as to form:

Bruce L. Disend, City Attorney

ATTEST/AUTHENTICATED:

Jodee Schwinn, City Clerk

EXHIBIT A

**Chapter 9.02 WATER UTILITY**

## 9.02.010 Billing procedures.

A. Metered Service Established. The consumption and use of all water taken from the city water system, or from the water system of any water district or association which obtains its water from the city water system, shall be metered at each individual connection to the city water system. The rates for such water shall be fixed from time to time by resolution of the City Council. The rates for private fire protection service shall also be fixed from time to time by resolution of the City Council.
B. Bills Due, Delinquency, Penalty.
1. All charges for water supplied shall be due and payable to the city on the first day of each month, and such charges shall be billed monthly.
2. "User," as stated in this subsection, means a person, firm, corporation, entity, user, owner, occupant of a building, property, or premises using or having available for use water service connected to the water system of the city from which water service is available and can be withdrawn or used, and also means the person or entity responsible for paying for water connection charges as shown on the records of the city. Charges for water furnished remaining unpaid at the close of business on the 20th day of the month in which billed (or the close of the next regular business day if the 20th should fall on a Saturday, Sunday or a legal holiday) shall be considered delinquent and shall call for a delinquent charge of ten (10) percent of the total combined utility amount due. Any checks returned due to insufficient funds shall incur a penalty in an amount to be fixed from time to time by resolution of the City Council. If the delinquent charges and penalties remain unpaid at the close of business on the 14th day of the succeeding month (or the close of the next regular business day if the 14th should fall on a Saturday, Sunday or a legal holiday) a shut-off notice will be mailed to the user. This notice will inform the user that water service will be discontinued and shut off following five working days from the date of the notice unless all delinquent charges and penalties are paid within said period of time. The notice will also inform the user of the opportunity to meet with the City Clerk or other designated city official in charge of billings to determine the accuracy of the delinquent charges and penalties prior to the discontinuance of water service as herein provided. Service will not be resumed until all delinquencies and penalties, together with a water turn-on fee of thirty-five dollars ($35.00), have been paid.
It shall be the obligation of the user of a building, property or premises using or having available for use water service connected to the water system of the city from which city water is available and can be withdrawn or used, to provide to the city a name and mailing address for the purposes of billing for water service and for the notices described above. No water service shall be provided to any premises unless such a billing name and address is provided. In the event water service is being provided to any premises and a billing name and address is not provided, the city will post the premises with a notice requiring that such information be provided. This notice shall state that water service will be discontinued and shut off following five working days from the date of the notice unless a mailing name and address is provided within said period of time. The notice will also inform the user of the opportunity to meet with the City Clerk or other designated city official in charge of billings to determine the accuracy of any delinquent charges and penalties then in existence and stated in the notice prior to the discontinuance of water service as provided in this section. Service will be resumed after a billing name and address is provided to the city, payment of water turn-on fees as provided in this section, and payment of all delinquent charges and penalties as provided in this section if applicable.
3. The first monthly bill of a new owner and the final bill of the previous owner will be pro-rated based upon the property closing date. If the city is notified of the sale after the closing date has passed, the billing will begin on the first business day that notification is received by the city. The owner will be liable for any unpaid bill from rentals and for a monthly minimum charge if the house remains unoccupied and the water has not been shut off at the owner's request. The back bill must be paid before the billing can be made to a new renter.

4. All charges for water and penalties in this section of after stated shall be a lien against the property to which such water service is furnished, superior to all other liens and encumbrances whatsoever, except those for general taxes and local and special assessments. Such liens shall be enforced by the city in the manner provided by law. Billings may be made in the name of a tenant or other occupants of the premises to which water service is furnished at the mailing address provided in subsection (B)(2) of this section, but such billing shall not relieve the owner of the premises from liability for the payment of the charges for furnishing water nor in any way affect the lien rights of the city against the premises to which water service is furnished. Failure to receive mail properly addressed to the mailing address provided above shall not be a valid defense for failure to pay the delinquent charges and penalties. Any change in the mailing address provided in this section must be properly filed with the office of the utility billing clerk before it will become effective. In the event the city must bring legal action to collect water service charges and/or penalties, the city shall, in addition, recover its attorney's fees and other costs incurred in connection with such collection.
5. An account set-up fee will be charged to all new billing customers to the utility billing system. The amount of this fee shall be fixed from time to time by resolution of the City Council.
6. It shall be the obligation of a water user to provide clear access to their water meter(s) so that reading the meter(s) is not impeded by landscaping, furniture, structures, debris or otherwise. In the event that the city meter reader cannot obtain reasonable access to the meter(s), a written notice shall be mailed to the user and placed at the property notifying the user that:
a. Access to the meter(s) must be provided; and
b. If access is not provided within fourteen (14) days, the city will clear an access to the meter(s) and charge the user for all costs incurred to provide the access.
7. A fee shall be charged to all utility billing customers requesting a re-read of their meter; provided, the fee shall not be charged if the original read was incorrect, if there is a leak associated with the read, or if the utility customer lacks the ability to re-read the meter without assistance due to physical, sensory or mental disability. The amount of this fee shall be fixed from time to time by resolution of the City Council. (Ord. 984 § 1, 2003; Ord. 980 § 1, 2003; Ord. 977 §§ 1--2, 2003; Ord. 962 § 1, 2002; Ord. 949 § 1, 2002; Ord. 948 § 1, 2002; Ord. 343 (part), 1982)

### 9.02.020 Connections.

(a) Service Installation, Water Meters, Capital Improvement Charge.
(1) Each separate residence (excluding mobile homes located in mobile home parks), multiple housing building, or commercial building using water from the city water system shall have a separate, direct connection to a water main. Each separate residence, multiple housing building, or commercial building shall have a separate shutoff. A general facilities charge shall be made, in an amount to be determined from time to time by resolution of the City Council. Pursuant to Washington State Department of Ecology guidelines, in conjunction with the Duvall comprehensive plan, one general facilities charge is required for each single-family detached dwelling unit, as defined in Section 14.34.360 of this code. Eighty-five (85) percent of one general facilities charge is required for each single-family attached (Section 14.34.350), senior citizen assisted (Section 13.34.340), multiple-family and mixed use (Section 14.34.330), or accessory (Section 14.34.320) dwelling unit that will draw water from the city's water system. Any other development desiring to draw water from the city's water system shall pay a general facilities charge calculated in the following manner:
(i) Anticipated monthly use shall be determined by the city engineer based upon anticipated property use, water supply line size, and plumbing fixture count, in accordance with state and federal manuals; and
(ii) The amount of anticipated use shall be converted to a ratio with the use utilized as the basis for calculating the single-family detached dwelling unit connection charge, or, in the event no such number exists, with an average use amount as established by the department of ecology for single-family detached dwelling unit; and
(iii) The ratio established shall be multiplied by the connection charge dollar amount as set by resolution of the City Council for a single-family detached dwelling unit.
In the event connection with the city water system requires the crossing of a street, roadway, railroad or river, there shall be an additional charge equal to the costs incurred in the installation of that portion of the connection crossing the street, roadway, railroad or river. The basic service

installation charge for customers outside the city limits shall be fixed from time to time by resolution of the City Council. The service installation charge shall be due prior to issuance of a building permit or, if no building permit is required in conjunction with the water service connection, prior to connection to the water system. In the event the building permit expires or the water service connection is not made ready by the applicant for connection by the city within one hundred twenty (120) days after the fees are paid and the connection is authorized by the city, the city shall retain that portion of the fee necessary to recover the city's administrative and other costs, and refund the balance, if any, to the applicant. The entire fee shall be re-collected, as provided in this section, prior to the reissuance of the building permit or connection to the water system.

2. Developers of all new subdivisions who expect to connect to a city water main shall be required to install all the service connections at such time the water main is installed. A service installation charge, for installation of the water meter on these developer installed service connections shall be due prior to issuance of the building permit for the residence. This service installation charge shall be fixed from time to time by resolution of the City Council. In the event the building permit expires the city shall retain that portion of the fee necessary to recover the city's administrative and other costs, and refund the balance, if any, to the applicant. The entire fee shall be recollected, as provided in this section, prior to the issuance of the building permit.

3. In addition to the service installation charge representing the actual cost of connection outlined in Section 9.02.020(1)(a) and (b), there shall be an additional connection charge for new water service connections outside the boundaries of LID No. 1 in order that such property owners shall bear their equitable share of the cost of the water system. This charge shall be due prior to issuance of the building permit, or if a building permit is not required in conjunction with the water service connection, prior to connection to the water system. The amount of the capital improvement connection charge shall be fixed from time to time by resolution of the City Council. In the event the building permit expires or the water service connection is not made ready by the applicant for connection by the city within one hundred twenty (120) days after the fees are paid and the connection is authorized by the city, the city shall retain that portion of the fee necessary to recover the city's administrative and other costs, and refund the balance, if any, to the applicant. The entire connection charge shall be recollected, as provided in this section, prior to the reissuance of the building permit or connection to the water system.

(b) Application for Water Service

1. All persons who desire to connect to the city water system, within the city limits or outside the city limits, must make written application to the permit coordinator. This application to contain at least, but not be limited to, the following information: Name and address of applicant/applicants and owner, occupation, location, legal description and address of property where water service is desired; approximate date water service is requested (notification of this date to be at least one week before water service is required). The service installation charge and connection charges, as stated above, and any charge hereinafter set forth, shall be paid prior to issuance of the building permit, or if no building permit is required in conjunction with the water service application, prior to connection to the water system.

2. If, within sixty (60) days of the date of conveying, by bill of sale, of a newly constructed water main to the city the developer presents a recovery contract accepted by the city, the city pledges itself to collect, to the extent provided in this section during a period of time consisting of fifteen (15) years, the prorated front footage cost of this newly constructed water main from any property owner who did not contribute to the original cost of the installation and who subsequently connects to said water main. This period shall commence from the date the contract has been recorded in the county auditor's office. These collections shall be paid to the original developer of said water main, his/her personal representative or assign, within sixty (60) days after each collection. There shall be a charge of ten dollars ($10.00) for making each collection, which charge is to be paid by the applicant for such collection and shall belong to the city water system.

It shall be the duty of the City Clerk, upon acceptance by the City Council of a bill of sale, to notify each developer of his right to enter into a recovery agreement with the city. If no action is taken by the developer within the sixty (60) days provided for above, his right to enter into a recovery agreement shall be forfeited.

(i) Each owner requesting such collections in his behalf shall submit to the city for acceptance the following: A contract, to be known as a "recovery contract," describing the mains to which such

contract applies, stipulating those properties which shall be required to pay front footage charges, stating the fair pro rata share per foot of frontage to be collected from other properties fronting on said main, and stating that the city agrees to make such collections.
(ii) The "fair pro rata share" for recovery contracts is defined as the total cost of construction, including engineering and legal fees related to construction or conveyance of the mains to the city, divided by the number of feet of frontage on the main of property which may reasonably be expected to connect thereto for water service (benefited frontage). If a corner lot abuts a new system on both front and side, and if both sides are affected by the same recovery contract, only the least dimension of said lot shall be subject to recovery charges.
(iii) In addition to the submission of the recovery contract, it shall be the responsibility of the owner requesting such contract to show on the as-built drawings for the system what frontages are considered to be paid for by the construction of extension. If any of the tracts subject to recovery are irregularly shaped so as to make determination of frontage difficult, a fair "equivalent frontage" shall be used in computations of fair pro rata share and shall be so stated in the drawings.
(iv) Each recovery contract shall be prepared by, or reviewed by, the city attorney with the assistance of the city engineer. For this purpose the owner shall submit all necessary data on the cost of construction, as well as the conveyance and affidavit required. The attorney and engineer shall request such changes of the contract as they deem necessary and shall recommend acceptance of the contract by the City Council only after such changes, if any, have been made. (Ord. #695. 1993, amending Ord. #343 and 9.02.020(a) and (b))
3. The minimum fee for a water service application shall be adopted by resolution and governed by the provisions of DMC Section 1.04.120. (Subsection (b)(3) added by Ord. #832, 1997)
(c) Unauthorized connections; violations and penalties.
1. Any person/persons tapping into the water system of the City of Duvall, other than under the supervision of authorized personnel, or without paying the connection charges, and any person/persons turning on a water service that has been shut off pursuant to Section 9.02.020(b)2, and without paying all delinquencies and penalties, and any person/persons who shall cause injury to any portion of the city water system intentionally, or who shall take any water from said water system without paying for same, shall be guilty of a misdemeanor and, upon conviction thereof, shall be subject to a fine, or imprisonment, or both fine and imprisonment, to the maximum extent provided by law for each violation and conviction.
This section shall not limit the city's civil remedies for damages.
2. The city may refuse to supply, or may discontinue service to any customer for violation of any provision of the water system code, or for failure to pay bills when due. The city may refuse, or discontinue, service to any customer who requires, or uses, such volume of water that water service to any other customer may be thereby impaired. The city shall discontinue service to any customer who makes an unauthorized connection to the city water system, by-passes a city water meter, or in any other way misappropriates city water.
3. Discontinuance of service for any cause stated in this ordinance shall not release the customer from his obligation to the city for payment of bills and/or charges.
4. Whenever service is discontinued, as provided above, or elsewhere in this ordinance, the customer shall be charged a fee as set from time to time by city council resolution for discontinuance. Restoration of service, at the customer's request, and after payment of all delinquent bills and/or charges due, shall be done at the convenience of the water department.
5. A customer who wishes to terminate water service shall give at least three days notice to the utility billing clerk's office. No charge will be made for the shutting off of the water. A customer who terminates water service and requests restoration of service at the same location within sixty (60) days shall be charged sixty-five dollars ($65.00) for such restoration of service.
(d) Water Meter and Water Service connection sizes and lengths.
1. Connection sizes;
(i) The size of a service connection and meter shall be determined by the number of dwelling units and shall not be less than the following:

| Units | Meter Size | Meter Minimum Rated Capacity |
|---|---|---|
| 1 & 2 | 3/4" | 30 gpm |

| | | |
|---|---|---|
| 3 to 6 | 1" | 50 gpm |
| 7 to 20 | 1 1/2" | 100 gpm |
| 50 to 100 | 3" | 300 gpm |
| Over 100 | Submit design for approval. | |

(ii) All multiple unit residences, apartments, trailer courts and motels shall be serviced by one connection and one meter, except that the owner may elect to treat each unit as a separate single residence and in such case there shall be installed and individual meter for each unit at the owners expense.
(iii) The pipe size for a service connection shall not be less than the size of the meter as set forth in the water application. At the discretion of the water superintendent, larger pipes may be installed to provide water to more than one meter from a single connection.
2. Length of water service connections;
(i) The maximum allowable distance from the water main to the meter shall be sixty (60) feet. Any service connection of greater length is considered a variance and shall be designed by a professional engineer and approved by the city engineer prior to installation. Also this applicant/applicants must follow the procedures for variance as listed elsewhere in this chapter.
(ii) The city reserves the right to meter any and all water users.
(iii) A private water line from the meter to the building to be served must not have a length of more than five hundred feet under any circumstances.
3. If the property to be served has not been platted a complete legal description of the property to be served must be given and verified by the city engineer. Water mains served by the city water system shall extend across the full frontage of the legally described property whose owner desires a permanent connection, and across the full frontage of any property that may lie between the said legally described property to be served and the street or road along which said mains lie. If the property has been platted and the plat recorded with the King County assessors office the water mains serving or about to serve the plat must be laid across the full frontage of all lots for which the service is requested before any water service connections will be made to any of said lots.
(e) Contractor's Restoration and Performance Bond Requirements and Insurance.
1. All individuals, businesses, and corporations who make application to install water lines, systems, or any part thereof, in any street in the city or the county, whether public or private, which are to be connected with the City of Duvall's water system, and whether the area is inside or outside of the city limits of the City of Duvall, shall post with the City of Duvall:
(1) Washington state contractor's license, and (2) a performance bond, if requested by the city, to guarantee for one year the aforesaid work actually performed, including but not limited to the actual installation of lines. Such bonds are conditions precedent to the commencement of work.
2. The restoration of street bond outside the city limits shall be in a reasonable sum for the restoration, which shall be determined by the development review committee and further, the bond shall be given by a company acceptable by the city.
3. Any individual, business, or corporation who receives a permit to install water lines as described in subsection (e)(1) of this section hereof, agrees by acceptance of such permit that he, his successors or assigns, will protect the City of Duvall and save it harmless from all claims, actions, or damages of every kind and description which may accrue to or be suffered by any person or persons or property by reason of the performance of such work, character of materials used, manner of installation, or by improper occupancy of rights-of-way or public place or public structure. In case any suit or action is brought against the City of Duvall for damages arising out of, or by reason of any of the above cases, the permittee, his successors or assigns, will, upon notice to him or them of commencement of such action, defend the same at his or their own sole costs and expense, and will satisfy any judgment after said suit or action shall have been determined, if adverse to the City of Duvall, and further, shall reimburse the City of Duvall for reasonable attorney's fees expended by the city in such actions.
4. All work contemplated to be done herein under shall be done satisfactory to the engineer and/or utility superintendent of the City of Duvall before any one individual or business is released from said restoration bond and before the one year term of the performance bond commences.
5. Insurance. The amounts of insurance required for any contractor performing such work shall be

determined from time to time by the development review committee. All required insurance policies shall name the City of Duvall as an additional insured. Such insurance must be obtained before any work may begin.
(f) Assessments for Main and Hydrant Installation.
1. All persons outside the original LID #1 and all persons partially inside and partially outside the original LID who are now served by the city with a temporary water line, shall be required to pay their proportionate share of the cost of installation of a six inch (or larger, if required) water main when said main passes their property and said temporary line is disconnected, and shall be obliged to pay the connection charges set forth in subsections (a) or (a)(2) of this section.
(g) Temporary Termination of Water/Sewer Service.
1. A customer who wishes to temporarily terminate water and sewer shall give at least three business days notice to the utility billing office. Effective January 1, 2002, a fee of sixty-five dollars ($65.00) shall be imposed for each temporary termination. There shall be no limit upon the number of times a request for temporary termination may be made, provided that the customer's account is current. These procedures and fees also apply to water-only customers.
2. Effective January 1, 2002, and annually thereafter, the Finance Director shall adjust the temporary termination fee by the same percentage as the percentage increase in the Seattle/Tacoma CPI-U (June-June) rounding the fee to the nearest dollar. (Ord. 940 § 1, 2001; Ord. 902 § 1, 1999; Ord. 892 § 1, 1999; Ord. 343 (part), 1982)

### 9.02.030 Fire hydrants and fire protection.

(a) Definitions. The definitions following are a part of this chapter. Whenever the following terms are used in this chapter, they shall have the meaning as defined. The definitions given shall not necessarily be limited to the meaning given herein whenever the term is one of common usage in which case the definition shall be augmented by the accepted use of the term.
(1) Approving authority--the approving authority for the several conditions of this chapter shall be the mayor, City Council, utilities superintendent of the City of Duvall or their appointee/appointees.
(2) Fire department--the term "fire department" shall mean the fire authority normally responsible for fire protection in the area.
(3) Water authority--shall mean the water department, water district or other body legally supplying water to fire hydrants in the area.
(4) U.L.--shall mean Underwriters Laboratories, Inc.
(5) U.B.C.--shall mean the Uniform Building Code of King County as adopted by the City of Duvall.
(6) Public hydrant--a public hydrant is a fire hydrant so situated and maintained to provide water for fire fighting purposes without restriction as to use for that purpose. The location is such that it is accessible for immediate use of the fire authority at all times.
(7) Private hydrant--a private hydrant is a fire hydrant so situated and maintained to provide water for fire fighting purposes with restriction as to use. The location may be such that it is not readily accessible for immediate use of the fire authority for other than certain private property.
(8) Flush type hydrant--a flush type hydrant is a hydrant installed entirely below grade.
(9) Fire flow--shall mean the flow of water available for fire fighting a fire at a specific building or within a specific area.
(10) Commercial and industrial properties-- Commercial and industrial properties shall include, but not necessarily be limited to retail and wholesale store, warehouses, service stations, manufacturing facilities, garages, theaters, hotels, motels, restaurants, bars and taverns, banks, showrooms, barber and beauty shops.
(11) Institutional Properties--Institutional properties include, but are not necessarily limited to, places of worship, private schools, parochial schools, institutions of higher learning, public and private hospitals, nursing homes, lodges and fraternal orders, unless the structure contains a function of a commercial or industrial nature.
(12) Public Properties--Public properties shall include civic buildings, public schools, playgrounds, public parks and appurtenances.
(13) Residential Properties--Residential properties are those intended for human habitation. Whenever the words "single-family dwelling" are used herein, they shall also include the structure known as a "duplex" two-family dwelling. A residence constructed and equipped for occupancy by more than two families shall be defined as a multifamily dwelling or high density dwelling, the terms

being identical in meaning.
(b) Building Served By Hydrants. All buildings constructed in the City of Duvall or areas served by the Duvall water system shall be served by fire hydrants installed as required by the ordinance codified in this section. Such fire hydrants shall be served by the city or by other adequate means as approved by the city engineer and fire department.
(c) Exceptions. The following buildings not served water by the city, are exempt from the requirements of this the ordinance codified in this section.
(1) Detached single-family dwellings.
(2) Other buildings not exceeding twenty-five hundred (2500) square feet in floor area.
Buildings in areas with existing hydrants spaced not more than one thousand (1000) feet apart except as required in Section 9.02.030(g) of the ordinance codified in this section.
(d) Testing of Fire Hydrants. All fire hydrants shall be subject to testing and inspection by the fire department.
(e) The installation of flush type hydrants is prohibited.
(f) Installation of Fire Hydrants. Standard fire hydrants shall be installed as follows: Maximum spacing between fire hydrants is six hundred (600) feet. In addition, hydrant spacing shall be predicated upon hydrants being located at street intersections. Public buildings, including schools, located in single-family residential areas shall be classified as commercial for fire protection services.
(g) Size of Main for Hydrants. All hydrants newly installed in a single-family residential area shall be supplied by not less than eight inch circulating mains. Dead-end mains supplying fire hydrants must be at least eight inches in diameter, except hydrant leads up to fifty (50) feet long may be six inches in diameter.
(h) Application of Section 9.02.030. This part applied to all buildings located so that a portion is more than two hundred (200) feet from a street property line as measured by vehicular travel. Exception: Detached single-family dwellings.
(1) Buildings having required fire flows of less than two thousand five hundred (2500) gpm, may have fire hydrants on one side of the building only.
(2) Then the required fire flow is over two thousand five hundred (2500) gpm, the fire hydrants shall be served by a main which loops around the building or complex of buildings and reconnects back into the distribution main.
(3) The number of fire hydrants shall be determined on an average spacing of three hundred (300) feet computed on an imaginary line parallel to and not less than fifty (50) feet from the structure. All hydrants are to be accessible to fire department pumpers over roads capable of supporting such fire apparatus. The city engineer shall determine the location of the fire hydrants depending on utility, topography and building location. Hydrants shall be a minimum of fifty (50) feet out from the building, minor deviations may be granted.
(4) The lead from the service main to the hydrant shall be no less than six inches in diameter. Any hydrant leads over fifty (50) feet in length from service to the hydrant shall be no less than eight inches in diameter. The provisions of this part shall apply without exception and regardless of the size of the service main.
(i) Requirements for Fire Hydrants. Standard hydrants shall have: Two two and one-half inch hose outlets and one four inch I.D. pumper port outlet. All outlet ports shall be approved by the fire department having jurisdiction, and have city of Seattle thread. Main valve opening shall be no less than five inches. Hydrants shall meet current A.W.W.A. standards for public hydrants and meet U.L. standards for private hydrants.
(j) Additional Requirements for Fire Hydrants. Fire hydrants shall be installed to meet sound engineering practices. There shall be an auxiliary gate valve installed between the service main and the hydrant sufficient to permit repair and replacement of the hydrant without disruption of water service. The location of all valves and fire hydrants installed shall be properly and accurately marked on identifiable plans or drawings, two copies of which shall be furnished the city engineer.
(k) Setting Hydrants. Hydrants shall stand plumb, be set to the finished grade with the lowest outlet of the hydrant no less than eighteen (18) inches above grade and no less than thirty-six (36) inches of clear area about the hydrant for clearance of a hydrant wrench on all outlets and on the control valve. The pumper port shall face the street. Where the street cannot be clearly defined or recognized, the port shall face the most likely route of approach and location of the fire truck while

pumping as determined by the city engineer.
(l) Dead End Lines. Fire hydrants shall be installed at the ends of dead end lines which are more than three hundred (300) feet in length. Said hydrants may later be moved to conform to standard spacing requirements when the main is again extended, under supervision of the superintendent.
(m) Blow-off Valves. Blow-off valves shall be installed at the end of all dead-end lines less than three hundred (300) feet in length unless a fire hydrant is provided at that point. A blow-off assembly shall conform to Duvall standard specifications.
(n) Installation Required. The installation of fire hydrants in accordance with this Ordinance shall be required of the owner and/or developer of any future business, commercial, institutional or industrial facility, dwelling or dwelling development.
(o) City to Serve. All fire hydrants installed as required by this Ordinance shall be served by the City of Duvall unless conditions warrant a waiver of this provision.
(p) Private Hydrants. The installation of private hydrants as defined herein shall be limited to those cases when the number of public hydrants installed under the distance provision of the ordinance codified in this section shall be insufficient in number. Private hydrants shall meet city requirements for public hydrants and shall be located as designated by the approving authority. The City of Duvall shall have the right to go upon the premises and to use the private hydrant for public purposes, including testing, flushing and emergency uses.
(q) Adequacy. All commercial, industrial, institutional and public properties shall provide adequate fire protection as prescribed in the ordinance codified in this section. As recommended by the approving authority, any or all of the above properties shall have a looped fire protection line around the property. The loop may be a part of the existing supply system. The size of the loop shall be no less than eight inches and shall be sized to the fire flows estimated according to the Washington Surveying and Rating Bureau.
(r) Obscuring Hydrants. No one shall plant any vegetation, erect any structure or perform any action which results in obstructing the view of a fire hydrant for a distance of fifty (50) feet. The owner and/or occupant of any area in which a hydrant is located shall be responsible for removing weed and tree growth from around the hydrant for a distance of not less than ten (10) feet. The purpose of this part is to maintain a clear visual area around the hydrant.
(s) Fire Hydrant Use. No water for purposes other than firefighting shall be taken from any city fire hydrant without first obtaining permission from the city water department. Applications for temporary use shall be made to the City Clerk in writing. This application to be approved by the water superintendent. The charges of Section 9.02.030(t) shall apply at the time the permit is issued.
(t) Sale of Water From Fire Hydrants. The sale of water from fire hydrants shall be through a hydrant meter or by other accurate means of measurement acceptable to the water superintendent. A deposit must be collected before permission will be granted to remove water from any fire hydrant. The amount of the deposit, along with a rental fee, and a price per hundred cubic feet, will be fixed from time to time by resolution of the City Council. The sale of water, hydrant deposit and hydrant rental charge to the state, county, or other governmental bodies shall be at the discretion of the water superintendent.
(u) Water lines for fire sprinklers shall be individually tapped and metered. The connection will include a water meter equaling the size of the supply line and shall comply with minimum backflow requirements.
All fire departments and fire districts shall be excluded from the above charges. (Ord. 903 § 1, 1999; Ord. 343 (part), 1982)

### 9.02.040 Water service specifications.

(a) Responsibility for Costs. Responsibility for costs of bringing water service to applicants whether inside city or outside (rural) of the corporate limits of the City of Duvall.
1. Costs for Labor and Material. All labor and material costs incurred in connecting to the Duvall water system and the water line required to convey water from the city water main to the property of the applicant/applicants, shall be borne by the property owner/owners making application for water. Upon completion of the work the applicant/applicants shall file with the City Clerk the final statement of costs, and copies of receipts for payments made on the installation of the water system, and upon verification of same, and with the signing of a water agreement (Recovery Contracts 9.02.020(2). The ownership of the system shall be accepted by the City Council on behalf of the city,

subject to the terms of said water agreement, after a period of ninety (90) days has elapsed from the completion of the work and subject to there being no liens upon the installation. All water lines shall be put in, in accordance with the city specifications and inspection procedures set forth in this chapter.

2. Pressure Reducing Valve. A pressure reducing valve (herein referred to as a PRV) shall be required on the customer's side of the meter on all new construction, with a water hookup, inside or outside the city limits of Duvall. The size of the PRV will be determined by the water superintendent according to meter size.

(b) Water System Specifications. Water systems specifications for the water systems inside and outside the City of Duvall.

1. Property Owner Responsibility. In the event the installation of a water line shall be made by, or under the direction of, property owner/owners, the owner/owners shall be responsible for all maintenance and repairs for a period of one year from the date of the initial meter installation. No hookup shall be made unless water lines meet with city specifications and have been inspected as provided for in this chapter. The city specifications shall consist of, and conform to, the special provisions and detail specifications of A.W.W.A. Standard Specifications, as supplemented by the City of Duvall Developer Extension Manual, prepared by the development review committee.

2. Size of Mains. All distribution mains shall be eight inches, or larger, as required by the comprehensive plan, or by "Washington Survey and Rating Bureau" standards, and there shall be a fire hydrant installation as described elsewhere.

3. Plan Check. Plans shall be checked by the water superintendent and/or the city engineer. They shall determine whether the plan is adequate and conforms to the overall water system of the city water system. The tract or area to be served shall be inspected by the water superintendent.

4. Corrections. Any corrections, or additions, deemed necessary by the water superintendent and/or the city engineer, will be indicated on the proposed plan, and one copy returned to the applicant/applicants for correction of the original and resubmission with the application. The amount of any recovery contract payment and city connection charges due will also be indicated on the print returned.

5. Approval. If no corrections were required to the plans submitted, and the applicant/applicants agree to the charges indicated by the water superintendent and/or the city engineer, the application will then be submitted to the development review committee for approval.

6. Registered Engineer Required. The design and construction of the water main/mains, which are to be connected to the city water system, shall be supervised by a registered professional engineer of the state of Washington. Details and methods of construction shall conform to the Duvall Standard Specifications. Responsibility for providing line and grade, and taking measurements for as-built drawings rest with the owner/owners engineer.

7. Testing. Upon completion of construction, the mains and appurtenances shall be inspected by the water superintendent, shall be tested in accordance with Duvall Standard Specifications, and be sampled for satisfactory disinfection. The cost of this sampling shall be at the owner/owners expense.

8. As-Built Drawings. As-built drawings of the completed installation of the water main/mains to be connected to the city water system shall be submitted to the water superintendent and/or the city engineer, and be approved by him/them, before the City Council of Duvall shall consider accepting the said water main/mains. These as-built drawings shall be drawn, subject to approval of the city engineer as to quality. They shall be drawn to a scale not larger than one inch equals fifty feet, nor smaller than one inch equals one hundred feet. They must show the location of all mains, valves, hydrants and fittings, giving sizes and types of each. The distance from main/mains to property lines must also be given.

9. Conveyance to City. Upon completion of the water main/mains to be connected to the city water system, title to said main/mains, shall be conveyed to the city, together with an affidavit that there were no unsatisfied liens, or unpaid bills of any kind, for any of the materials used in construction, or installation, of said water main/mains. An affidavit must be submitted to the city from the contractor and his engineer stating that all labor used by them in connection with the installation of said water main/mains has been paid, and that they themselves have been paid in full in accordance to the contract.

10. Acceptance. When all the stipulations and requirements, as set forth in this section, have been

fulfilled, the city engineer, and/or water superintendent and the councilmember for the water of the City Council of Duvall, shall recommend to said council that the title for said main/mains, along with all franchises, permits, easements and affidavits be accepted, and that individual applications for water service from the above mentioned main/mains be considered.

(c) Water Systems, Cross Connections and Back Flow Prevention.

1. Interpretation and Intent. The regulations set out in this section are to be reasonably interpreted. It is their intent to recognize the varying degrees of hazard and to apply the principal that the degree of protection should be commensurate with the degree of hazard.

2. Conformance to Rules and Regulations. Any customer, regardless of whether residing within or without the city limits, who is now receiving water from the city system or who will in the future receive water from the city, shall comply with the rules and regulations contained in this section.

3. Organization and Conformance. Any water district, municipal organization, or other organization, which is connected to the city water supply and/or which is furnished to people or members within said district or organization, shall cause all the people or members within said district or organization as well as the district or organization itself, to comply with the rules and regulations contained in this section.

4. Definitions. Definitions as used in this section, unless the context states otherwise, the following definitions shall apply.

(A) "Air gap separation" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device, and the flood level rim of the receptacle, and shall be at least double the diameter of the supply pipe measured vertically above the flood level rim of the vessel. In no case shall the gap be less than one inch.

(B) "Auxiliary supply" means any water source or system, other than the public water supply, that may be available in the building or premises.

(C) "Back flow" means the flow, other than the intended direction of flow, of any foreign liquids, gases, or substances, into the distribution system of a public water supply.

(D) "Back flow prevention device" means a device to counteract back flow pressures or prevent back siphonage.

(E) "Back pressure" means back flow caused by a pump, elevated tank, boiler, or other means that could create pressure within the system greater than the supply pressure.

(F) "Back siphonage" means a form of back flow due to a negative or subatmospheric pressure within a water system.

(G) "Cross connection" means any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture or other device which contains, or may contain, contaminated water, sewage, or other waste or liquid of unknown or unsafe quality which may be capable of imparting contamination to the public water supply as a result of back flow, bypass arrangements, jumper connections, removable sections, swivel or change over devices, and other temporary, or permanent, devices through which, or because of which, back flow could occur.

(H) "Customer" means any person, family, business, corporation, partnership or firm connected to the city water supply.

(I) "Double check valve assembly" means an assembly composed of two single, independently acting check valves, including tightly closing shut-off valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve.

(J) "Reduced pressure principal back flow prevention device" means a device incorporating two or more check valves and an automatically operating differential relief valve, located between the two checks, two shut-off valves, and equipped with necessary appurtenances for testing. The device shall operate to maintain the pressure in the zone between the two check valves, less than the pressure on the public water supply side of the device. At the cessation of normal flow, the pressure between the check valves shall be less than the supply pressure. In the case of leakage of either check valve, the differential relief valve shall operate to maintain this reduced pressure by discharging to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere, thereby providing an air gap in the device.

5. Cross-connection Prohibited--Exceptions. Except as provided in Section 9.02.040(5), all cross-connections, as defined in Section 9.02.040(c)(G), whether or not such cross-connections are

controlled by automatic devices such as check valves or by hand operated mechanisms such as a gate valve or stopcocks, are prohibited.
6. Cross-connection--Failure To Discontinue. Failure on the part of persons, firms, or corporations to discontinue the use of any and all cross-connections, will be sufficient cause for the discontinuance of the public water service to the premises on which the cross-connection exists.
7. Cross-connection--Removal. The water superintendent shall, in cooperation with the health officer or the local plumbing inspector, make periodic inspections of the premises served by the public water supply to check for the presence of cross-connections. Any cross-connection found in such inspection shall be ordered removed by the responsible agency or authority. If an immediate hazard to health is caused by the cross-connection, water service to the premises shall be discontinued until it is verified that the cross-connection has been removed.
8. Back Flow Prevention Device--Installation. Back flow prevention devices shall be installed at the service connection or within any premises wherein the judgment of the water superintendent, the nature and extent of the activities, or the materials used in connection with the activities on the premises, or materials stored on the premises, would present an immediate and dangerous hazard to health should a cross-connection occur, even though such cross-connection does not exist at the time the back flow device is required to be installed. This shall include, but not be limited to, the following situations.
(A) Premises having an auxiliary water supply, unless the quality of the auxiliary supply is in compliance with the rules and regulations of the state.
(B) Premises having internal cross-connections that are not correctable, or intricate plumbing arrangements which make it impractical to ascertain whether or not a cross-connection exists.
(C) Premises where entry is restricted so that inspections for cross-connections cannot be made with sufficient frequency, or at sufficiently short notice, to assure that cross-connections do not exist.
(D) Premises having a repeated history of cross-connections being established, or reestablished.
(E) Premises on which any substance is handled under pressure so as to permit entry into the public water supply, or where a cross-connection could reasonably be expected to occur. This shall include the handling of process waters and cooling waters.
(F) Premises where material of a toxic or hazardous nature are handled such that if back siphonage should occur, a serious health hazard may result.
(G) The following types of facilities will fall into one of the above categories where a back flow prevention device shall be installed at these facilities as set forth in this section, unless the water superintendent determines no hazard exists:
1. Hospitals, mortuaries, clinics;
2. Piers and docks;
3. Laboratories;
4. Sewage treatment plants;
5. Food and beverage processing plants;
6. Chemical plants using a water process;
7. Petroleum processing or storage plants;
8. Radioactive material processing plants or nuclear reactors;
9. Others specified by the secretary of the department of social and health services;
9. Back Flow Prevention Device--Degree of Hazard. The type of protective device required shall depend on the degree of hazard which exists, as follows:
(A) An air gap separation or a reduced pressure principle back flow prevention device shall be installed, where the water supply may be contaminated with sewage, industrial waste of a toxic nature or other contaminant which would cause a health or system hazard.
(B) In the case of a substance which may be objectionable but not hazardous to the health, a double check valve assembly, air gap separation, or a reduced pressure principle back flow prevention shall be installed.
10. Back Flow Prevention Device--Location. Back flow prevention devices required in this section shall be installed at the property line of the premises or at the meter, where meters are used, or at a location designated by the secretary of social and health services, or by the water superintendent.
11. Back Flow Prevention Device--Installation. Back flow prevention devices required in this section shall be installed under the supervision of, and with the approval of the city.
12. Protective Device--Approval Required. Any protective device required in this section shall be a

model approved by the secretary of the department of social and health services. A double check valve assembly or a reduced pressure principle back flow prevention device will be approved if it has successfully passed performance tests of the University of Southern California engineering center or other testing laboratories satisfactory to the secretary of the Department of Social and Health Services.

13. Back Flow Preventions Device--Inspection, Tests. Back flow prevention devices installed under this section shall be inspected and tested annually, or more often where successive inspections indicate failure. The devices shall be repaired, overhauled, or replaced whenever they are found to be defective. Inspection, tests, repairs and records thereof shall be done under the city's supervision.

14. Failure to Comply--Termination. Failure of any customer, or any district, or any organization to cooperate in the installation, maintenance, testing of back flow prevention devices, or the requirements of an air gap separation, shall be grounds for the termination of the water service at a point where such flow, which is to be terminated by the city, would best prevent possible contamination of the public water supply.

(d) Variances.

1. No variance from the minimum requirements outlined in the ordinance codified in this section shall be granted by the development review committee until the following have been complied with:

(A) Application for Variance. The owner/owners, requesting a variance shall make written application to the development review committee setting forth the name/names of the owner/owners of the properties in a plat of the properties, and a dimensioned sketch showing the proposed installation. The application shall state the reasons for requesting the variance and the agreement of the applicants to pay all costs and expenses incurred by the city in processing the application.

(B) Filing Fee. The application for a variance shall be accompanied by a fee, which shall not be refundable, but which shall be applied to the costs and expenses of the city in processing the application. The amount of this fee will be fixed from time to time by resolution of the City Council.

(C) Factors to be Considered. In considering the application for variance, including temporary lines, the development review committee shall consider the following factors:

1. Whether or not the variance would have an adverse effect upon the accomplishment of the comprehensive water plan;
2. Whether or not the proposed variance is consistent with the comprehensive water plan;
3. Whether or not there would be adverse effects upon the adjoining or neighboring properties;
4. Any benefits to the city generally resulting from the proposed variance;
5. Whether or not the applicant/applicants will be deprived of a use of his property/properties enjoyed by other property owners similarly situated;
6. The minimum standards for public water systems, as published by the Division of Social and Health Services, Department of Health of the State of Washington shall be met.

(D) The city may require as a condition of granting the variance:

1. The applicant/applicants must agree to replace the temporary line or substandard improvement with facilities meeting city standards within two years or less without the right of reimbursement.
2. A bond or other adequate security shall be required in the amount of two times the current estimated cost, said bond running to the city and the adjoining property owners.
3. If an intermediate property owner desires to install a permanent line, the temporary line shall be replaced and the properties benefitted by the temporary line shall pay one half of the cost of the permanent line installation and a lien shall be filed in favor of the city and adjoining property owners to insure payment prior to water hookup.

(E) Informing City Council. Before any variance may be granted, the development review committee must inform the City Councilmember in charge of water, and the Mayor, of the pending application for variance.

### 9.02.050 Water services outside the city limits.

(a) Intent to Annex.

1. No water service shall be provided to any property contiguous with the city limits of the City of Duvall until the property is annexed to the city. In the case of any owner of property not contiguous with the city limits of the City of Duvall, who desires to connect to the city water system, the owner will sign a statement of intention to annex to the city and shall agree in said statement to petition for

and consent to such annexation immediately upon any request by the city at any date after the owner's property becomes contiguous with the city limits or becomes contiguous with property of which an annexation request has been filed with the City of Duvall. This statement shall recite that it is binding upon the owner, his/her heirs, successors and assigns, and shall be construed as a covenant running with the land. The form of this statement must receive the approval of the city attorney, and shall be recorded in the official records of the King County Auditor at the expense of the owner prior to connection of the subject property to the city water system. Any reasonable attorney fees connected with this statement must also be paid by the owner prior to connection of the subject property to the city water system.
2. Facilities owned and managed by the federal, state, county, and local school, fire and library districts, are excluded from the provisions of Section 9.02.050(a)1.
(b) Temporary Lines.
1. All lines constructed outside the city limits of Duvall must conform to "Duvall standard specifications" as outlined elsewhere in this chapter. Applicants outside the city may request a variance from the standard specifications under Section 9.02.040(d). (Amended Ord. 671, 1993)
2. No new connections shall be permitted to existing lines smaller than four inches, outside the city limits.

### 9.02.060 City not responsible.

A. Discontinuance of Service.
The city reserves the right at any time, without notice, to shut off the water supply for repairs, extensions, nonpayment of rates, for any reason relating to the health, safety, or welfare of the residents of Duvall or others served by the city water system, and for any noncompliance by any property owner served by the city water system relating to obligations incumbent upon said owner in return for water service under the ordinance codified in this chapter and the city shall not be responsible nor liable for any damage such as bursting of boilers supplied by direct pressure; the breaking of any pipes or fixtures; stoppage or interruption of water supply; or any damage resulting from the shutting off of water.

### 9.02.070 Prohibited acts.

A. Water Supply to Additional Premises. Permission required. It is unlawful for any person whose premises are furnished with city water to furnish water to additional premises unless he shall first make application in writing to do so at the city office and shall be granted permission to do so.
B. Water Supply to Additional Premises—Double Charge. Water supply to additional premises double charge—charge for shutting off and turning on. When additional premises are connected without the application prescribed in Section 9.02.070(a) such premises may be charged double the rate for the time they are in use and the service may be shut off by the utilities superintendent. In case the water is turned off as provided in this section, the same shall not be turned on until all charges against said premises including a turn on/turn off charge as provided by resolution of the City Council, have been paid in full.
C. Unlawful Connections to Mains. It is unlawful for any person to attach or detach from any water main, any service pipe or other connection through which water is supplied by the city or to interfere in any manner with such pipes or connections without first having obtained written permission from the utilities superintendent.
D. Unlawful Connections to Hydrants. It is unlawful for any person to connect with or remove water from any hydrant owned or used by the city, provided however that the provisions of this section do not apply when permission has been granted to do so under Section 9.02.030(a)1 of the ordinance codified in this section.
E. Damage to Waterworks Property. It is unlawful for any person, unless duly authorized by the utilities superintendent, to disturb, interfere with or damage any water main, water pipe, machine, tool, meter, fire hydrant, or other appliances, buildings, improvements, lawns, grass plots, flowers, vines, bushes or trees belonging to or used in connection with or under the control of the municipal water supply system of the city.
F. Obstructing Fire Hydrant. It is unlawful for any person to obstruct access to any fire hydrant by placing around or thereon any vegetation, stone, brick, lumber, dirt or other material, or to willfully or carelessly injure the same.

G. Unlawful to Turn On Water Meter After Turned Off. It shall be unlawful for any person to turn on a city water meter after it has been turned off by the city for any reason.
H. Damages—Additional Damages. The City of Duvall shall be reimbursed for all time expended by city officials or employees in attending to violations of subsections A through G of this section, and for any and all costs and materials incurred in remedying any problems occurring due to such violations. This reimbursement shall be due within ten (10) days after billing by the city. If the reimbursement is not paid within the ten (10) day period, then the amount of the reimbursement shall commence accruing interest at the maximum statutory rate. In the event the city must bring legal action to collect the reimbursement charges, the city in addition to such charges shall recover its attorney's fees and the other costs incurred in connection with such collection. In the case of any property owner who violates subsections A through G of this section, with the violation being in connection with the service of water to the property of the owner, then the reimbursement charges, when unpaid as defined above, shall constitute a lien against the property to which city water service is provided, and shall be processed in the manner provided in Section 9.02.010(B).
The reimbursement charges provided in this section shall be additional to any other charges to which the city is entitled under the ordinance codified in this chapter, and shall be additional to the double water rate provisions of Section 9.02.010(B).
I. Prohibited Acts Considered Misdemeanors. The prohibited acts referred to in subsections A through H of this section will be considered misdemeanors, and will be punishable by maximum ninety (90) days in jail, and/or a fine of five hundred dollars ($500.00).
J. The prohibited acts set forth in subsections A through H of this section shall also be considered civil infractions. Civil infractions under this section shall be processed as set forth in Chapter 2.24. It shall not be necessary for the code enforcement officer to issue a notice of violation prior to issuing a notice of civil infraction for violations of this section. (Subsection J added in Ord. 839, 1997)

### 9.02.080 Severability.

Severability. If any provision of the ordinance codified in this chapter or its application to any person or circumstance is held invalid, the remainder of the ordinance codified in this chapter or the application of the provisions to other persons or circumstances is not affected.

### 9.02.090 Adoption of comprehensive plan.

The City of Duvall adopts by reference the comprehensive water system plan prepared by RH2 Engineering, Inc. dated November 22, 2004 and on file with the City Clerk. (Ord. 1004 § 1, 2004: Ord. 996 § 1, 2004: Ord. 227, 1977)

## Chapter 9.03 WATER USAGE RESTRICTIONS

### 9.03.010 Authority.

In case of shortage of water the Department of Public Works is authorized to impose water use restrictions in order to efficiently safeguard the safety and health of the general public or to provide for the public convenience. The use of water for irrigation, cooling, or other uses may be forbidden, restricted or regulated and such regulations may be made effective as to all customers. Rationing may be imposed during any shortage of water, either in lieu of or in addition to other measures hereby authorized.

### 9.03.020 Power.

The Director of Public Works shall conduct public education efforts regarding the benefits and necessity of conservation by the public, and is authorized to promulgate such rules and regulations as may be necessary to implement water use restriction. The Director of Public Works is further authorized to make exceptions to such restrictions in specific cases as he finds reasonable (such as, but not limited to, watering newly seeded or sodded lawns, alleviating unnecessary economic hardship to commercial or industrial activities, or preventing possible damage to health, safety or welfare).

### 9.03.030 Penalty.

It is unlawful for any person to violate water use restrictions. In addition to other lawful remedies, the Director of Public Works is authorized to impose a surcharge of fifty dollars ($50.00) for each day a customer's water usage practices exceed water conservation restrictions as provided for in this chapter. The surcharge will be added to and become part of the water bill for the customer in addition to any service rate amount. Prior to the imposition of a surcharge, the Public Works Department shall send a notice to the billing address or deliver or post a notice at the service address advising of the customer's water usage practices in excess of mandatory water shortage restrictions and advising that a surcharge may be imposed for any further violations.

### 9.03.040 Enforcement.

A. Each police office of the city and the director or any employee of the City of Duvall Public Works Department and Building Department shall have the authority to enforce the provision of this chapter.

B. In addition to penalties otherwise provided, the Director of Public Works is authorized to install a water restricting device on the waterline or line serving any person who commits a second or subsequent violation of any of the provisions of this chapter. Alternatively, after such notice of a violation as may reasonably be given based on the circumstances, the Director of Public Works may cause water service to be terminated for subsequent or continuing violation of water conservation restrictions.

### 9.03.050 Severability.

If any section, subsection, sentence, clause, phrase, part or portion of this chapter is for any reason held to be invalid or unconstitutional by any court of competent jurisdiction, such decision shall not affect the validity of the remaining portion of this chapter. (Ord. 573, 1990)

EXHIBIT B

## Chapter 9.04 SANITARY SEWER UTILITY*

### 9.04.010 Definitions.

Unless the context specifically indicates otherwise, the meaning of the terms used in this chapter shall be as follows:
"Building drain" means that part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer, beginning five feet outside the inner face of the building walls.
"Building sewer" means the extension from the building drain to the public sewer or other place of disposal.
"Garbage" means solid wastes from the preparation, cooking, and dispensing of food, and from the handling, storage, and sale of produce.
"Industrial wastes" means the liquid wastes from industrial process as distinct from sanitary sewage.
"Natural outlet" means any outlet into a watercourse, pond, ditch, lake or other body of surface or ground water.
"Properly shredded garbage" means the wastes from the preparation, cooking, and dispensing of food that has been shredded to such degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half inch in any dimension.
"Public sewer" means a sewer in which all owners of abutting properties have equal rights, and is controlled by public authority.
"Sanitary sewer" means a sewer which carries sewage and to which storm, surface, and ground waters are not intentionally admitted.
"Sewage" means a combination of the water-carried wastes from residences, business buildings, institutions, and industrial establishments.
"Sewage treatment plant" means any arrangement of devices and structures used for treating sewage.
"Sewer" means a pipe or conduit for carrying sewage.
"Suspended solids" means solids that either float on the surface of, or are in suspension in water, sewage, or other liquids; and which are removable by laboratory filtering.
"Watercourse" means a channel in which a flow of water occurs either continuously or intermittently.
(Ord. 209 (part), 1976)

### 9.04.020 Use of public sewers required.

A. It is unlawful for any person to place, deposit or permit to be deposited in any unsanitary manner upon public or private property within the city, or in any area under the jurisdiction of the city, any human or animal excrement, garbage, or other objectionable waste.
B. It is unlawful to discharge to any natural outlet within the city, or in any area under the jurisdiction of the city, any sanitary sewage, industrial wastes, or other polluted waters, except where suitable treatment has been provided in accordance with subsequent provisions of this chapter.
C. Except as herein provided, it shall be unlawful to construct or maintain any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of sewage.
D. The owner of each house, building, or property used for human occupancy, employment, recreation, or other purpose, situated within the city and abutting on any street, alley or right-of-way in which there is now located or may in the future be located a public sanitary or combined sewer of the city, is hereby required at his/her expense to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of this chapter, within ninety (90) days after date of official notice to do so, provided that said public sewer is within one hundred (100) feet of the property line; provided, however, such connection shall not be required prior to one year from the acceptance of the city's sewage treatment plant. If any owner fails, refuses or neglects to so connect to the public sewer within said ninety (90) day period, then thereupon the city may post said structure and prohibit occupancy thereof until such time as such

connection has been made; furthermore, the city may cause any existing water meter to be disconnected or removed until such time as the connection to the public sewer has been accomplished at which time any such water meter shall be reconnected or re-installed as the case may be. (Ord. 209 (part), 1976)

### 9.04.030 Building sewer permits.

A. No unauthorized person shall uncover, make any connections with or openings into, use, alter, or disturb any public sewer or appurtenance thereof without first obtaining a written permit from the Public Works Superintendent or his/her duly authorized representative. There shall be three classes of building sewer permits:
1. For residential service;
2. For commercial service;
3. For industrial service.
B. In each case the owner or his/her duly authorized agent or representative shall make application in writing on a special form furnished by the city for said purposes. The permit application shall be supplemented by any plans, specifications or other information considered pertinent in the judgment of the public works superintendent or his duly authorized representative. The permit and inspection fees shall be adopted by resolution and governed by the provisions of Section 1.04.120 of this code. The minimum fee shall be paid to the city at the time the application is filed.
C. Permit applications shall be filed with the Public Works Superintendent with the following information:
1. Owner's name;
2. Address to be served;
3. Owner's mailing address;
4. Side sewer contractor's name and side sewer license number;
5. Legal description of property to be served;
6. All outside dimensions of building to be served;
7. Location of buildings on property to be served;
8. Purpose of building;
9. Full course of the proposed sewer.
D. No work shall be commenced until the permit has been issued. The permit card must be posted on the job. Permits may be issued to the owner or occupant of any property and the owner or occupant need not employ a licensed side sewer contractor to perform the work if the owner or occupant employ another person to make the installation of the side sewer, it must be a licensed side sewer contractor and such contractor shall secure the permit. All side sewer contractors must show their state contractor's license card to the Public Works Superintendent or his representative prior to the granting of the permit. (Ord. 831, 1997; Ord. 294; Ord. 209 (part), 1976)

### 9.04.040 Independent sewers--Cost.

A separate and independent building sewer shall be provided for every building; except where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard, or driveway, the building sewer from the front building may be extended to the rear building and the whole considered as one building sewer.
Old building sewers may be used in connection with new buildings only when they are found, on examination and tests by the Public Works Superintendent, to meet all requirements of this Ordinance.
All costs and expense incident to the installation and connection of the building sewer shall be borne by the owner or applicant of the premises in question. The owner shall indemnify the city against any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer. Any connection to a cesspool or similar installation shall be removed, direct connection from the house to the public sewer shall be made, and the cesspool or similar installation shall be disinfected and filled with fresh earth.

### 9.04.050 Specifications for building sewers.

All materials and workmanship in connection with the installation of any building sewers shall be as

required by standard plans and specification of the City of Duvall.
Pipe may be cast iron, WWP 401, concrete ASTM C 14, asbestos cement WPOA SS (ACSP); plastic A.B.A. or P.V.C. when installed as per manufacturer's specifications. (Asbestos cement cast iron with approved rubber gaskets or approved plastic pipe shall be used wherever the side sewer is below the high water table as established by the Public Works Superintendent).
All excavations required for the installation of a building sewer shall be open trench work unless otherwise approved by the Public Works Superintendent. Pipe laying and back fill shall be performed in accordance with ASTM specification C12-19 except that no back fill shall be placed until the work has been inspected.
The size and slope of the building sewer shall be subject to the approval of the Public Works Superintendent, but in no event shall the diameter be less than four inches (4"), except in the case where two (2) buildings are served, in which case the diameter shall not be less than six inches (6") below the second connection. The minimum slope of the sewer pipe shall be not less than two (2%) percent and shall be measured over a minimum length of thirty inches (30") at each checkpoint. If the minimum grade cannot be obtained and the Duvall Public Works Superintendent approves a connection at a lesser grade, a document approved by the City shall be signed by the recorded owners and shall be notarized and recorded with the County Auditor. This document shall release the City of Duvall from all future claims for damages due to this connection and will be referred to as a "Grade Release." The Grade Release shall be procured before the pipe is laid if there is any doubt about securing proper grade. If found lacking in grade upon inspection, the Grade Release shall be recorded before any pipe is backfilled.
After approval and recording of location by the Public Works Superintendent, backfill of selected material shall be carefully tamped around and over the pipe crown to a minimum depth of twelve inches (12") so as not to damage pipe or joints. This back fill will contain no rocks over one inch (1") diameter, frozen chunks, wood or other deleterious material. The balance of the back fill on the City of Duvall property right-of-way shall be placed in twelve-inch (12") tamped layers. (In certain soil conditions, water settlement may be approved if requested.) This balance of back fill will contain no rocks over six inches (6") in diameter, frozen chunks, wood or other deleterious material. Finish with six-inch (6") minimum of one and one-half inch (1 1/2") minus gravel in traveled roadway for temporary surfacing.
Pipe joints shall prevent infiltration in excess of City specifications. All joint materials shall be previously approved by the Public Works Superintendent.
(a) Cement mortar joints will not be acceptable.
(b) Rubber gaskets of approved type, manufactured from oil resistant synthetic rubber stock, shall be used to join all non-metallic pipe except where specific prior approval for other type or types of joints has been obtained from the Public Works Superintendent.
(c) Lead for cast iron bell and spigot pipe jointing shall be commercial grade manufactured from long fiber asbestos, cross laminated or woven and shall be suitably impregnated. Bolts and nuts shall be of best commercial grade machine bolts, American Standard Regular.
(d) Jointing materials of approved type shall be installed in strict accordance with their manufacturer's specifications.
(e) Asbestos cement pipe cast iron pipe with approved rubber gaskets, or approved plastic pipe shall be used in all cases where installations are below high water mark.
(f) Connections from cast iron pipe to concrete pipe shall be made in an approved manner. Joints shall be installed in accordance with manufacturer's recommendations.
The pipe run and bedding requirements are as follows:
(1) Changes in line or grade shall be made with wyes.
(2) No 90 degree bends, consecutive 45 degree bends or tees will be allowed.
(3) When laying around a corner, a wye and bend (maximum 45 degree) combination shall be used with the end of the wye left as a cleanout.
(4) Increasers or wyes shall be used when changing the sizes of pipe.
(5) No grafts on four-inch (4") or six-inch (6") pipe shall be allowed.
(6) Pipe shall be laid on firm bedding and in a dry trench. Rock shall be excavated to three-inch (3") minimum below grade, and the trench back-filled to grade with suitable material, such as sand or moist earth firmly tamped in place or pea gravel.
(7) Sewer pipe shall not be laid closer than two and one-half (2 1/2') from the foundation wall, and if

there is no foundation wall, then the outer line of any footings, pilings, building supports or porch shall be considered the foundation wall.
(8) All side sewers sixty feet (60') or shorter shall be four inches (4") or larger. (9.04.050 (8)-- (11) amended by Ord. 364, 1983)
(9) All side sewers two hundred feet (200') or shorter shall be six inches (6") or larger and shall have a cleanout installed at its termination point.
(10) All side sewers longer than two hundred feet (200') shall be constructed as mainline additions to the sanitary sewer systems, eight inch (8") pipe side deeded to the City for operation and maintenance on a public easement or right of way.
(11) All eight inch (8") sewer mains shall terminate with an approved clean-out if the length is less than two hundred feet (200'). If the length is greater than two hundred feet (200') it shall terminate in a manhole.

### 9.04.060 Inspection.

The applicant for the building sewer permit shall notify the Public Works Superintendent when the building sewer is ready for inspection and connection to the public sewer. The connection shall be made under the supervision of the Public Works Superintendent or his/her representative. All sewer pipe and fittings shall be kept uncovered and protected until inspected and approved by the Public Works Superintendent. An accurate "as-built" drawing of the side sewer, indicating location and depth of cleanouts, pipe size, and other details, must be supplied by the person installing the side sewer prior to acceptance.
Building sewers shall be tested as follows or by other methods approved by the Public Works Superintendent. Building sewers shall be tested for visible leakage before backfilling by inserting a removable plumber's plug at the lower end of the line and filling the line with water to its highest point. The contractor shall make this test before calling for inspection so that the inspector can observe and approve in one visit. A tee or wye at the property line shall be provided in the sewer for insertion of the plug, to be capped tightly and secured against back pressure or infiltration upon completion of the test.

### 9.04.070 Precautions while building.

All excavations for building sewer installation shall be guarded with barricades and lights and such other precautions as are reasonably adequate to protect the public from accident and injury. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the City. During the course of the work, the following restrictions shall apply:
(a) Gutters along the curb must be kept open for drainage at all times during construction.
(b) All timbers and lumber must be removed from the excavation before backfilling.
(c) All improved streets are to be kept as free of mud as practicable and are to be restored to their original condition. Special care should be taken in stockpiling material in graveled and oiled streets to facilitate adequate restoration. Where excavated material is of a muddy consistency, an adequate depth below surface of roadway shall be left to be backfilled by the contractor with crushed rock or similar materials, so as to prevent a "muddy" or "chuck hole" condition.
A surety bond in an amount deemed sufficient and determined by the Public Works Superintendent, but in no event less than One Thousand Dollars ($1,000.00), shall be furnished and deposited with the City to indemnify the City against any loss, damage, liability in connection with such sewer work. If the work is not properly performed or properly completed and the owner fails to correct or complete the required work within five (5) days after written notice is mailed to the owner, or in the case an emergency, without notice to the owner, the City may perform such work as may be necessary and all costs and expenses incurred by the City shall be charged to the owner.

### 9.04.080 Discharge restrictions into a sanitary sewer.

No owner shall discharge, or cause to be discharged, any storm water, surface water, roof runoff, subsurface drainage, cooling water or unpolluted industrial process waters into any sanitary sewer owned by the City.
Also, no owner shall discharge, or cause to be discharged into any sanitary sewer, the following:
(a) Any liquid or vapor having a temperature higher than 150 F.

(b) Any water or waste which may contain more than one hundred (100) parts per million by weight of oil, fat or grease.
(c) Any gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas.
(d) Any garbage that has not been properly shredded to a size of one-half (1/2") in any direction.
(e) Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, paunch manure or any other solid or viscous substance capable of causing obstruction to the flow in the sewers or other interference with the proper operation of the sewage treatment system.
(f) Any waters or wastes having a "pH" lower than 5.5 or higher than 9.0 or having any other property capable of causing damage or hazard to structures, equipment or personnel of the sewage system or to the sewage treatment process.
(g) Any waters or wastes containing a toxic or poisonous substance in a sufficient quantity to injure or interfere with any sewage treatment process or constitute a hazard to humans or animals or create any hazard in the receiving waters of the sewage treatment system.
(h) Any waters or wastes containing more than 350 parts per million by weight of suspended solids.
(i) Any noxious or malodorous gas or substance capable of creating a public nuisance.
(j) A five (5) day Biochemical Oxygen Demand greater than 300 parts per million by weight.
(k) Any waters or wastes having an average daily flow greater than two percent (2) of the average daily sewage flow of the Public Sewage System into which the waters or wastes are about to be discharged.

### 9.04.090 Sewer charges.

The monthly rates and charges for sewer disposal service shall be set by resolution. The rates and charges shall be reviewed annually, in the month of December, and shall be adjusted to reflect changes in the Consumer Price Index, all urban customers, for metropolitan Seattle for the previous twelve (12) month period ending in July of the current year. (§ 9.04.090 amended by Ord. 575, 1990 and Ord. 631, 1991)

### 9.04.100 Billings and collections.

"User" as stated herein means a person, firm, corporation, entity, user, owner or occupant of a building, property, or premises using or having available for use sewer service connected to the sewer system of the City of Duvall, and also means the person or entity responsible for paying for sewer charges as shown by the records of the City of Duvall.
All bills for sewer disposal service shall be as set forth in Ordinance No. 209 or as the same may be amended from time to time. Charges for sewer disposal services remaining unpaid at the close of business on the twentieth day of the month in which billed (or the close of the next regular business day if the twentieth should fall on a Saturday, Sunday, or a legal holiday) shall be considered delinquent and shall call for a delinquent charge of ten (10) percent of the total combined utility amount due. Any checks returned due to insufficient funds shall incur a penalty in an amount to be fixed from time to time by resolution of the City Council. Said delinquent charges and penalties shall become a lien upon the real property so furnished as provided by Washington state law, and shall be enforced as a real property lien and shall be superior to all other liens and encumbrances whatsoever, except those for general taxes and local and special assessments, and concurrently enforced by discontinuing and shutting off city water services as provided herein and as provided by Washington state law. If the delinquent charges and penalties remain unpaid at the close of business on the fourteenth day of the succeeding month (or the close of the next regular business day if the fourteenth should fall on a Saturday, Sunday, or a legal holiday), a notice shall be mailed to the user setting forth the lien described above and further informing that water service will be discontinued and shut off following five working days from the date of the notice unless all delinquent charges and penalties prior to the discontinuance of water service as provided herein. Water service will not be resumed until all delinquencies and penalties, together with a water turn-on fee of thirty-five dollars ($35.00), have been paid.
It shall be the obligation of the user of a building, property, or premises using or having available for use sewer service connected to the sewer system of the City of Duvall to provide to the City of Duvall a mailing address for the purposes of billing for sewer disposal services and for the notice above-described. No water service shall be provided to any premises unless such a billing address is provided. In the event sewer disposal services are being provided to any premises and a billing

address is not provided, then the City of Duvall will post the premises with a notice requiring that such address be provided. This notice shall state that water service will be discontinued and shut off following five working days from the date of the notice unless a mailing address is provided within said period of time. The notice will also inform official in charge of billings to determine the accuracy of any delinquent charges and penalties then in existence and stated in the notice prior to the discontinuance of water service as herein provided. Service will be resumed after a billing address is provided to the City of Duvall, payment of water turn-on fees as provided herein, and payment of all delinquent charges and penalties as provided herein if applicable. Billings may be made in the name of a tenant or other occupants of the premises which are provided sewer disposal services at the mailing address provided above, but such billings shall not relieve the owner of the premises from liability for the payment of the charges for furnishing of such sewer disposal services nor in any way affect the lien rights of the city against the premises to which said sewer disposal services are furnished. Failure to receive mail properly addressed to the mailing address provided above shall not be a valid defense for failure to pay the delinquent charges and penalties. Any change in the mailing address provided above must be properly filed in writing with the office of the Utility Billing Clerk before it will become effective.

In the event the city must bring legal action to collect sewer disposal charges and/or penalties, the city shall, in addition, recover its attorney's fees and other costs incurred in connection with such collection. (Ord. 1044 § 1, 2007: Ord. 467, 1987; Ord. 209 (part), 1976)

### 9.04.110 General facilities charge.

A. There is imposed upon each person connecting to the Duvall sewer system payment of a sewer general facilities charge. The general facilities charge shall be made, in an amount to be determined from time to time by resolution of the City Council. Pursuant to Washington State Department of Ecology guidelines, in conjunction with the Duvall comprehensive plan, payment of the general facilities charge is required for each single-family detached dwelling unit as defined in Section 14.34.360 of this code. Provided the general facilities charge for each single-family attached (Section 14.34.350), senior citizen assisted (Section 13.34.340), multiple-family, and mixed use (Section 14.34.330), or accessory (Section 14.34.320) dwelling unit that will add wastewater to the Duvall sewer system shall be eighty-five (85) percent of the regular charge.

B. Any other development desiring to connect and add wastewater to Duvall's sewer system shall pay a hook-up charge calculated in the following manner:

1. Anticipated monthly flow shall be determined by the City Engineer based upon anticipated property use, water supply line size, and plumbing fixture count, in accordance with state and federal manuals; and
2. The amount of anticipated flow shall be converted to a ratio with the flow utilized as the basis for calculating the single family detached dwelling unit connection charge; and
3. The ratio established shall be multiplied by the current general facilities charge.

C. The sewer general facilities charge shall be collected at the time of final plat approval, or, where no plat is involved, at the time of building permit application. (Ord. 995 §§ 1, 2, 2004; Ord. 974 §§ 1, 2, 2003; Ord. 917 § 3, 2000: Ord. 901 § 1, 1999: Ord. 891, 1999: Ord. 714, 1994; Ord. 703; Ord. 632, 1991; Ord. 507 (part); Ord. 489 (part); Ord. 418, 1985; Ord. 324; Ord. 270; Ord. 209 (part), 1976)

### 9.04.115 Sewer equalization charge.

A. There is imposed upon the owners of properties which have not been previously assessed or charged under the city ULID No. 1, as formed by Ordinance No. 200, a sewer equalization charge in the amount calculated as follows:

The number of square feet of the property multiplied by $.0455.

B. The sewer equalization charge shall be collected at the time of final plat approval, or, where no plat is involved, at the time of building permit application. (Ord. 917 § 4, 2000)

### 9.04.120 Connection to city owned sanitary sewer lines.

All connection charges for service from sanitary sewer lines owned by the city outside of the boundary of ULID No. 1 and not subject to a recovery contract shall be computed at the rate of six dollars and fifty cents per foot of frontage for all installations completed prior to January 1, 1980. For

sewer lines constructed after January 1, 1980 and not subject to recovery contracts, the connection charge shall be based on the actual construction cost per front foot. These front footage charges are declared to represent a fair pro rata share of the cost of construction for an eight inch sewer line with appurtenances, without regard to the actual size of line constructed.
Where the city has participated in a project financed by the method of "cash contributions" the connection charge shall be the fair share of the actual construction costs. Said connection charges shall not apply to premises which (1) have been previously connected without payment of connection charges, (2) are served by lines constructed for the purpose of serving said premises and donated to the city or (3) are situated on property for which connection charges have been previously paid. (Ord. 327; Ord. 209 (part), 1976)

### 9.04.125 Sewer installation charge.

All direct city expenses incurred by inspecting or installing the connection of a private side sewer, or other appropriate sewer, to the city-owned sewer line shall be reimbursed. The amount of city expense shall be figured by applying the city's normal adopted developer billing rates. All sewer installation charges shall be paid before the issuance of a certificate of occupancy. (Ord. 917 § 5, 2000)

### 9.04.130 Responsibility for maintenance.

The property owners served shall be responsible for maintenance of the building sewer. A permit shall not be required for maintenance or repairs inside the private property line, except where a change in location or arrangement is planned. Prior to making repairs, notice of repairs shall be given to the Superintendent of Maintenance where no permit is required. A regular permit shall be required for work in the public right-of-way. (Ord. 489 (part); Ord. 209 (part), 1976)

### 9.04.135 Civil infraction.

It shall be a civil infraction for any person, firm, corporation, business or other entity to violate the provisions of Chapter 9.04. Civil infractions under this section shall be processed as set forth in Chapter 2.24. It shall not be necessary for the Code Enforcement Officer to issue a notice of violation prior to issuing a notice of civil infraction for violations of Chapter 9.04. (Ord. 839 (part), 1997)

### 9.04.140 Severability.

If any section, sentence, clause, or phrase of this chapter or any amendments thereto shall be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this chapter.
Based on the explosive growth occurring in the city and upon the city's budget needs to fully capture the proportionate share of sewer capital improvement charges for property being developed in the city, the City Council declares that an emergency exists in the city with respect to the imposition of the increased sewer capital improvement fees outlined in this section. Wherefore there being a state of emergency, and this chapter being designed to protect the public health, safety and welfare of the citizens of the city, the ordinance codified in this chapter shall be immediately effective upon adoption by the City Council and approval by the Mayor. In the event a court of competent jurisdiction should declare that the ordinance codified in this chapter could not have immediate effect as outlined in this section, it shall then be effective five days after its publication as provided by law. (Ord. 507 (part); Ord. 209 (part), 1976)

APPENDIX C: City of Duvall Backflow Prevention Assembly Test Report Form

## APPENDIX C: City of Duvall Backflow Prevention Assembly Test Report Form

# BACKFLOW PREVENTER INSPECTION AND FIELD TEST

**City of Duvall**
14525 Main St NE
PO Box 1300
Duvall, WA 98019
425.788.3434
FAX 425.788.0311
CoDbackflow@duvallwa.gov

**ASSEMBLY MANUFACTURER** | **MODEL** | **SERIAL NUMBER** | **SIZE** | ☐ Commercial ☐ Residential

☐ **New** ☐ **Existing**
☐ **Replacement - Old Serial No.:** _____ ☐ Removed from Service ☐ Premise ☐ In-Premise

**For New Installations:**
**City of Duvall Permit No.:** _____ **City of Duvall Inspector:** _____

**Facility Name:** _____ **Contact Person:** _____ **Phone :** _____

**Facility Address:** _____ **Email::** _____

**Preventer Physical Location:** _____ **Hazard Type / Downstream Process:** _____

☐ **DCVA** ☐ **RPBA** ☐ **PVBA** ☐ **AG** ☐ **OTHER** _____ **Water Service Restored:** ☐ **Yes** ☐ **No** **Line Pressure:** _____ psi

**Record Detector Meter Reading – When Applicable** ☐ Gal ☐ CuFt | **USC Approved** ☐ Yes ☐ No | **Proper Installation** ☐ Yes ☐ No | **Proper Orientation** ☐ Yes ☐ No | **Confined Space** ☐ Ye ☐ No

| Initial Test | DCVA | RPBA | PVBA / SVBA |
|---|---|---|---|
| ☐ **Passed** ☐ **Failed** | **Check Valve 1** ☐ Leaked _____ psid **Check Valve 2** ☐ Leaked _____ psid | **Relief Valve** Opened _____ psid ☐ Not Open **Check Valve 2** ☐ Closed Tight ☐ Leaked **Check Valve 1** _____ psid **Approved Air Gap** ☐ Yes ☐ No | **Air Inlet Valve** Opened _____ psid ☐ Not Open Opened Fully ☐ Yes ☐ No **Check Valve** _____ psid ☐ Leaked |
| **Cleaning, Repairs & Parts** | **DCVA** ☐ **Cleaned** ☐ **Repaired** ☐ Disc ☐ O-Ring(s) ☐ Spring ☐ Module ☐ Guide ☐ Rubber Kit ☐ Seat | **RPBA** ☐ **Cleaned** ☐ **Repaired** ☐ Disc ☐ O-Ring(s) ☐ Spring ☐ Module ☐ Diaphragm ☐ Rubber Kit/Guide ☐ Seat | **PVBA / SVBA** ☐ **Cleaned** ☐ **Repaired** ☐ Air Inlet Disc ☐ Float ☐ Air Inlet Spring ☐ Diaphragm ☐ Check Disc ☐ Rubber Kit ☐ Check Spring |
| **Final Test** ☐ Passed ☐ Failed | **Check Valve 1** ☐ Leaked _____ psid **Check Valve 2** ☐ Leaked _____ psid | **Relief Valve** Opened _____ psid **Check Valve 2** ☐ Closed Tight **Check Valve 1** _____ psid | **Air Inlet Valve** Opened _____ psid Opened Fully ☐ Yes ☐ No **Check Valve** _____ psid |

**Air Gap Inspection** ☐ **Passed** ☐ **Failed** **Supply Pipe Diameter** _____ " **Air Gap Separation** _____ "

**Remarks ***

**By this signature I certify:**

1. **I personally inspected and field-tested the backflow assembly using field test procedures meeting WAC 246-290-490 and test equipment meeting WAC 246-292-031; or I personally inspected the air gap or AVB.**
2. **The information in this report is true, complete, and accurate.**

| **Initial Test By (Print BAT Tester Name)** | **BAT Company Name** | **BAT Phone** | **BAT CERT #** | **Date Tested** |
|---|---|---|---|---|
| | | | | |

| **BAT Signature** | **Test Kit Make & Model** | **Serial #** | **VER / Cal Date**** |
|---|---|---|---|
| | | | |

***Note unapproved Backflow preventer, missing defective components, repairs made, or conditions that may adversely affect assembly.***
****The date of the most recent field test kit verification of accuracy or calibration, whichever is most recent.***

APPENDIX D: DOH Backflow Incident Report Form

Cross-Connection Control Program

# BACKFLOW INCIDENT REPORT FORM

***Note:*** *Use this form to comply with WAC 246-290-490(8)(g).*

## Part 1: Public Water System (PWS) Information

| PWS ID: | PWS Name: | County: |
|---|---|---|

## Part 2: Backflow Incident Information

### A. Incident Identification

| Incident date: | Time of incident: | Incident ID (DOH use): |
|---|---|---|

### B. Information on Premises where Backflow Originated

| | | |
|---|---|---|
| Name of premises: | | |
| Premises physical address: | | |
| City: ,WA | | Zip: |
| Premises type: non-residential ☐ residential ☐ | | |
| Premises category/description (Table 9 category*, if applicable): | | |
| Most recent hazard evaluation prior to incident (mm/dd/yyyy): None ☐ | | |
| PWS's assessed hazard level: | *Premises isolation* required by PWS? Yes ☐ No ☐ | |
| Type of backflow preventer required by PWS: | PWS relies on *in-premises protection*? Yes ☐ No ☐ | |
| Other hazard evaluation information: | | |

*See WAC 246-290-490(4)(b)(i).

### C. Method of Discovery of Backflow

| | | |
|---|---|---|
| **How the backflow was discovered (check all that apply):** | Direct observation ……. ☐<br>Meter running backwards …….. ☐<br>Water use decrease …… ☐<br>Disinfectant residual monitoring ... ☐<br>Water quality monitoring …….. ☐ | Water quality complaint ……..... ☐<br>Illness/injury complaint ……..... ☐<br>Result of Investigation ……... ☐<br>Other (Describe): ☐ |
| **Incident reported to the public water system by:** | PWS Personnel ☐ Premises Owner/Occupant ☐ Other PWS Customer ☐<br>Backflow Assembly Tester ☐ Other (Specify): | |

### D. Contaminant Information

| | |
|---|---|
| **Contaminant type (check all that apply):** | Microbiological ☐ Chemical ☐ Physical ☐ |
| **Describe contaminant (for example, the organism name, chemical, etc.).** Please attach lab analysis or MSDS, if available. | |

## E. Extent and Effects of Contamination

| | |
|---|---|
| Estimated extent of contamination: | Contained within premises ☐<br>Entered PWS distribution system ☐ |
| Estimated number of connections affected: | Residential Non-residential |
| Estimated population affected or at risk: | Residential Non-residential |
| Number water quality complaints: | Describe water quality complaints: |
| Number illnesses reported: | Describe illnesses/irritation (specific illnesses, if known): |
| Number physical injuries(e.g. burns) or irritation(e.g. rashes) cases reported: | |

## Part 3: Cross-Connection Control Information at Backflow Site

## A. Source of Contaminant

| | | |
|---|---|---|
| **Source of contaminant or fixture type (check all that apply):** | Air conditioner/heat exchanger …..… ☐<br>Auxiliary water supply ……... ☐<br>Beverage machine ……..…… ☐<br>Boiler, hot water system ……..……. ☐<br>Chemical injector/aspirator ……..... ☐<br>Fire protection system ……..….. ☐<br>Irrigation system (PWS supplied) ….. ☐ | Industrial/commercial process water/fluid……. ☐<br>Medical/dental fixture ……..…… ☐<br>Reclaimed water system……..….. ☐<br>Swimming pools, spa ….……..……. ☐<br>Wastewater (sewage) system …..….. ☐<br>Other (specify): …….……. ☐<br>…….. |

## B. Distribution System Pressure Conditions in the Vicinity of the Backflow Incident

| | | |
|---|---|---|
| **Type of backflow:** | Backsiphonage ☐<br>Backpressure ☐ | **Typical distribution system pressure in vicinity of incident** (if range, enter lower end of range)**:** psi |
| **Main/pressure status at time of incident (check all that apply):** | Normal ……..... ☐<br>Main break ……..... ☐<br>Fire fighting …… ☐<br>Other high usage ……. ☐<br>Power outage …… ☐ | Source/plant outage …… ☐<br>Scheduled water shutoff by PWS …... ☐<br>Unscheduled/emergency shutoff …… ☐<br>Unknown ...……..... ☐<br>Other (specify) ☐ |

| |
|---|
| **Describe causes and circumstances leading to backflow**: |
| |
| |
| |

## C. Backflow Preventer Information/Installation/Approval Status at Site of Backflow

Complete the tables in C and D for the ***premises isolation*** preventer for either of the following situations:

- If a premises isolation backflow preventer is installed ***and*** the contaminant entered the PWS distribution system.
- If the premises isolation assembly is the only backflow preventer at the site.

In all other cases, complete tables in C and D for the ***in-premises*** backflow preventer installed at the fixture. If more than one backflow preventer was involved in the backflow incident, copy tables C and D and complete them for the additional preventer(s).

| **If no backflow preventer was installed at the time the incident occurred, check this box ☐ and go directly to Part 4. Don't fill out the tables below (in C and D).** |
|---|

| | | |
|---|---|---|
| **Backflow preventer information:** | Type installed: | Installed for: |
| | Make: | Model: Size: |
| | Serial number: | Date installed: |
| **Installation status (check all that apply):** | Properly installed/plumbed ☐ Improperly installed/plumbed ☐ | Improperly protected bypass present ☐ If so, explain: |
| **Commensurate with assessed degree of hazard?** | Yes ☐ No ☐ | If not, explain: |
| **DOH/USC-approved at time of backflow incident?** | Yes ☐ No ☐ | If not, approved when installed? Yes ☐ No ☐ |

## D. Backflow Preventer Inspection/Testing Information at Site of Backflow

| | | |
|---|---|---|
| **Most recent inspection/test information *prior* to backflow incident. Attach test report(s), if available.** | No test report on record …..... ☐ | |
| | Date tested/inspected:<br>Passed test/inspection *without* repairs …… ☐<br>Failed initial test/inspection, passed *after* repair …… ☐<br>Failed test/inspection, no repairs made …….. ☐ | |
| **Inspection/test information *after* backflow incident [per WAC 246-290-490(7)(b)]. Attach test report.** | Not tested/inspected …..... ☐ | |
| | Date tested/inspected:<br>Passed test/inspection *without* repairs …… ☐<br>Failed initial test/inspection, passed *after* repair……. ☐<br>Failed test/inspection, no repairs made……... ☐ | |
| **Preventer failure information , if applicable (check all that apply):** | Fouled check ……. ☐<br>Debris …… ☐<br>Weather-related damage …... ☐ | Damaged seat …. ☐<br>Other: ☐ |
| **If preventer failed inspection/test, did failure allow backflow?** | Yes ☐ No ☐ If yes, explain: | |

## Part 4: Corrective Action/Notifications

| | | |
|---|---|---|
| **Action *taken* by PWS to restore water quality (check all that apply):** | None …… ☐<br>Flushed/cleaned mains …… ☐<br>Flushed/cleaned plumbing… ☐<br>Disinfected mains …… ☐<br>Disinfected plumbing ……... ☐ | Other treatment (describe): ☐<br><br>Replaced mains …… ☐<br>Replaced plumbing …….. ☐<br>Other: ☐ |
| **Action *ordered* by PWS to correct cross-connection (check all that apply):** | None ……..…… ☐<br>Eliminate cross-connection... ☐<br>Remove by-pass ……... ☐<br>Install **new** preventer … ☐<br>For *premises isolation* ☐<br>For *fixture protection* ☐ | Change **existing** preventer ☐<br>Repair/replumb …..…… ☐<br>Reinstall correctly ……..... ☐<br>Replace with same type ☐<br>Upgrade type .....……. ☐<br>Other: ☐ |
| **Action ordered accomplished?** | Yes ☐ Date: No ☐ | If no, explain: |
| **Agency notifications per WAC 246-290-490(8)(f) (check all that apply):** | DOH ☐ Local Health Agency ☐ Local Adm. Authority ☐<br>Issued by end of next business day: | |
| **Notifications of consumers in area of incident (check all that apply):** | Population at risk ☐ Public notification (PN per DOH regs.) ☐<br>Boil Water Advisory ☐ Other (describe): | |
| **Other enforcement/corrective actions (describe):** | | |

## Part 5: Cost of Backflow Incident (optional)

| Item | PWS Personnel Hours Expended | Cost to PWS ($) | Cost to Premises Owner ($) |
|---|---|---|---|
| **Investigation** | | | |
| **Restoration of water quality** | | | |
| **Correction of cross-connection situation** | | | |
| **Litigation and/or settlement** | | | |
| **Other not included in above** | | | |

## Part 6: Further Information/Documentation

Additional information about this incident such as pictures, sketches, newspaper/journal articles, water quality analyses, epidemiological reports, etc. would be helpful. Information may be in electronic form or hard copy.

## Part 7: Form Completion Information

***Note:*** *Form should be completed by a person currently certified as a Cross-Connection Control Specialist.*

| | | |
|---|---|---|
| I certify that the information provided in this Backflow Incident Report is complete and accurate to the best of my knowledge. | | |
| CCC Program Mgr. Name (print)**:** | | Title: |
| Signature: | CCS Cert. Number: | Date: |
| Phone: | E-mail: | |
| I have reviewed this report and certify that the information is complete and accurate to the best of my knowledge. | | |
| PWS Mgr./Representative Name (Print): | | Title: |
| Signature: | Op. Cert. Number: | Date: |

***Please send completed backflow incident form:***

***By mail to:***

Washington State Department of Health
Office of Drinking Water – CCC Program Manager
P O Box 47822
Olympia, WA 98504-7822

***By email to:*** cccprogram@doh.wa.gov

**Please send questions, comments, or suggestions about this form to us at the address above or e-mail them to cccprogram@doh.wa.gov**

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

# Appendix J

## Wellhead Protection Program

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CITY OF DUVALL

# Wellhead Protection Program

## 1.0 INTRODUCTION

A wellhead protection program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination of the groundwater that it supplies for drinking water.

Section 1428, of the 1986 Amendments to the federal Safe Drinking Water Act (SDWA), mandates that each state develop a wellhead protection program. In Washington State, the Department of Health (DOH) is the lead agency for the development and administration of the State's wellhead protection program. All federally defined Group A public water systems that use groundwater as a water source are required to implement a wellhead protection program. All required elements of a local wellhead protection program must be documented and included in either the Comprehensive Water System Plan (applicable to Duvall) or Small Water System Management Program document (not applicable to Duvall).

The State mandate for wellhead protection and the required elements of a wellhead protection program are contained in *WAC 246-290-135 Source Protection*, which became effective in July of 1994. The minimum required elements of a wellhead protection program for water systems in Washington State that rely on groundwater are as follows:

- A completed susceptibility assessment of each water source.
- Delineation of wellhead protection areas for each water source.
- An inventory of known and potential contaminant sources located within the defined wellhead protection areas. This inventory list shall be updated every two years.
- Documentation of the purveyor's notification to all owners/operators of known and potential sources of groundwater contamination within defined wellhead protection areas.
- Documentation of the purveyor's notification to regulatory agencies and local governments of the defined boundaries of the wellhead protection areas and the findings of the contaminant source inventory.
- A contingency plan to ensure that customers have an adequate supply of water in the event that contamination causes a temporary or permanent loss of the system's principal source of supply.
- Documentation of the purveyor's coordination with local emergency spill responders (including police, fire, and health departments), including notification of wellhead protection area boundaries, results of susceptibility assessment, inventory findings, and contingency plan.

The City of Duvall is not required to prepare a Wellhead Protection Program, because all potable water supply is provided by Seattle Public Utilities. However, the City is taking a proactive

approach to protecting the Taylor's Landing Well in the event that the City decides to use the well in the future as a source of potable water.

## 2.0 Past Protection Efforts

The City of Duvall currently holds a water rights claim to the Taylor's Landing Well, which is located southwest of the intersection of Main Street NE and NE Allen Street. The well is an artesian well that was historically used to augment low or dry private wells in the unincorporated areas north of Duvall by hauling water from the well site. The Taylor's Landing Well was closed to the public on May 31, 2000 and securely capped & locked at the time for liability reasons; and as a result, the well is not used for potable water supply. In or around 2017, the City cleared additional space around the wellhead, improved the well cap, poured a concrete slab, and enclosed the wellhead with chain-link fencing and signage. Water from the well is still sporadically used in the summer by the City's Public Works Department to fill water tanks for irrigation and other strictly non-potable purposes. The City is retaining the water rights and ownership of the well for possible future use. This wellhead protection plan has been prepared to protect the wellhead in the event that this effort is pursued in the future.

## 4.0 Water Quality

The Taylor's Landing Well has a history of good water quality, both before and after public use of the well, which was terminated in May of 2000. Water quality samples were taken from the Taylor's Landing Well in December of 2001 as part of the East King County Groundwater Monitoring Program. These were the second round of water samples for the well and were tested for a substantially larger number of parameters than the first round. Samples were collected by King County Water and Land Resources Division staff and analyzed by the King County Environmental Lab. The samples were tested for standard inorganic and organic compounds and were all found to be satisfactory in regard to the organic and inorganic parameters. Additionally, many of the organic compounds could not be detected because their concentrations were below the laboratory's method detection limit (MDL). Though not required, in an effort to document water quality at the wellhead the City began annual water quality testing in 2011.

## 5.0 Susceptibility Assessment

In 1994, DOH developed the *Susceptibility Assessment Survey Form* for water purveyors to

complete for use in determining a drinking water source's potential for contamination. The results of the susceptibility assessment may provide monitoring waivers which allows reduced source water quality monitoring.

The City of Duvall has not performed a susceptibility assessment for this well in the past, since the well is not used for potable water supply and is not considered a source of drinking water. The City will complete and submit a susceptibility assessment of the Taylor's Landing Well to DOH if the City decides to use the well as a potable water source in the future.

# 7.0 Delineation of Wellhead Protection Areas

A wellhead protection area is the surface and subsurface area surrounding a well, well field, or spring; through which contaminants are likely to pass and eventually be transported into the drinking water system. This is the area around the source that must be managed to protect the water supply from contamination. Establishing, or delineating, the boundaries of the wellhead protection area for each source is most commonly accomplished using the time of travel rates of groundwater.

## 7.1 Wellhead Protection Area Zones

The first component of a wellhead protection area is the sanitary control area required by *WAC 246-290-135*. This protective area should already be tightly controlled by the purveyor to minimize direct contamination at the wellhead. The minimum sanitary control area for a well shall have a radius of 100 feet around the wellhead. The construction, storage, disposal, or application of known or potential contaminants is prohibited within this area, unless permitted by DOH and the water purveyor. The City's only active well is located on City owned property that extends beyond the minimum required sanitary control area.

Wellhead protection areas are commonly based on 1-year, 5-year, and 10-year time of travel zones. For example, a 1-year time of travel zone represents an area around the well or well field in which contaminants could reach the well within one year. Each zone has different management strategies based on the urgency of response and characteristics of risks to public health posed by contaminants within the zones. An additional zone, called "buffer zone", may also be established to provide an area of added protection outside the 10-year time of travel zone for the wellhead protection area.

## 7.2 Delineation Methods

There are several delineation methods that can be used, but the simplest approach is the Calculated Fixed Radius (CFR) method. This method requires the least amount of technical data and is typically used for the initial delineation for identifying immediate threats to water quality. However, the major drawback of this method is that groundwater rarely behaves as simply as predicted with this method. Applying the CFR method yields a circular boundary around each of the wells or well fields, based on the data entered into a simple volumetric flow equation. Data input includes the annual volume pumped by the well, the open interval or length of well screen,

aquifer porosity, and the desired travel time (typically 6-month, 1-year, 5-year, and 10-year). Other more complex, but probably more accurate delineation methods utilize analytical models, hydrogeologic mapping, and computer flow models.

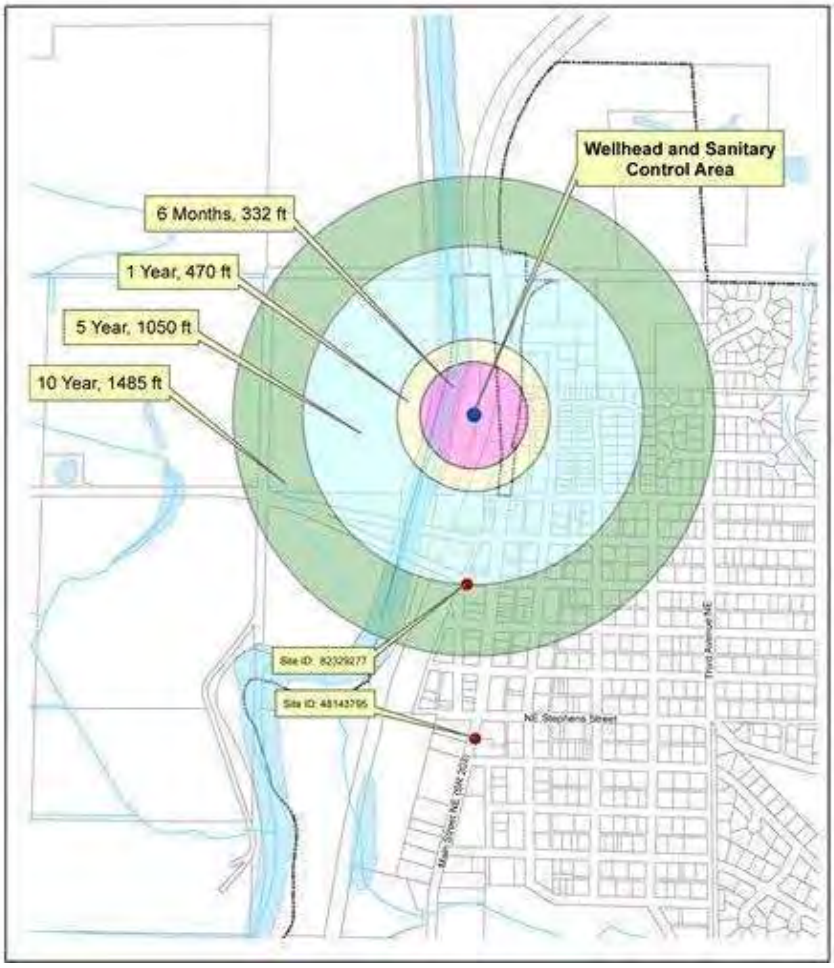
## 7.3 Delineation Results

The CFR method was utilized during preparation of the City's 2004 Comprehensive Water System Plan to establish the wellhead protection area boundaries. Table 1 presents data for the Taylor's Landing Well and the results of the CFR computations, which are based on the well's water rights information, since pumping rate information is not available. The wellhead protection area boundaries for the 6-month, 1-year, 5-year, and 10-year time of travel computations are presented in Figure 1.

Table 1
Well Data and Calculated Fixed Radius Values

| Description | Taylor's Landing Well |
|---|---|
| **Data** | |
| Source No. | N/A |
| Sec-Twp-Rng | Govt Lot 4 13-26N-6E |
| Year Water Rights Granted | 1940 |
| Ground Elevation (ft) | 48 |
| Screened Open Interval (ft) | 10 |
| Current Pumping Rate (gpm) | 0 |
| Annual Water Right (gal) | 11,404,008 |
| Aquifer Porosity (estimated) | 0.22 |
| **Calculated Fixed Radius (CFR) Value** | |
| 6 Month Time of Travel (ft) | 332 |
| 1 Year Time of Travel (ft) | 470 |
| 5 Year Time of Travel (ft) | 1,050 |
| 10 Year Time of Travel (ft) | 1,485 |

Figure 1
Wellhead Protection Area and Calculated Fixed Radius Values




## 7.4 Delineation Update Requirements

DOH recommends water systems with a low or moderate susceptibility rating upgrade their initial delineation using a more sophisticated groundwater flow model approach within five years following the initial delineation. If the water system has a high susceptibility rating, DOH recommends upgrading their initial delineation within two years following the initial delineation. In addition, wellhead protection area boundaries should be reviewed and revised when new wells are brought on-line or when there is a change in the annual volume pumped from a well. DOH recommends re-evaluation of the wellhead protection area boundaries during the update of the Comprehensive Water System Plan, which occurs on a 6-year, or now 10-year schedule.

There was been no appreciable change in either the use or demand of the wellhead, or the land uses and ownership adjacent to the wellhead. At this time the City is not proposing any revisions to the wellhead protection boundaries established in 2004.

# 9.0 INVENTORY OF POTENTIAL CONTAMINANT SOURCES

An essential element of wellhead protection is an inventory of all potential sources of groundwater contamination throughout the delineated wellhead protection areas. The purpose of the inventory is to identify past, present, and proposed activities that may pose a threat to the source of water supply (i.e., the aquifer). An initial inventory of a wellhead protection program should include, at a minimum, all potential sources of contamination within the 1-year time of travel zone and high risk potential contaminant sources within the 10-year time of travel zone.

## 9.1 Inventory Approach

An inventory of potential sources of groundwater contamination was conducted in 2011 during preparation of the City's 2011 Comprehensive Water System Plan. Several databases maintained by the Washington State Department of Ecology (Ecology) and the United States Environmental Protection Agency (EPA) were searched for known and potential contaminant sources.

The inventory efforts completed to date have been somewhat limited, due to budget limitations and the inactivity of the well site. Prior to any future resumption of potable uses of the well site; the City will complete a more detailed inventory of potential sources of groundwater contamination.

## 9.2 Inventory Findings

The inventory that was performed revealed several potential sources of contamination located within a broad area around the well. The approximate location of two sites is shown in **Figure 1** and a list of the potential sources of contamination is shown in **Table 2**. Only one of these potential sources is located within the 10-year time of travel zone of the Taylor's Landing wellhead protection area, as shown in **Figure 1**. All of the potential sources of contamination were found on the Ecology Leaking Underground Storage Tank List.

Table 2
Potential Sources of Contamination

| Site ID | Name | Address | Material Stored | WHPA |
|---|---|---|---|---|
| 82329277 | Valley Shell | 15729 Main St. NE Ste. A | Diesel/Unleaded Fuels | Inside 10 year |
| 48143795 | Farwest Petroleum Company | 15410 Main St. NE | Unleaded Fuels | Outside 10 year |
| 101082 | Harding & Sons (INACTIVE) / Now Sherlock Storage | 14441 Main St. NE | Diesel/Unleaded Fuels and Used Oil | Outside 10 year |
| 618917 | Safeway Fuel 1572 | 14020 Main St. NE | Diesel/Unleaded Fuels | Outside 10 year |

Source: Department of Ecology Leaking and Underground Storage Tank Lists

Other typical potential sources of contamination that are not specifically shown in **Figure 1** or listed in **Table 2** are discussed below. A further investigation of these will be conducted during future inventory efforts.

*Hazardous Spills on Highways* – State Route 203 passes through the 6-month, 1-year, 5-year and 10-year time of travel zones of the Taylor's Landing Well Wellhead Protection Area. Automobile accidents within this section of Highway 203 could result in spills of gasoline or other transported hazardous materials that would threaten the aquifer of the well.

*Pesticide and Herbicide Use along Roads* – Pesticides and herbicides are typically applied along county roads by King County and along state highways by the Washington State Department of Transportation. Although the chemicals in pesticides and herbicides are a potential source of contamination to the Taylor's Landing Well, the proper application of them will most likely avoid contaminating the groundwater.

*Septic Systems* – Septic systems for wastewater disposal and treatment are found in areas of the City that are not served by the City's sewage collection system. The ability to remove pollutants from the discharge of these systems depends on the type of the surrounding soil. In addition, septic systems may be unlawfully used for disposal of toxic materials. These onsite sewage disposal systems, which typically consist of a septic tank and drainfield, could pose a threat to the City's groundwater source. However, the City's existing map of properties served by septic systems shows that no septic systems are located within the 10-year time of travel zone.

*Home Oil Furnace Tanks* – Some residents in the Duvall area may be using oil furnaces to heat their homes. The number and location of these is unknown. The fuel for oil furnaces can be stored in above-grade or buried tanks. The City's groundwater source may be threatened by heating oil that leaks out of the tanks into the underlying soil. The risk of this potential contaminant depends on the location of leaking tanks relative to the City's wells, the amount and rate of leakage, and the type of underlying soil. Since no home oil furnace tanks are known to exist within the Wellhead Protection Area there is little risk of this type of contamination occurring.

*Hazardous Household Materials* – Almost all households have hazardous materials that are commonly used for a variety of cleaning and maintenance purposes. Some of these materials include cleaning solvents, paints, antifreeze, and engine oil. Improper use or disposal of these may result in contamination of the City's groundwater source. The Taylor's Landing Well is located in an area that has several single family residences within its wellhead protection area.

*Private Wells* – Poorly constructed private wells with inadequate seals and improperly abandoned wells may pose a threat to the City's groundwater source. Poorly constructed private wells with insufficient seals provide a direct pathway for contaminants from stormwater runoff, rodents, insects, and other pollutants to enter the aquifer used by the City's well.

*Stormwater* – Stormwater runoff can potentially contaminate the City's groundwater source. Runoff from industrial and commercial areas can contain high levels of metals and hydrocarbons. Runoff from residential areas is typically high in nutrients, pesticides, and metals. As development of new housing areas in Duvall occurs more stormwater will

need to be detained, likely through stormwater detention ponds. There are several areas of recent and upcoming land development within the Taylor's Landing Well wellhead protection area.

*Water Courses* – Water courses located within wellhead protection areas can carry contaminants that may pose a threat to the City's groundwater source. The Snoqualmie River is the largest water course within the Duvall area. The mainstream of the Snoqualmie River is located within the Taylor's Landing Well's 6-month, 1-year, 5-year, and 10-year time of travel zone.

*Agricultural Practices* – Ranches within the wellhead protection areas can be a threat to the City's groundwater source. Inadequate cleanup of animal waste is the most likely source of potential contamination found on ranches.

## 9.3 Inventory Update Requirements

In accordance with *WAC 246-290-135*, the inventory list of actual and potential groundwater contaminant sources located within the delineated wellhead protection areas must be updated every two years. The timing of the updates will be scheduled such that every third update is accomplished at the same time as the re-evaluation of the wellhead protection area boundaries that is required during each 6-year Comprehensive Water System Plan update. The inventory list of actual or potential groundwater contaminant sources was updated in July 2011.

# 11.0 NOTIFICATION OF INVENTORY FINDINGS

Owners and operators of known and potential sources of groundwater contamination will be notified of their location within the delineated wellhead protection areas. In addition, all water customers will be notified (via a billing insert) of the City's potential groundwater source, the Wellhead Protection Program, and the importance of protecting the City's potential sources. Regulatory agencies, local governments, and emergency response agencies will also be notified of the location of the wellhead protection areas, contaminant source inventory findings, contingency plans, and emergency response procedures. Table 3 lists all of the recipients that will be receiving these notifications. An example of each of the four types of notification letters that will be sent is attached.

Table 3
Notification Recipients

| Agency or Business | Mailing Address | City, State Zip |
|---|---|---|
| **Businesses within Wellhead Protection Area** | | |
| Valley Shell, Owner | 15729 NE Main Street | Duvall, WA 98019 |
| **Regulatory Agencies and Local Governments** | | |
| WA State Dept. of Health | 20435 72nd Ave S, Suite 200 | Kent, WA 98032 |
| WA State Dept. of Ecology | 3190 160th Ave SE | Bellevue, WA 98008 |
| City of Duvall, Planning Dept. | PO Box 1300 | Duvall, WA 98019 |

| City of Duvall Water Customers | | |
|---|---|---|
| As Appropriate | Varies | Duvall, WA 98019 |

# 13.0 CONTINGENCY PLANNING

With no active potable uses, and future use anticipated to primarily occur under emergent conditions; loss of this water source would have no impact on the City's ability to provide water to its citizens. However, for the purposes of providing a framework for future use; the contingency plan for operation of the well in the event of water source contamination is as follows.

*Emergency Condition* : Aquifer Contamination

*Impact on System* : Minor impact. Water not suitable for potable use - loss of supply. The City currently uses two connections to Seattle Public Utilities Tolt Supply Line for supply. Taylor's Landing Well would most likely be used to supplement water received from the Tolt Supply Line. If the aquifer were to be contaminated, the well could be shut down with minimal impact to the City's water customers.

*Emergency Response* :

1. Shut down any well pumps or access to the contaminated water source.
2. Notify DOH of the aquifer contamination.
3. Notify the public of the problem and instruct them to boil any water obtained from the water source.
4. Analyze water quality of water within reservoirs (if applicable) and dispose of properly if contaminated.
5. Disinfect reservoirs and water mains, as necessary, to remove contaminated residuals.
6. Adjust control of system facilities, as necessary, to provide supply from storage facilities if water within them is not contaminated.
7. Monitor water quality at affected well field and investigate cause of contamination.
8. Contact Seattle Public Utilities to request additional supply from the Tolt Supply Line, if required.
9. Implement water use reduction measures, as necessary, to ensure an adequate supply of water.

# 14.0 Program Implementation and Recommendations

The City of Duvall Wellhead Protection Program is an ongoing effort that requires staffing and resources to ensure its effectiveness in protecting a potential source of future drinking water. As

discussed previously in this document, the regulations require that the City complete a *Susceptibility Assessment Survey Form* as well as perform an inventory of all potential sources of groundwater contamination throughout the delineated wellhead protection areas every two years. In addition, DOH recommends water systems using the calculated fixed radius method, like the City of Duvall, upgrade their initial delineation using a more sophisticated groundwater flow model approach within two or five years following the initial delineation, depending on their susceptibility rating. At a minimum, the City must re-evaluate the wellhead protection area boundaries during the Comprehensive Water System Plan update process, which occurs every six or ten years.

The following tasks will be pursued as part of the City's on-going Wellhead Protection Program and completed prior to utilizing the well for potable purposes:

- Develop and adopt a wellhead protection ordinance that addresses permitted uses and performance standards for properties located within designated wellhead protection areas.
- Complete and submit a *Susceptibility Assessment Survey Form* to DOH.
- Perform a more accurate delineation of the wellhead protection area boundaries utilizing analytical models, hydrogeologic mapping, and computer flow models.
- Perform a more detailed inventory of potential sources of groundwater contamination.
- Confirm location, condition, and proper closure of abandoned private wells, especially those within 1-year time of travel zones.
- Distribute the required notifications of delineations and inventory findings.
- Develop and distribute public education materials within the wellhead protection areas to address groundwater protection and household, landscape, and gardening practices that could affect groundwater quality. Coordinate with and utilize existing information developed by King County and DOH.
- Establish a Wellhead Protection Committee to promote public education and awareness of the City's groundwater source and contaminant prevention. Coordinate these efforts with the regional agencies.
- Restrict land uses in the 1-year time of travel zones that pose a high risk to groundwater, such as gas stations, oil recycling, dry cleaners, fuel storage facilities, high density animal keeping, high density septic systems, and golf courses. Coordinate these efforts with King County.
- Develop signage at the perimeter of and at strategic locations around the wellhead protection areas to inform people that they are entering an area that contains a potential drinking water source that is vulnerable to surface activities.

# Appendix K

## Water Rights Certification and Self-Assessment

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# Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

| Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below | WFI Source # If a source has multiple water rights, list each water right on separate line | Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold | | | | Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold | | | | 10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold | | | | 20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary Qi Maximum Rate Allowed | Non-Additive Qi Maximum Rate Allowed | Primary Qa Maximum Volume Allowed | Non-Additive Qa Maximum Volume Allowed | Total Qi Maximum Instantaneous Flow Rate Withdrawn | Current Excess or (Deficiency) Qi | Total Qa Maximum Annual Volume Withdrawn | Current Excess or (Deficiency) Qa | Total Qi Maximum Instantaneous Flow Rate in 10 Years | 10-Year Forecasted Excess or (Deficiency) Qi | Total Qa Maximum Annual Volume in 10 Years | 10-Year Forecasted Excess or (Deficiency) Qa | Total Qi Maximum Instantaneous Flow Rate in 20 Years | 20-Year Forecasted Excess or (Deficiency) Qi | Total Qa Maximum Annual Volume in 20 Years | 20-Year Forecasted Excess or (Deficiency) Qa |
| 1 674 D* | N/A | 65 | -- | 35 | -- | -- | 65 | -- | 35 | -- | 65 | -- | 35 | -- | 65 | -- | 35 |
| 2 | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| | **TOTALS =** | 63 | | 35 | | -- | 65 | -- | 35 | -- | 65 | -- | 35 | -- | 65 | -- | 35 |
| Column Identifiers for Calculations: | | A | | B | | C | =A-C | D | =B-D | E | = A-E | F | =B-F | G | =A-G | H | =B-H |

**PENDING WATER RIGHT APPLICATIONS:** Identify any water right applications that have been submitted to Ecology.

| Application Number | New or Change Application? | Date Submitted | Quantities Requested | | | |
|---|---|---|---|---|---|---|
| | | | Primary Qi | Non-Additive Qi | Primary Qa | Non-Additive Qa |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**INTERTIES:** Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

| Name of Wholesaling System Providing Water | Quantities Allowed In Contract | | Expiration Date of Contract | Currently Purchased Current quantity purchased through intertie | | | | 10-Year Forecasted Purchase Forecasted quantity purchased through intertie | | | | 20-Year Forecasted Purchase Forecasted quantity purchased through intertie | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum Qi Instantaneous Flow Rate | Maximum Qa Annual Volume | | Maximum Qi Instantaneous Flow Rate | Current Excess or (Deficiency) Qi | Maximum Qa Annual Volume | Current Excess or (Deficiency) Qa | Maximum Qi 10-Year Forecast | Future Excess or (Deficiency) Qi | Maximum Qa 10-Year Forecast | Future Excess or (Deficiency) Qa | Maximum Qi 20-Year Forecast | Future Excess or (Deficiency) Qi | Maximum Qa 20-Year Forecast | Future Excess or (Deficiency) Qa |
| 1 Seattle Public Utilities | Not Restricted | | 01/01/2062 | 748 | N/A | 575 | N/A | 1,129 | N/A | 867 | N/A | 1,311 | N/A | 1,007 | N/A |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| **TOTALS =** | Not Restricted | | | 748 | N/A | 575 | N/A | 1,129 | N/A | 867 | N/A | 1,311 | N/A | 1,007 | N/A |
| Column Identifiers for Calculations: | A | B | | C | =A-C | D | =B-D | E | =A-E | F | =B-F | G | =A-G | H | =B-H |

**INTERRUPTIBLE WATER RIGHTS:** Identify limitations on any water rights listed above that are interruptible.

| Water Right # | Conditions of Interruption | Time Period of Interruption |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |

**ADDITIONAL COMMENTS:**

# Appendix L

## Water Quality Monitoring Plan

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CITY OF DUVALL

# Water Quality Monitoring Plan

## 1.0 Introduction

This Water Quality Monitoring Plan presents the requirements for monitoring water quality in the City of Duvall's (City) distribution system in accordance with the drinking water regulations contained in WAC 246-290-300. This plan also provides a summary of the existing water system facilities and system operation.

## 2.0 Existing Water System Description

### 2.1 Water System Information

The City is a municipal corporation that owns and operates a public water system within its corporate boundaries. Water system data on file at the Department of Health (DOH) for the Duvall system is as follows:

| | |
|---|---|
| System Type | Group A - Community - Public Water System |
| System Name | City of Duvall |
| County | King |
| DOH System ID Number | 207508 |
| Owner Number | 1625 |
| Address | 15525 Main Street NE Duvall, WA 98019 |
| Contact | Steven Leniszewski, P.E.; Public Works Director |
| Contact Phone Number | 425-788-3434 |

### 2.2 Water System Operation and Control

The existing water system is divided into five pressure zones, due to the wide range of elevations that are served (between 55 feet and 500 feet). All water supply is provided through two metered connections from Seattle Public Utilities (SPU) Tolt Pipeline No. 1 that follows an alignment directly south of the City. The Tolt 1 Supply Station provides water to the 615 Zone and indirectly fills the 0.5 MG Crestview Estates Reservoir in the 555 Zone through an altitude control valve at the reservoir site. Water from the Tolt 1 supply station can also indirectly fill the 450 Zone's 2.2 MG Big Rock Road Reservoir through an altitude control valve at the reservoir site. The Tolt 2 Supply Station provides water directly to the 450 Zone and the Big Rock Road Reservoir. The settings of the supply facilities and water usage throughout the system dictate the amount of water either flowing into or out of the reservoirs. When necessary the 615 Zone

Booster Pump Station can draw water from the 450 Zone Big Rock Road Reservoir and pump it into the closed 615 Zone (i.e., no storage within the zone). This process allows the 615 Zone to both meet demands and to supply water to the 0.5 MG Crestview Estates Reservoir when the altitude valve opens for filling the reservoir. The 485 Zone and the 330 Zone are supplied by pressure reducing stations with water that originates from the 555 and 450 Zones, respectively. As planned, the 485 Zone will be incorporated into the 555 Zone to improve looping and service.

## 2.3 Pressure Zones

A list of the City's existing pressure zones, average day demand (ADD), and their respective total percent of demand is presented in **Table 1** and further described in Chapter 4. The maximum hydraulic elevation is reflected in the name of each pressure zone.

Table 1. Pressure Zones

| Pressure Zone | 2019 Annual Supply (gallons) | Average Day Demand (gpm) | Average Day Demand (MGD) | Percent of Total Demand (%) |
|---|---|---|---|---|
| 330 | 52,108,473 | 99 | 0.14 | 27.8% |
| 450 | 24,912,998 | 47 | 0.07 | 13.3% |
| 485 | 1,462,251 | 3 | 0.00 | 0.8% |
| 555 | 46,650,979 | 89 | 0.13 | 24.9% |
| 615 | 62,436,860 | 119 | 0.17 | 33.3% |
| Total | 187,571,561 | 357 | 0.51 | 100.0% |

## 2.4 Water Sources

The City's existing active water source is presented below in **Table 2**. All of the City's water is currently purchased from Seattle Public Utilities.

Table 2. Water Sources

| DOH No. | Source Name | Category | Use |
|---|---|---|---|
| S01 | 77050Y/Seattle | Purchase – Treated | Permanent |

## 2.5 Water Storage

A list of the City's existing water storage facilities is presented below in **Table 3.**

Table 3. Water Storage

| Name | Pressure Zone | Material | Volume (gallons) | Overflow Elevation (feet) | Current Status |
|---|---|---|---|---|---|
| Big Rock Road | 450 | Steel | 2,200,000 | 450 | Active |
| Crestview Estates | 555 | Steel | 500,000 | 555 | Active |

## 2.6 Water Treatment

All water treatment is currently provided by SPU. The City's water is chlorinated to disinfect and

kill harmful bacteria that may be present in the water and fluoridated to assist in the prevention of tooth decay. Additionally, filtration and ozonation of SPU's Tolt River source is provided by SPU at the Tolt Treatment Facility.

## 2.7 Pump Stations

The 615 Zone Booster Pump Station pumps water from the 450 Zone to the closed 615 Zone.

## 2.8 Pressure Reducing Stations

A list of the City's existing pressure reducing stations is presented below in **Table 4**.

Table 4. Pressure Reducing Stations

| PRV Name | Upper Pressure Zone | Lower Pressure Zone | Ground Elevation (feet) | Normal Pressure | | Station Status |
|---|---|---|---|---|---|---|
| | | | | Inlet (PSI) | Outlet (PSI) | |
| Kennedy Drive | 450 | 330 | 213 | 99 | 54 | Active |
| 26500 NE 145th | 450 | 330 | 168 | 118 | 73 | Active |
| 3rd & Virginia | 450 | 330 | 222 | 95 | 50 | Active |
| 143rd & 268th | 450 | 330 | 235 | 89 | 44 | Removed (2020) |
| NE Big Rock Road | 450 | 330 | 173 | 116 | 71 | Active |
| Stephens St & Broadway | 450 | 330 | 188 | 110 | 65 | Active |
| 272nd & 143rd | 555 | 450 | 300 | 106 | 63 | Removed (2020) |
| Sunset Heights 144th | 555 | 450 | 292 | 109 | 67 | Active |
| Millers Homestead | 555 | 450 | 317 | 98 | 56 | Active |
| Bruett Road | 555 | 450 | 320 | 97 | 55 | Active |
| Kasper Heights | 555 | 485 | 360 | 80 | 56 | Active |
| 275th & 141st | 555 | 485 | 336 | 90 | 66 | Active |
| 150th & 278th | 615 | 555 | 436 | 77 | 49 | Active |
| Manion & 156th | 615 | 555 | 434 | 78 | 50 | Active |
| 282nd &140th | 615 | 555 | 406 | 90 | 62 | Active |

# 3.0 Source Water Quality Monitoring

The quality of drinking water in the City's water system is regulated by the requirements that are contained in Chapter 246-290 of the Washington Administrative Code (WAC). Since all water is supplied to Duvall from SPU, the City relies on the personnel and procedures of SPU to provide a reliable and high-quality supply of water to the City's system. SPU is responsible for the quality of the water from the source to the City's two metered supply connections, whereas the City is responsible for the quality of the water within the City's water distribution system.

SPU is required to perform water quality monitoring at each of the two active sources for inorganic chemical and physical substances, organic chemicals, unregulated inorganic and organic chemicals, and radionuclides. The water quality laboratory of SPU routinely monitors the

quality of water at the Cedar and Tolt River sources for these substances and subsequently reports the results to Duvall and its other regional supply customers.

# 4.0 Distribution System Water Quality Monitoring

The City is required to perform water quality monitoring within the distribution system for coliform bacteria, disinfectant (chlorine) residual concentration, lead and copper, and trihalomethanes in accordance with WAC 246-290. However, most of the City's required monitoring and testing is accomplished by SPU.

Table 5. Water Quality Monitoring Requirements

| Test | Location | Schedule | SPU's Responsibilities | City's Responsibilities |
|---|---|---|---|---|
| Routine Coliform | Distribution System | Monthly | SPU collects and tests 5 samples per month by agreement with DOH. | City to provide follow-up samples if required (WAX 246-290-320). |
| Chlorine Residual | Distribution System | Monthly | SPU collects and tests samples in conjunction with coliform sampling. | City voluntarily completes weekly supplemental testing at 2.2 MG reservoir. |
| Lead and Copper | Customer Taps | Every 3 years (last in 2018) | City collects and SPU tests samples. | City participates following SPU notification. |
| Disinfection By-Products | Distribution System | Every 90 days | SPU collects and tests 4 samples at pre-determined locations. | Coordinate with SPU to collect samples and complete testing. |
| Asbestos | Distribution System | NA | None | Not required due to less than 10% asbestos pipe in system, waiver in place through 2028. |
| General Disinfection | Distribution System | As needed | None | Laboratory water quality suite testing. |

## 4.1 Monitoring Requirements and Procedures

Coliform Bacteria Routine Sampling – SPU provides coliform monitoring of the City's water system as part of its regional monitoring program. Specific requirements are contained in *WAC 246-290-300*. Duvall receives all its water from SPU, which has an agreement with DOH that allows purveyors using water supplied by SPU to collect 70 percent of the samples required. Based on the population served by the City, a minimum of six (6) coliform samples are required each month; however, SPU's agreement with DOH reduces the minimum number of samples per month to five (5). If a coliform presence is detected in an SPU sample, repeat samples must be taken by the City in accordance with the repeat sampling discussion below.

Table 6 lists the addresses of the City's routine sampling locations, including upstream and downstream sampling locations if repeat sampling is necessary. A total of five samples are collected at each location for DU-1 and DU-2 each month.

Table 6. Coliform Monitoring Sample Locations

| Number | Address | Pressure Zone |
|---|---|---|
| DU-1 | Intersection of 3rd Ave NE and NE Stewart St | 450 |
| DU-2 | 28522 NE 151st St | 615 |
| DU-3 | 27620 NE 158th PL | 555 |
| DU-4 | 16406 270th Ave NE | 330 |
| DU-6 | 14300 275th Ave NE | 555 |
| DU-7 | 14300 3rd Ave NE | 450 |
| DU-8 | 26425 NE Cherry St | 330 |
| DU-9 | PW Shop - 14525 Main Street NE | 330 |
| DU-10 | 2.2 MG Reservoir - 28330 Big Rock Road | 615 / 555 |
| **Repeat sampling sites* | | |

Coliform Bacteria Repeat Sampling – The City is responsible for follow-up or repeat sampling if samples collected by SPU test positive for coliforms. If a sample tests positive for coliform, a repeat sample shall be taken at the same location as the suspect sample and two additional samples shall be taken within five service connections upstream and downstream of the suspect sample. These repeat samples shall be taken by the end of the next business day after receiving the unsatisfactory results. If the results conclude that a maximum contaminant level (MCL) is exceeded (i.e., coliform are present in two or more samples for the month, including repeat samples), the City shall proceed with public notification in accordance with Part 7 of WAC 246-290.

Disinfectant Residual Concentration – Specific requirements are contained in WAC 246-290-662 for disinfectant residual concentration monitoring. The samples collected by SPU for coliform analysis are also analyzed for residual disinfectant concentration by the SPU Water Quality Laboratory. The minimum residual disinfectant concentration entering the City's distribution system should be at least 0.2 mg/L. Samples taken within the distribution system are required to have a residual disinfectant concentration that is detectable in at least 95% of the samples taken each calendar month.

Asbestos – Specific requirements are contained in 40 CFR 141.23(b). The current maximum contaminant level for asbestos is seven million fibers per liter and greater than ten microns in length. The City has been granted an asbestos monitoring waiver by DOH because the system has less than 10% asbestos cement (AC) pipe and all water is purchased from SPU.

Fluoride Concentration – Specific requirements are contained in WAC 246-290-460 for systems that are fluoridating drinking water. SPU currently fluoridates the City's water supply and is therefore required to maintain fluoride concentration in the range of 0.8 through 1.3 mg/L. Determinations of fluoride concentrations shall be made daily by SPU, and reports of the analyses shall be submitted to DOH within ten days of the end of the reporting month. Monthly check samples shall be taken downstream of each fluoride injection point by SPU, at the first sample tap where adequate mixing has occurred.

Disinfection By-Products – SPU provides disinfection by-products monitoring of the City's water

system as part of its regional water quality monitoring program. Specific requirements are contained in WAC 246-290-300.

Lead and Copper – Specific requirements are contained in Title 40, Parts 141.86, 141.87, and 141.88 of the Code of Federal Regulations (CFR). The City participates in SPU's regional lead and copper monitoring program. The City regularly obtained samples within the water service area for the regional monitoring program between 2003 and 2008 and submitted the samples to the SPU Water Quality Laboratory for analysis. SPU is expected to resume lead and copper monitoring in the summer of 2011.

Duvall provides information on lead and copper to customers in their annual drinking water quality report to comply with public notification requirements for lead and copper.

The new Lead and Copper monitoring requirements implemented at the State level and becoming effective October 1, 2011 are not expected to affect the City. SPU currently performs Lead and Copper testing and the City already provides information to its customers in the annual Consumer Confidence Report (CCR).

# 5.0 Coliform & E. coli Response Plan

On April 1, 2016, the federal Revised Total Coliform Rule (RTCR) replaced the 1989 Total Coliform Rule (TCR). The Revised Total Coliform Rule requires systems vulnerable to contamination to "find and fix" problems and pathways that could allow pathogens to enter the distribution system. Routine coliform samples are to be collected from representative points in the distribution system at regular time intervals.

Public water systems are required to deliver safe and reliable drinking water to their customers 24 hours a day, 365 days a year. If the water supply becomes contaminated, consumers can become seriously ill. Fortunately, public water systems take many steps to ensure that the public has safe, reliable drinking water.

One of the most important steps is to regularly test the water for coliform bacteria. This coliform monitoring plan will enable water operators to use laboratory and economical tests to evaluate the microbial water quality of the water system. These tests help ensure the water provided to customers is free of disease-causing organisms.

## 5.1 Coliform Bacteria

Coliform bacteria are organisms that are present in the environment and in the feces of all warm-blooded animals and humans. Coliform bacteria will not likely cause illness. However, their presence in drinking water indicates that disease-causing organisms (pathogens) could be in the water system. Most pathogens that can contaminate water supplies come from the feces of humans or animals. Testing drinking water for all possible pathogens is complex, time-consuming, and expensive. It is relatively easy and inexpensive to test for coliform bacteria. If coliform bacteria are found in a water sample, water system operators work to find the source of contamination and restore safe drinking water. There are three different groups of coliform bacteria; each has a different level of risk. The three groups are; total coliform, fecal coliform and E. coli.

## 6.2 Total Coliform, Fecal Coliform, and E. coli

Total coliform, fecal coliform, and E. coli are all indicators of drinking water quality. The total coliform group is a large collection of different kinds of bacteria. Fecal coliforms are types of total coliform that mostly exist in feces. E. coli is a sub-group of fecal coliform. When a water sample is sent to a lab, it is tested for total coliform. If total coliform is present, the sample will also be tested for either fecal coliform or E. coli, depending on the lab testing method.

## 6.3 Coliform and E. coli Present

If routine sample or repeat sample shows "Unsatisfactory, Total Coliform Present" and "E. coli present" then:

1. Notify Water Lead, Water Manager, Public Works Director, DOH
2. FLUSH and "Find and Fix" source of contamination.
3. Take three repeat samples, (one from the same tap, one within 5 (five) connections upstream, one within 5 (five) connections downstream)
4. Conduct an Assessment: A water system evaluation done by a Water Distribution Manager 2 (WDM2) or higher, an Engineer, or Health staff, to "Find and Fix" the contamination source.
5. Public Notification, within 24 hours if 2 (two) related samples test positive for total coliform bacteria and there is E. coli bacteria in one or more of the samples. If sample shows "Unsatisfactory, Total Coliform Present" and "E. coli absent" then repeat items 1-3 listed above and repeat until samples tests "Satisfactory".

The presence of E. coli bacteria in the distribution system will create significant challenges for us and our customers. We may be required or choose to advise our customers to boil their drinking water or use bottled water. Our customers may not be able to drink their tap water while we investigate the problem or pursue corrective action.

# City of Duvall Coliform Sample Collection

MATERIALS

- SPU Sample Stand key.
- Cooler with ice or instant (chemical) cold packs.
- Sampling Bottles (at least two extra) with lab paperwork and test labels.
- Digital thermometer (IR) and digital Colorimeter.
- Meter Setter Sampling Wand within protective tube.
- Hand pump
- 1 gallon of Chlorinated distilled water (approx. 200 ppm, ½ fluid ounce of typical chlorine bleach per gallon of water) for secondary sample collection sites.

PROCEDURE

1. Get sterilized sample bottles and place in cooler. Two ice packs are required for the large coolers and a single ice pack is required for the small coolers. Always take at least 2 to 3 extra bottles along with you in case a sample bottle is contaminated in the field. Make sure the sample bottles are designated for bacteriological use and are labeled with a SPU Water Quality LIMS bar code (SPU water Quality Laboratory) and/or note "Coliform Testing for Drinking Water" (AmTest Laboratories).
2. Flushing
    - SPU Sample Stands (Primary Samples): When you arrive at the sample stand check the flow. If the flow is acceptable no flow changes should be made. If the water is not flowing or flowing at a low velocity, flush the sample stand at a high velocity for 5 minutes. Then return the flow to an acceptable velocity and allow to flow for an additional 2 minutes.
    - Meter Setter Sampling Locations (Secondary Samples): When you arrive verify that standing water is at least 4 inches below the sample port and/or use hand pump to remove excess standing water. Pour chlorinated distilled water (approx. 200 ppm, ½ fluid ounce of typical chlorine bleach per gallon of water) over the sample station port, attach sampling wand, and flush out of the wand top at high velocity for 2 minutes while directing the discharge away from meter box and erodible soil. Close the flushing valve at the wand top, open the sampling valve, and flush for an additional 2 minutes.
3. Before sampling, complete lab sheet paperwork. Then measure the water temperature and chlorine residual by using the digital thermometer and digital Colorimeter. Record on your field data sheet. You may then collect a sample.
4. When you are ready to collect a sample, hold the bottle at the base, remove the sterile seal, and unscrew the cap. Hold the cap so that the threads are facing downward. Do not set the sample cap down and do not allow your fingers to touch the inner surface of the cap.
5. Immediately fill the sample bottle up to the shoulder leaving ample air space (approximately 1 inch of air space is adequate). Avoid splashing while filling the bottle and do not overflow the bottle. If you do overfill the bottle, get a new sample bottle and try again. <u>At no point during sampling should the sample bottle touch the sample tap or any other surface</u>. (If it is raining avoid allowing any water dripping off of the sample stand cover to get into the sample bottle).
6. After filling the bottle to the appropriate level, immediately cap the bottle securely. Write the sample location on the bottle label and place bottle in an upright position in the cooler. Do not throw or toss the bottle in the cooler. It is important that samples remain cool (<10°C) during transit, so keep cooler lid closed when not in use.
7. <u>If at any point you are uncertain of the sterility of the sample bottle or your sample collection technique, get a new bottle and start all over</u>. (Bottles are inexpensive).

8. Place samples in cooler dedicated solely for transporting drinking water samples. Deliver Samples immediately to:

   - AmTest Laboratories, 13600 NE 126th PL, Suite C, Kirkland. M-F 07:00 to 17:00 (425-885-1664), After Hours call 425-770-7037 Kathy)
   - SPU Water Quality Lab, 800 S Stacy St, Seattle, WA 98134, M-F -7:00 to 17:30 (206-684-7834),

9. Keep your coolers clean. Clean out your coolers with soap and water immediately upon return from sample delivery and allow to air dry in a cool, clean location in preparation for next use.

## H. *E. coli*-Present Sample Response

| Distribution System *E. coli* Response Checklist | | | | |
|---|---|---|---|---|
| **Background Information** | **Yes** | **No** | **N/A** | **To Do List** |
| We inform staff members about activities within the distribution system that could affect water quality. | ☐ | ☐ | ☐ | ☐ |
| We document all water main breaks, construction & repair activities, and low pressure and outage incidents. | ☐ | ☐ | ☐ | ☐ |
| We can easily access and review documentation on water main breaks, construction & repair activities, and low pressure and outage incidents. | ☐ | ☐ | ☐ | ☐ |
| Our Cross-Connection Control Program is up-to-date. | ☐ | ☐ | ☐ | ☐ |
| We test all cross-connection control devices annually as required, with easy access to the proper documentation. | ☐ | ☐ | ☐ | ☐ |
| We routinely inspect all treatment facilities for proper operation. | ☐ | ☐ | ☐ | ☐ |
| We identified one or more qualified individuals who are able to conduct a Level 2 assessment of our water system. | ☐ | ☐ | ☐ | ☐ |
| We have procedures in place for disinfecting and flushing the water system if it becomes necessary. | ☐ | ☐ | ☐ | ☐ |
| We can activate an emergency intertie with an adjacent water system in an emergency. | ☐ | ☐ | ☐ | ☐ |
| We have a map of our service area boundaries. | ☐ | ☐ | ☐ | ☐ |
| We have consumers who may not have access to bottled or boiled water. | ☐ | ☐ | ☐ | ☐ |
| There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water. | ☐ | ☐ | ☐ | ☐ |
| We have identified the contact person at each day care, school, medical facility, food service, and other customers who may have difficulty responding to a Health Advisory. | ☐ | ☐ | ☐ | ☐ |
| We have messages prepared and translated into different languages to ensure our consumers will understand them. | ☐ | ☐ | ☐ | ☐ |
| We have the capacity to print and distribute the required number of notices in a short time period. | ☐ | ☐ | ☐ | ☐ |
| **Policy Direction** | **Yes** | **No** | **N/A** | **To Do List** |
| We have discussed the issue of *E. coli*-present sample results with our policy makers. | ☐ | ☐ | ☐ | ☐ |
| If we find *E. coli* in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers. | ☐ | ☐ | ☐ | ☐ |
| **(Cont.)** | | | | |

| Distribution System *E. coli* Response Checklist | | | | |
|---|---|---|---|---|
| **Potential Public Notice Delivery Methods** | **Yes** | **No** | **N/A** | **To Do List** |
| It is feasible to deliver a notice going door-to-door. | ☐ | ☐ | ☐ | ☐ |
| We have a list of all of our customers' addresses. | ☐ | ☐ | ☐ | ☐ |
| We have a list of customer telephone numbers or access to a Reverse 9-1-1 system. | ☐ | ☐ | ☐ | ☐ |
| We have a list of custo | ☐ | ☐ | ☐ | ☐ |
| We encourage our customers to remain in contact with us using social media. | ☐ | ☐ | ☐ | ☐ |
| We have an active website we can quickly update to include important messages. | ☐ | ☐ | ☐ | ☐ |
| Our customers drive by a single location where we could post an advisory and expect everyone to see it. | ☐ | ☐ | ☐ | ☐ |
| We need a news release to supplement our public notification process. | ☐ | ☐ | ☐ | ☐ |

## Distribution System *E. coli* Response Plan

**If we have *E. coli* in our distribution system we will immediately:**

1. Call DOH.
2. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary.
3. _____ _____
4. _____ _____
5. _____ _____
6. _____ _____
7. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3-6.

| *E. coli*-Present Triggered Source Sample Response Checklist – All Sources | | | | |
|---|---|---|---|---|
| **Background Information** | **Yes** | **No** | **N/A** | **To Do List** |
| We review our sanitary survey results and respond to any recommendations affecting the microbial quality of our water supply. | ☐ | ☐ | ☐ | ☐ |
| We address any significant deficiencies identified during a sanitary survey. | ☐ | ☐ | ☐ | ☐ |
| There are contaminant sources within our Wellhead Protection Area that could affect the microbial quality of our source water, and<br>If yes, we can eliminate them. | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ |
| We routinely inspect our well site(s). | ☐ | ☐ | ☐ | ☐ |
| We have a good raw water sample tap installed at each source. | ☐ | ☐ | ☐ | ☐ |
| After we complete work on a source, we disinfect the source, flush, and collect an investigative sample. | ☐ | ☐ | ☐ | ☐ |
| **Public Notice** | **Yes** | **No** | **N/A** | **To Do List** |
| We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our water system's governing body (board of directors or commissioners) and received direction from them on our response plan. | ☐ | ☐ | ☐ | ☐ |
| We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our wholesale customers and encouraged them to develop a response plan. | ☐ | ☐ | ☐ | ☐ |
| We have prepared templates and a communications plan that will help us quickly distribute our messages. | ☐ | ☐ | ☐ | ☐ |

| *E. coli*-Present Triggered Source Sample Response Checklist – Source S__* | | | | |
|---|---|---|---|---|
| **Alternate Sources** | **Yes** | **No** | **N/A** | **To Do List** |
| We can stop using this source and still provide reliable water service to our customers. | ☐ | ☐ | ☐ | ☐ |
| We have an emergency intertie with a neighboring water system that we can use until corrective action is complete (perhaps for several months). | ☐ | ☐ | ☐ | ☐ |
| We can provide bottled water to all or part of the distribution system for an indefinite period. | ☐ | ☐ | ☐ | ☐ |
| We can quickly replace our existing source of supply with a more protected new source. | ☐ | ☐ | ☐ | ☐ |
| **Temporary Treatment** | **Yes** | **No** | **N/A** | **To Do List** |
| This source is continuously chlorinated, and our existing facilities can provide 4-log virus treatment (CT = 6) before the first customer.<br>If yes, at what concentration? _____ mg/L | ☐ | ☐ | ☐ | ☐ |
| We can quickly introduce chlorine into the water system and take advantage of the existing contact time to provide 4-log virus treatment to a large portion of the distribution system. | ☐ | ☐ | ☐ | ☐ |
| We can reduce the production capacity of our pumps or alter the configuration of our storage quantities (operational storage) to increase the amount of time the water stays in the system before the first customer to achieve CT = 6. | ☐ | ☐ | ☐ | ☐ |
| We can alter the demand for drinking water (maximum day or peak hour) through conservation messages to increase the time the water is in the system prior to the first customer in order to achieve 4-log virus treatment with chlorine. | ☐ | ☐ | ☐ | ☐ |

*NOTE: If your system has multiple sources, you may want to complete a separate checklist for each source.

## *E. coli*-Present Triggered Source Sample Response Plan – Source ___

**If we have *E. coli* in Source ___ water, we will immediately:**

1. Call DOH.
2. _____ _____
3. _____ _____
4. _____ _____
5. _____ _____

# Appendix M

## Annual Water Quality Reports

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## Rate Assistance Program

During this declared COVID-19 emergency, the City of Duvall has temporarily suspended water disconnections for non-payment, and will not be adding any new late fees on accounts with past due balances. Account balances will continue to accrue. If you have questions, or need to set up payment arrangements, please contact stephanie.goodwin@duvallwa.gov. Current utility payment methods are outlined on the website. Please visit www.duvallwa.gov/132/Utility-Billing for detailed information. If you need financial assistance for utilities, you may consider contacting Hopelink by visiting www.hopelink.org/ need-help/financial-assistance.

## Community Participation

You are invited to participate in our public City Council meetings and voice any concerns or suggestions you have about your drinking water. The City Council meets the 1st and 3rd Tuesdays of each month at 7:00 p.m. At this time meetings are being held virtually. Please check the city website for current meeting location.

## Making Sure This Report Reaches Our Customers

The EPA has informed water providers that having this report available on the City website meets delivery requirements as long as customers are notified of this option and those who would like a paper copy can request one. The City has decided to provide it in this way to conserve paper and save printing and mailing costs. If you would like to provide feedback about the delivery method or request a copy be mailed to you, please send an email to sara.ruhland@duvallwa.gov or call Public Works, 425.788.3434 ext. 8043.

## Utility Billing News

Go paperless! Get your utility bill emailed to you. Register using your utility bill. It's free and easy! Just have your most recent utility bill with you for current information and go to https://duvall.merchanttransact.com/ . If you've already registered, sign in and go to My Profile. Under Your Accounts, click on your account number then: Select "NO, do not print and send my bill using the postal service" AND select "YES, send an electronic copy of my billing statement via email". Click on SUBMIT. Your utility bill will be emailed to the account you have registered with. **Please note**: any past due or pending disconnection notices will still be mailed.


City of Duvall
PO Box 1300
Duvall, WA 98019
www.duvallwa.gov

City Hall
15535 Main St NE
Phone: 425.788.1185

Utility Clerk
425.788.1185 ext.8090

Public Works
14525 Main St NE
425.788.3434


# 2019 Drinking Water Quality Report

## Where your water comes from

Duvall is proud and pleased to provide you with our annual drinking water quality report. Duvall's water system contains two supply stations, 41 miles of water main, 15 pressure reducing stations, pump station and two water reservoirs totaling 2.7 million gallons (MG) of water storage. It takes much effort, care and expertise to manage your water system. Maintaining clean and reliable drinking water is an essential priority for Duvall. Ongoing testing and infrastructure improvements to our system help ensure that the quality of the City's water. We are committed to protecting this valuable resource - now and for future generations.

The City purchases all of its water from Seattle Public Utilities (SPU). SPU provides many cities and water districts with water from two watersheds, the Cedar and the Tolt. All of Duvall's water comes from the Tolt Watershed. Both SPU and Duvall monitor and test it to maintain high quality. There are seven sample stands throughout the city that SPU and Duvall use to test the quality of our drinking water every day.

## Drinking Water Sources

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

## Ensuring Safe Tap Water

To ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) and / or the Washington State Department of Health (DOH) prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) and / or the Washington State Department of Agriculture regulations establish limits for contaminants in bottle water that must provide the same protection for public health.


## Special Health Needs

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA / Centers for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the EPA's Safe Drinking Water Hotline.

**Other Useful Tolt Data:**

Water Hardness = 1.27 Grains / Gallon (this water is soft)

PH = 8.18

Alkalinity = 19.7 mg

## Definitions:

**1 ppm =** *1000 ppb*

**MCL:** *Maximum Contaminant Level* - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

**MCLG:** *Maximum Contaminant Level Goal* - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

**MRDL:** *Maximum Residual Disinfectant Level* - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

**MRDLG:** *Maximum Residual Disinfectant Level Goal* - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

**NA:** *Not Applicable*

**ND:** *Not Detected*

**NTU:** *Nephelometric Turbidity Unit* - Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2019 is 5 NTU, and for the Tolt supply it was 0.3 NTU for at least 95% of the samples in a month. 100% of Tolt samples in 2019 were below 0.3 NTU.

**ppm:** *1 part per million = 1 mg/L = 1 milligram per liter*

**ppb:** *1 part per billion = 1 ug/L = 1 microgram per liter*

**TT**: *Treatment Technique* - A required process intended to reduce the level of a contaminant in drinking water.

## Cross Connection Control Program

The purpose of a Cross Connection Control Program is to keep unsafe water from mixing with the potable water supply. Duvall maintains a database of assemblies installed throughout the City. We monitor all testing and send customers an annual reminder notice. Your efforts in performing required testing is essential to protecting our drinking water.

Backflow assemblies fail for a variety of reasons. That's why state law requires them to be tested annually by a certified tester - to ensure that the assemblies will function if there is a backflow event.

Garden Hoses can be hazardous to the water quality in your home. To prevent backflow and keep your water safe **DO NOT**:

- Submerge a garden hose into anything that you would not want to drink.
- Use hose-end applicators to apply garden chemicals to your yard.

When not in use, keep the hose bibs on the house in the "off" position. The spray nozzle at the end of the hose is not a safe shut off. If you have an automatic sprinkler system you most likely have a double check valve assembly that requires annual maintenance and testing. Anyone curious to find out more can call 425.939.8042 to discuss.

## 2019 Results

The results of monitoring in 2019 are shown in the following tables. These results are parameters regulated by federal and state agencies. For other water quality information please contact the Public Works Department. We can also send you a list of the more than 200 compounds for which we tested for but did not find in our drinking water supplies. Water quality data for non-regulated parameters are also provided on SPU's website: https://www.seattle.gov/utilities/services/water/water-quality.

Water quality monitoring data can be difficult to interpret. To make all the information fit into one table, we use many acronyms that are defined within this report.

### 2019 Water Quality Monitoring Results

| | | EPA's | | Levels in Tolt Water | | |
|---|---|---|---|---|---|---|
| **Detected Compounds** | **Units** | **MCLG** | **MCL** | **Avg.** | **Rng.** | **Typical Sources** |
| ***Raw Water*** | | | | | | |
| Total Organic Carbon | ppm | NA | TT | 1.1 | 1.0 to 1.3 | Naturally present in the environment |
| ***Finished Water*** | | | | | | |
| Turbidity | NTU | NA | TT | 0.03 | 0.01 to 0.17 | Soil runoff |
| Arsenic | ppb | 0 | 10 | 0.4 | 0.3 to 0.4 | Erosion of natural deposits |
| Barium | ppb | 2000 | 2000 | 1.3 | 1.1 to 1.5 | Erosion of natural deposits |
| Bromate | ppb | 0 | 10 | 0.2 | ND to 2 | By-product of drinking water disinfection |
| Nitrate | ppm | 10 | 10 | 0.11 | One sample | Erosion of natural deposits |
| Chromium | ppb | 100 | 100 | 0.2 | ND to 0.24 | Erosion of natural deposits |
| Fluoride | ppm | 4 | 4 | 0.7 | 0.6 to 0.8 | Water additive, which promotes strong teeth |
| Coliform, Total | % | 0 | 5% | 0 | | Naturally present in the environment |
| Total Trihalomethanes | ppb | NA | 80 | 29.0 | 21.2 - 35.7 | By-products of drinking water chlorination |
| Haloacetic Acids(5) | ppb | NA | 60 | 21.3 | 14.8 - 28.6 | |
| Chlorine | ppm | MRDLG =4 | MRDL = 4 | Avg = 0.87<br>Rng. = 0.76-1.01 | | Water additive used to control microbes |

## Report Illicit Discharges or Spills

All city storm drains flow into natural waterways. So it is very important to report illegal dumping or even accidental spills in our roadways, storm systems or natural waterways.

**Business Hours 7:00 - 3:30 PM, M-F: 425.939.8040**

**After Hours: 425.419.3748** (Emergency Only)

Non-emergency information may also be sent to ***stormwater@duvallwa.gov.***

Puget Sound Starts Here

## Contaminants and Regulations

Washington's Source Water Assessment Program is conducted by the DOH Office of Drinking Water. According to the DOH, all surface waters in Washington are given a susceptibility rating of "High", regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Information of the source water assessments is available from the DOH website at: https://fortress.wa.gov/doh/swap/.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline, **1.800.426.4791**.

Since both watersheds are publicly owned, SPU is able to vigorously protect it's watersheds through a comprehensive watershed protection program. Even so, there is always some potential for natural sources of contamination. In Duvall's surface water supplies, the potential sources of contamination include:

- Microbial contaminants, such as viruses, bacteria, and protozoa from wildlife;
- Inorganic contaminants , such as salts and metals, which are naturally occurring; and
- Organic contaminants, which result from chlorine combining with the naturally occurring organic matter.

## Lead and Copper Monitoring Results (Tolt WSA)

| Parameter and Units | MCLG | Action Level+ | 2017 Results* | Homes Exceeding | Source |
|---|---|---|---|---|---|
| Lead, ppb | 0 | 15 | 4.0 | 0 of 51 | Corrosion of household plumbing systems |
| Copper, ppm | 1.3 | 1.3 | 0.15 | 0 of 51 | |

* 90th Percentile: i.e. 90 percent of the samples were less than the values shown.
\+ The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Duvall is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at **1.800.426.4791** or *http://www.epa.gov/safewater/lead*.

Although there is no detectable lead in our source water, tests show there are sometimes elevated levels of lead and copper in some samples, primarily because of corrosion of household plumbing systems. These results show that it is very important that homeowners, business owners, and others be aware of their type of plumbing, and how the plumbing affects their drinking water quality.

Where you live, when your plumbing was installed, and what type of plumbing you have, all play a part in determining your potential exposure level. SPU treats the water to minimize the tendency for lead to enter the water, and results show that they have been very successful at this.

In Washington State, lead in drinking water comes primarily from materials and components used in household plumbing. The more time water has been sitting in pipes, the more dissolved metals, such as lead, it may contain. Elevated levels of lead can cause serious health problems, especially in pregnant women and young children.

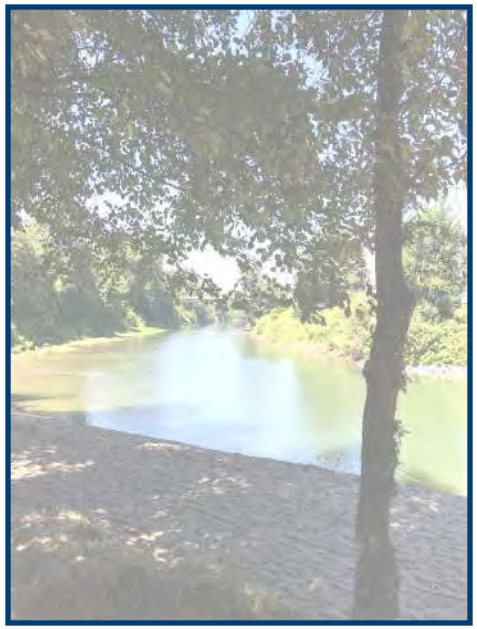
To help reduce potential exposure to lead: for any drinking water tap that has not been used for six hours or more, flush water through the tap until the water is noticeably colder before using for drinking or cooking. You can use the flushed water for watering plants, washing dishes, or general cleaning. Only use water from the cold-water tap for drinking, cooking, and especially for making baby formula. Hot water is likely to contain higher levels of lead. Finally, remember that drinking water is only a minor contributor to overall exposure to lead. Other sources, including paint, soil, and food, also contribute.

### Conservation—Use Water Wisely

All of our individual efforts to save water add up to make a big difference. Future generations are counting on us to preserve water resources. When we work together, our individual efforts to save water add up to make a big difference. – There are everyday actions we can all take to use water wisely:

- Find and Fix Leaks – save money and prevent waste by fixing leaks, www.savingwater.org.
- Check the soil before you water. Probe with a finger or trowel to see if the soil is still damp a few inches down. When it's dry down at the root zone, it's time to water.
- Water deeply, but less frequently. An hour after watering, check the soil again to see if you've penetrated as deep as the roots reach. Adjust your watering time to moisten the whole root zone, but then wait until the upper few inches of soil are dry before watering again – that encourages deeper roots.
- Water slowly, or start and stop irrigation, to prevent surface runoff and give water time to penetrate.
- Get water right to the roots, by using a watering wand with shutoff for small areas. For larger areas, drip or soaker hose under mulch delivers water efficiently right to the roots.
- Make every drop count. Water early or late in the day to reduce evaporation, build your soil with compost and mulch, and choose low water use plants.

The Saving Water Partnership (SWP) – which is made up of the City of Duvall and 18 water utility partners – has set a ten-year conservation goal: keep the total average annual retail water use of SWP members under 110 millions of gallons per day (mgd) through 2028, despite forecasted population growth, by reducing per capita water use. For 2019, the Saving Water Partnership met the goal, using 94.0 mgd.



**Saving Water Partnership Survey**

Thank you! Out of 18 utilities participating in the Saving Water Partnership Survey, Duvall tied for second in participants! Great Job!

# Appendix N

## Hydraulic Model Calibration

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# Technical Memorandum

**Date:** July 14, 2020

**Project:** Water Model Update and Steady State Calibration

**To:** Shaun Tozer
City of Duvall

**From:** Elisheva Walters, EIT
Stephanie Ard, PE
Murraysmith, Inc.

**Re:** Model Update & Steady State Calibration


## Background

The City of Duvall's (City) hydraulic model is maintained on an on-call basis by Murraysmith and was last calibrated in 2011 for the 2012 Water System Plan. The hydraulic model is used for water system analyses and improvement-planning purposes. Murraysmith has periodically updated the model network with new GIS records; the last of these updates occurred in Fall 2018.

The City is growing at a fast pace; new customers and additional piping are added yearly to the system. As part of the City's 2020 Water System Plan update, Murraysmith updated and calibrated the model with the most recent GIS records, developer plat planning documents, field testing, and current operational settings.

The following memo documents the calibration of the hydraulic model according to the guidelines in Section 6.1.3 of the Department of Health's (DOH) *Water System Design Manual*, dated October 2019.

## Model Update

The model update included a facility and network updates, demand allocation, and steady-state calibration, as described in more detail in the following sections.

### *Facilities Update*

No major changes were made to system facilities (pumps, supply stations, and tanks) since no improvements have been made to the facilities since the last model update.

Operational settings for system control valves were updated using City-provided settings.

## *Water System Pipe Network Update*

To accurately represent the City's current system in the model, new piping from the City's GIS records dated December 19, 2019, were imported into the model and assigned a diameter, material, roughness, and date of installation using GIS data. A detailed list of major piping updates is shown in **Table 1.** Local contour data was used to assign elevations to pipe network junctions. Pipe connectivity was reviewed manually and using model network analysis tools; for example, to check for duplicate junctions at the same location or disconnected adjacent pipes. Pressure zone boundaries were manually reviewed to ensure pressure zones were discrete (not leaking); all pipes and isolation valves between pressure zones were closed.

### Table 1
### Major Pipe Updates

| Description | Year Installed | Pressure Zone | Linear Feet | Diameter (in) | Material |
|---|---|---|---|---|---|
| Dietrich Jung Water Main Extension | 1996* | 450 | 715<br>240 | 8<br>4 to 6 | DI<br>DI |
| North Hill Development | 2016 | 615 | 5,543<br>73 | 6 to 8<br>1 to 2 | DI<br>PVC |
| SR 203 Safety Improvements | 2016 | 330 | 218 | 8 to 12 | DI |
| Big Rock Road/Walden/Duv Development | 2019-2020** | 330, 450, and 555 | 13,545 | 6 to 8 | DI |
| Cedarcrest High School | 1996* | 615 | | 4 to 12 | DI |

*Not included in previous model

**Portions of this development had not been installed at the time of calibration; these pipes were inactivated in the model for calibration.

## *Demand Allocation*

Water consumption was allocated to accurately represent current system demands. The City's 2019 annual billing records were spatially located by address using GIS street address data, and the average billed demand for each meter was allocated to the nearest junction in the model. Nodes were visually verified at zone boundaries to ensure demand was allocated to the correct zone. Billed demands were then scaled up to account for non-billed system demands and distribution system leakage using production data from the SPU Tolt Supply stations. The 2019 billed use was scaled until the total demand matched the amount purchased from SPU in 2019 (minus construction water use; see below). See **Figure 1** for a summary of demand allocation by pressure zone.

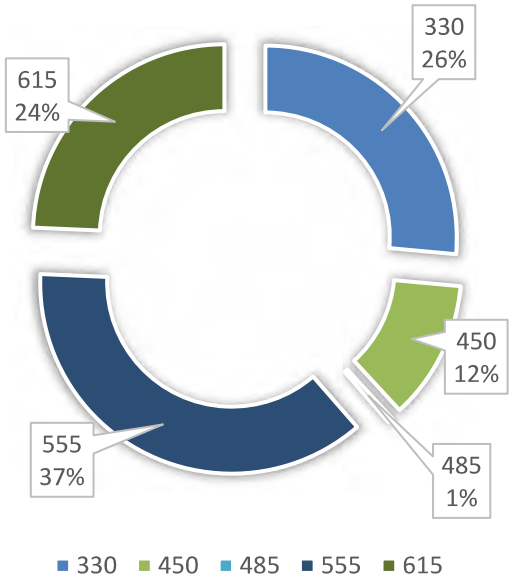



Figure 1
Demands by Zone

Due to the rate of growth and development in Duvall, construction water use through hydrants accounted for a large portion of water use in 2018 and 2019. Murraysmith elected not to include this demand in the model due to its inconsistent location and annual demand. Because water for construction is typically not pulled from hydrants during peak use, the absence of this demand in the model is not expected to affect system operations during worst case flow scenarios.

Aside from construction hydrant use, 90% of the water purchased from SPU was billed to customers in 2019. This difference between billing volume and production volume is considered to negligibly impact the accuracy of the model; however, several factors may contribute to the discrepancy:

- System leakage (6.2% of production for 2018)
- Any net storage difference over the year
- False meter reads
- Customer meters that could not be spatially associated (address was not found)
- Flushing

## Steady State Calibration

During the steady state model calibration, system field data was compared to model simulation results and Murraysmith considered how the model might be updated to reflect reality. Static and residual pressures were measured at representative hydrants throughout the water system, and boundary conditions were reported for the time of the test (e.g. tank level, pump status, supply station head). A confidence level was assigned to each hydrant location based on how closely the pressures in the model matched field pressures.

## *Static Pressure and Flow Testing*

Field testing was conducted in March 2020 at 23 hydrant locations for all pressure zones in the distribution system, except the 485 zone, which is a small zone supplied by other pressure zones. Continuous pressure monitoring was not conducted.

Each field test consists of the following. **Figure 2** illustrates the hydrant test setup.

- An initial static pressure reading is measured at the selected "pressure" hydrant. ("Pressure hydrant" refers to the hydrant that remains closed during the test.)
- Flow measurement equipment is installed on an adjacent "flow" hydrant. The small port of the hydrant is opened to measure flow. ("Flow hydrant" refers to the hydrant that is opened during the test.)
- Once pressures stabilize at the pressure hydrant and flow stabilizes at the flow hydrant, the residual pressure is measured at the pressure hydrant.
- The static pressure, flow rate, and residual pressure are recorded along with the date and time of the test, and system boundary conditions (e.g. tank level or pump status). Because Duvall does not have a working telemetry system, it was not feasible to record system boundary conditions for each test. Instead, each tank level and the downstream pressure at the Tolt 1 Supply Station was recorded before testing began (the Tolt 2 Supply Station was noted as out of service during testing). The 615 booster pump station was assumed to be off for the duration of the testing period.

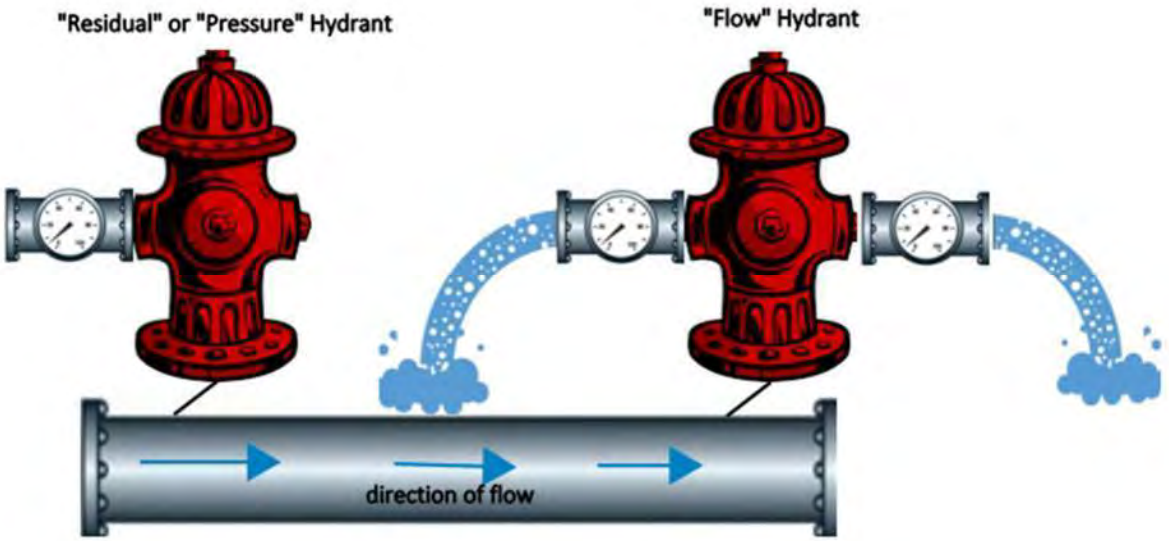



Figure 2
Hydrant Test Setup

Test locations were chosen to represent each pressure zone, favoring locations at the edge of a zone and/or on a dead end since these locations typically feel pressure changes before other

locations in the system during high flows. Representative locations at new developments or in areas with water quality issues were also tested. A map of test locations is shown in **Figure 3**.

## *Boundary Conditions and Operational Status*

In addition to flow and pressure data, system boundary conditions are required to calibrate a model. "Boundary conditions" refer to the operational status of the system during the test (e.g. tank level, whether or not a pump is on, closed valve). The head and flow from the Tolt Supply Station 1 acted as a constant boundary condition for all zones in the system. In pressure zones 330, 485, and 555, the boundary conditions were dictated by pressure reducing valve (PRV) settings which remained unchanged during flow testing. The Tolt Supply Station 2 was not operational during the tests (a boundary condition for zones 450 and 330). In zones 450 and 555, tank water level was required to establish boundary conditions. For zone 615, the booster pump boundary condition was assumed to be "off" for all tests, which matched field conditions during the tests.

Because continuous telemetry was not available for the tests, tank levels and Tolt Supply head was approximated based on the condition measured before the tests began. Lower confidence levels may be expected for the calibration tests due to this approximation.

## *Calibration*

During calibration, model attributes were adjusted according to available data and by trial and error until model results closely matched field tests. As a starting point, junction and facility elevations were reviewed against local contour data and updated where required. Pipe roughness factors were updated according to the values shown in **Table 2.**

### Table 2
### Updated Roughness Coefficients

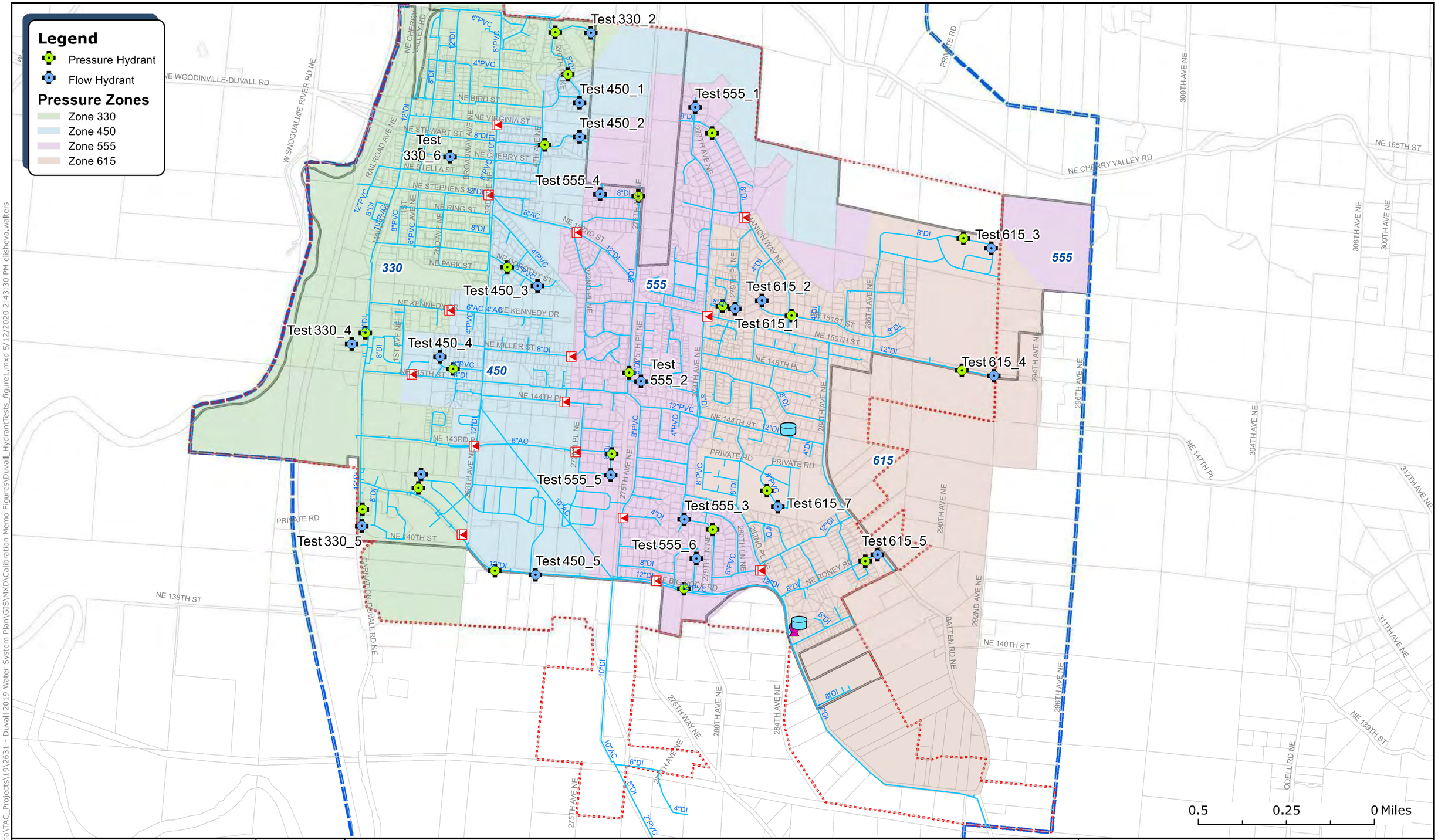
| Zone | DI Pipe | PVC/ABS Pipe | AC Pipe | Other |
|---|---|---|---|---|
| 615 | 135 | 150 | 120 | 130 |
| 555 | 130 | 140 | 120 | 130 |
| 450 | 130 | 150 | 120 | 130 |
| 330 | 130 | 140 | 120 | 130 |

Where model pressure results did not match field test data, Murraysmith worked with the City to confirm nearby water main configurations, valve settings/statuses, and elevations. The following is a list of specific assumptions or findings made during the calibration.

- A minor loss of 50 was assigned at the Big Rock 2.2 MG tank to simulate head losses at the tank. The City is actively working to track down the causes of these losses.

- Field tests showed large losses in the Old Town neighborhood. A 4-inch pipe was added to Cherry St to simulate observed pressure losses for this location.
- The model showed large static pressure discrepancies using the City's provided PRV settings at the Tolt Supply Station 1. A pressure setting of 100 psi was used for the 4" PRV and a setting of 97 psi for the 8" PRV. This discrepancy could be due to a faulty elevation for the PRVs.
- The 12" pipe downstream (east) of Cedar Crest High School was changed to 8" pipe.
- The pressure setting on the pressure sustaining valve at the fill line for the Crestview 0.5 MG tank was changed to 52.9 psi to match field static pressures in the 615 zone.

Any remaining calibration discrepancies were attributed to possible errors during field tests, such as improperly calibrated equipment, erroneous data readings, or from a test performed too quickly after the previous test without allowing time for the water system to stabilize.




murraysmith

City of Duvall
Small Town. Real Life.

# City of Duvall
# Water Master Plan

## Figure 3
## Testing Location Map

July 2020

19-2631

\\ad.msa-ep.com\Tacoma\TAC_Projects\19\2631 - Duvall 2019 Water System Plan\GIS\MXD\Calibration Memo Figures\Duvall_HydrantTests_figure1.mxd 5/12/2020 2:43:30 PM elisheva.walters

## *Confidence Level*

The overall confidence in model performance based on calibration results is summarized for each zone according to the criteria listed in **Table 3**. High confidence in model results indicates less uncertainty in any identified deficiencies and improvement analysis used in system-wide master planning as well as localized development reviews.

The confidence level of the model can also be evaluated using a regression analysis of the field pressures vs. model pressures (or, for residual pressure changes, the pressure change in the field vs. the pressure change in the model). Because a linear model can be assumed for this analysis, an R-squared value closer to 1 indicates higher model accuracy. As shown in **Figures 4 and 5,** the static model configuration for Duvall is more reliable than when the system is made to handle large amounts of flow. This lower confidence level for high-flow conditions is partially because of the limited access to real-time boundary conditions (e.g. SCADA data) for the calibration scenario.

### Table 3
### Calibration Confidence Level

| Confidence Level | Confidence Definition* |
|---|---|
| High | 0 to 5psi difference |
| Medium | 6 to 10 psi difference |
| Low | Greater than 10 psi difference |

*The pressure difference refers to the difference between field and model static pressure as well as the difference between field and model residual pressure drop.

The results of the model calibration and confidence level are summarized by zone in **Table 4** for the 2010 and 2020 calibration efforts. The calibration confidence levels for each of the 2020 tests are shown in **Figure 4, Figure 5, and Table 5**.

### Table 4
### Summary of Calibration Confidence by Zone

| Pressure Zone | Confidence (2010) | Number of Test Locations (2010) | Confidence (2020) | Number of Test Locations (2020) |
|---|---|---|---|---|
| 330 | Low | 1 | Medium | 4 |
| 450 | Medium | 2 | High | 5 |
| 485 | High | 1 | * | 0* |
| 555 | Medium | 2 | Medium | 6 |
| 615 | Low | 2 | High | 8 |

*No tests were performed in the 485 zone due to its small size.

## Table 5
## Steady State Calibration Testing Data

| Test ID | Press-ure Zone | Date & Time | Pressure Hydrant | | | Flow Hydrant | | Absolute Static Difference model-field (psi) | Static Confid-ence | Absolute Residual Drop Difference model-field (psi) | Residual Drop Confid-ence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Hydrant ID | Static Pressure (psi) | Residual Pressure (psi) | Hydrant ID | Flow Rate (gpm) | | | | |
| 330_2 | 330 | 3/4/2020 13:20 | FHYD0199 | 115 | 95 | FHYD0024 | 1163 | 0.2 | High | 2.3 | High |
| 330_4 | 330 | 3/4/2020 13:40 | FHYD0283 | 130 | 115 | FHYD0286 | 1400 | 5.3 | Medium | 9.2 | Medium |
| 330_5 | 330 | 3/4/2020 14:00 | FHYD0109 | 104 | 96 | FHYD0108 | 1365 | 3.1 | High | 1.9 | High |
| 330_6 | 330 | 3/9/2020 12:45 | FHYD0228 | 100 | 55 | FHYD0230 | 1121 | 6.9 | Medium | 1.3 | High |
| 450_1 | 450 | 3/9/2020 13:15 | FHYD0202 | 110 | 80 | FHYD0201 | 1297 | 6.5 | Medium | 2.7 | High |
| 450_2 | 450 | 3/4/2020 13:01 | FHYD0220 | 85 | 77 | FHYD0221 | 974 | 2.9 | High | 2.4 | High |
| 450_3 | 450 | 3/9/2020 11:09 | FHYD0028 | 75 | 60 | FHYD0249 | 1163 | 2.1 | High | 4.0 | High |
| 450_4 | 450 | 3/9/2020 10:50 | FHYD0267 | 90 | 85 | FHYD0011 | 1324 | 3.1 | High | 6.1 | Medium |
| 450_5 | 450 | 3/9/2020 10:30 | FHYD0067 | 105 | 75 | FHYD0068 | 1238 | 3.1 | High | 0.2 | High |
| 555_1 | 555 | 3/4/2020 11:00 | FHYD0361 | 75 | 68 | FHYD0362 | 1238 | 3.1 | High | 4.4 | High |
| 555_2 | 555 | 3/4/2020 11:24 | FHYD0044 | 65 | 62 | FHYD0153 | 1163 | 0.5 | High | 0.6 | High |
| 555_3 | 555 | 3/9/2020 10:16 | FHYD0127 | 65 | 55 | FHYD0039 | 1121 | 2.5 | High | 7.1 | Medium |
| 555_4 | 555 | 3/4/2020 12:41 | FHYD0179 | 60 | 51 | FHYD0180 | 1163 | 1.1 | High | 2.1 | High |
| 555_5 | 555 | 3/4/2020 11:43 | FHYD0293 | 85 | 70 | FHYD0294 | 1269 | 1.1 | High | 10.8 | Low |
| 555_6 | 555 | 3/9/2020 9:13 | FHYD0034 | 75 | 55 | FHYD0380 | 1121 | 1.5 | High | 8.3 | Medium |
| 615_1 | 615 | 3/9/2020 10:37 | FHYD0084 | 84 | 65 | FHYD0083 | 698 | 0.7 | High | 1.9 | High |
| 615_2 | 615 | 3/9/2020 10:18 | FHYD0352 | 80 | 60 | FHYD0353 | 604 | 3.1 | High | 1.2 | High |
| 615_3 | 615 | 3/4/2020 9:37 | FHYD0384 | 110 | 85 | FHYD0386 | 950 | 0.9 | High | 1.0 | High |
| 615_4 | 615 | 3/4/2020 9:59 | FHYD0088 | 80 | 55 | FHYD0087 | 974 | 0.3 | High | 2.3 | High |
| 615_5 | 615 | 3/4/2020 14:28 | FHYD0113 | 82 | 64 | FHYD0112 | 1163 | 0.7 | High | 2.0 | High |
| 615_7 | 615 | 3/9/2020 8:30 | FHYD0339 | 90 | 75 | FHYD0340 | 1269 | 2.2 | High | 10.0 | Low |

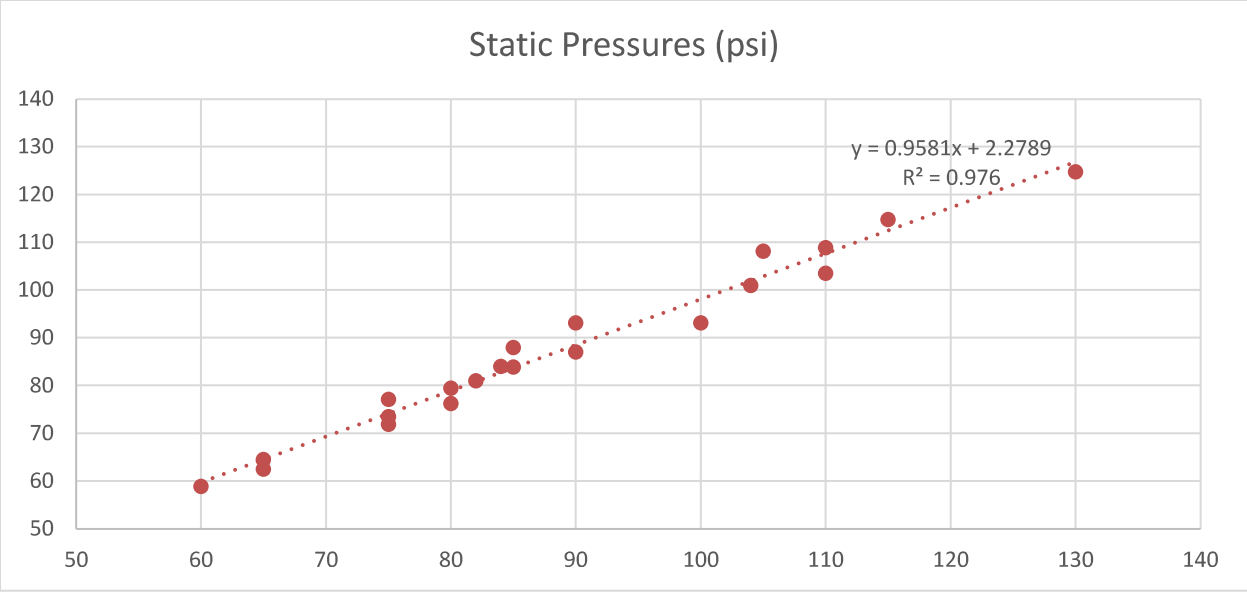



Figure 4
Regression Analysis for Static Pressures

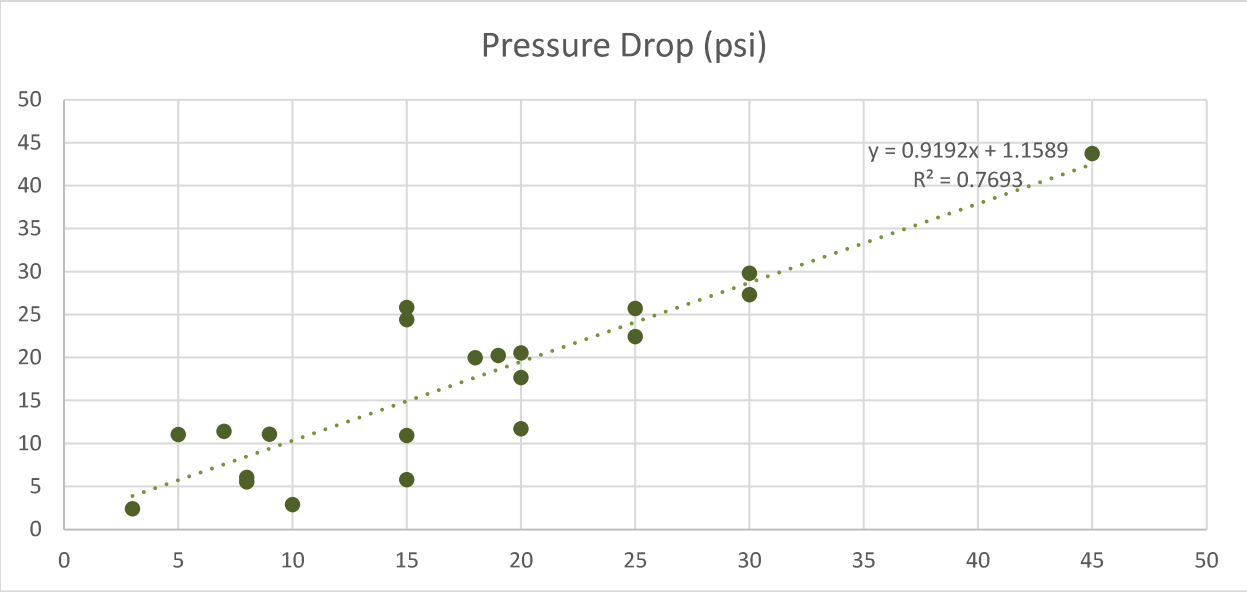



Figure 5
Regression Analysis for Residual Pressure Drop

## Conclusion

Using the available data, the model was calibrated to reasonably correspond to field pressure and flow tests. Static pressures in the model show a high correlation with static pressures taken in the field, while residual pressures show a medium correlation with residual pressures taken in the field. These results show that while the model is well calibrated using existing data, there is room for improvement once better telemetry controls are installed and active within the City's system.

For this calibration, the model boundary conditions (tank levels, Tolt head, and pump flows) were determined based on a manual measurement at the beginning of the flow test day. Once live telemetry data is available, one will have a better understanding of how flow moves through the physical system and be better able to replicate this flow in the model.

The confidence level achieved for this model make it acceptable to use for planning-level analyses on the system. Furthermore, the simplicity of the system may increase the modeler's confidence level in the model since the lack of complexity reduces variables that could introduce model error.

# Appendix O

## Determination of Non-Significance

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# STATE ENVIRONMENTAL POLICY ACT

## Determination of Non-Significance (DNS)
## 2021 Comprehensive Water System Plan

**Date of Issuance:** October 25, 2021

**Lead Agency:** City of Duvall, 15535 Main Street NE, P.O. Box 1300, Duvall, WA 98019

**Agency Contact:** Steven Leniszewski, Public Works Director, 425.939.8042, steven.leniszewski@duvallwa.gov

**Agency File Name/Number:** 2021 Comprehensive Water System Plan

**Applicant/Proponent:** City of Duvall Public Works Department, PO Box 1300, Duvall, WA 98019 c/o Steven Leniszewski, Public Works Director.

**Description of Proposal:**

The 2021 Comprehensive Water System Plan evaluates historical growth and water usage for the future (water demand); inventory; describes and analyzes the existing water system to determine if it meets minimum requirements mandated by Department of Health (DOH) standards and city polices; provides a capital improvement program that identifies water system improvements which resolve existing system deficiencies and accommodate future needs of the system for a minimum of 20 years into the future, prepares an implementation schedule of improvements and financing plan that meet the goals of the financial program; reviews and updates the water use efficiency program; documents operations and maintenance program and complies with all other water system plan requirements of DOH.

**Location of Proposal:** Non-Project Action (CIP projects will be with in water system boundary)

**Threshold Determination:** The Lead Agency has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under Revised Code of Washington (RCW) 43.21C.030(2)(c). This DNS is issued under Washington Administrative Code (WAC) 197-11-340(2). This information is available on the City's website at http://www.duvallwa.gov/DocumentCenter/Index/516

*This determination is based on the following findings and conclusions:*

Review of the Draft 2021Comprehensive Water System Plan dated October 2021, the SEPA Checklist dated August 2021, and agency comments and City responses.

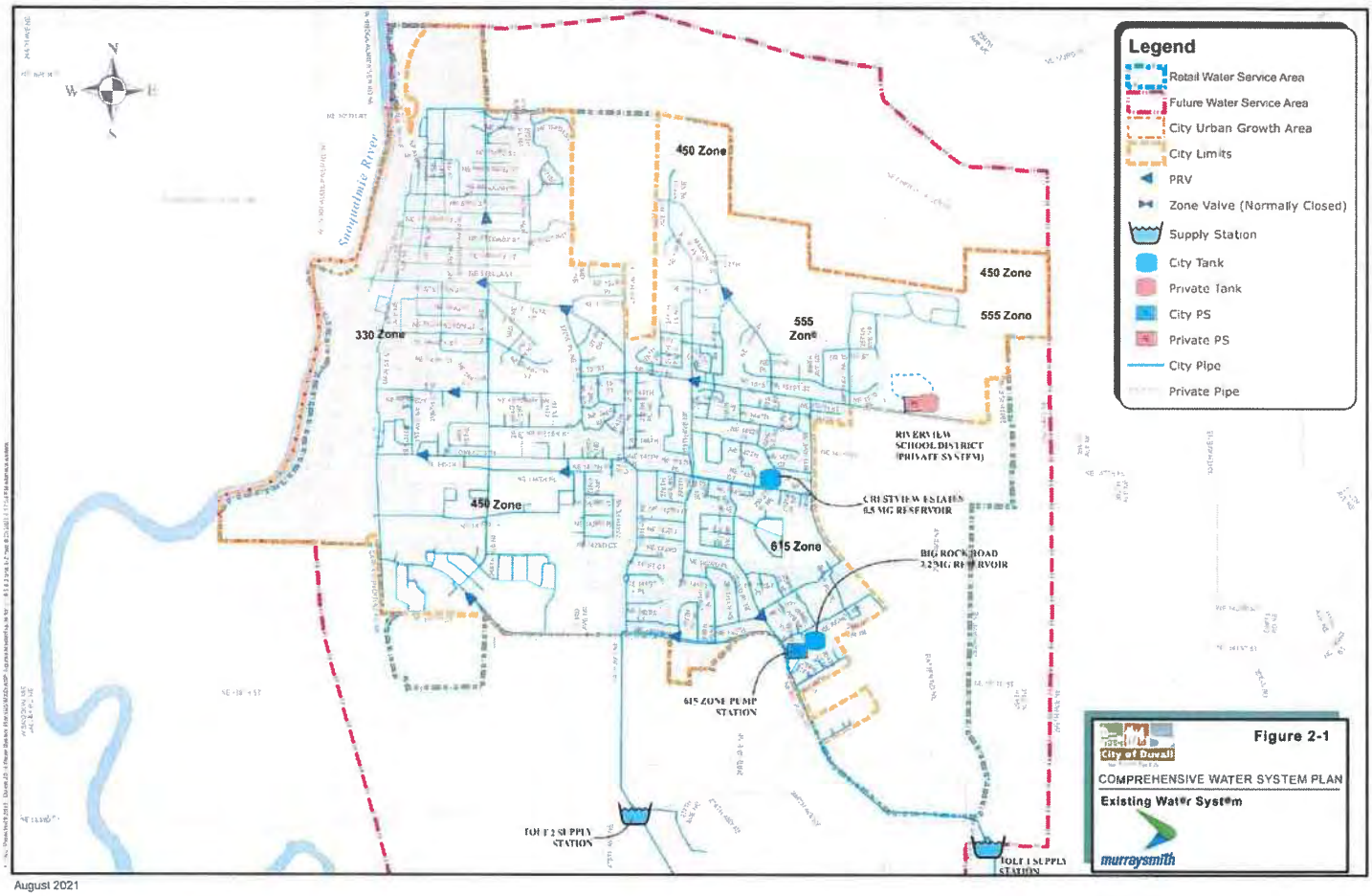
**Public Comment Period:** Submit comments regarding this DNS to the Agency Contact or SEPA Responsible Official by 4:30pm (PST/PDT) on **Monday, November 8, 2021**. The lead agency will not act on this proposal for at least 21 days from the date of issuance.

**SEPA Responsible Official:** Lara Thomas, Community Development Director, 15535 Main Street NE, PO Box 1300, Duvall, WA 98019, 425.939.8079, lara.thomas@duvallwa.gov

Signature: _____ Date: 10/25/21

**Disclaimer:** Issuance of this threshold determination does not constitute approval of any permit associated with this proposal. The proposal will be reviewed for compliance with all applicable City of Duvall codes which regulate development activities including, but not limited to, Land Use Codes, Building Codes, Public Works Development Design Standards, Surface Water Design Manual, and Sensitive Area regulations.

**Appeals:** Any agency or aggrieved person may file an appeal of this SEPA Threshold Determination in accordance with Duvall Municipal Code Section 14.08.060.C. The SEPA appeal deadline is 21 days after the threshold determination is issued.


Legend
Retail Water Service Area
Future Water Service Area
City Urban Growth Area
City Limits
PRV
Zone Valve (Normally Closed)
Supply Station
City Tank
Private Tank
City PS
Private PS
City Pipe
Private Pipe
Snoqualmie River
450 Zone
450 Zone
555 Zone
555 Zone
330 Zone
450 Zone
615 Zone
RIVERVIEW SCHOOL DISTRICT (PRIVATE SYSTEM)
615 ZONE PUMP STATION
TOLT 2 SUPPLY STATION
TOLT 1 SUPPLY STATION
Figure 2-1
COMPREHENSIVE WATER SYSTEM PLAN
Existing Water System
murraysmith

August 2021

# Appendix P

## Asset Management

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# Technical Memorandum

Date: February 17, 2021

Project: Duvall Comprehensive Water System Plan

To: Shaun Tozer
City of Duvall

From: Stephanie Ard, PE
Mari Orama, PE


Re: City of Duvall Asset Management Best Management Practices

## Introduction

Murraysmith, Inc. (Murraysmith) has prepared a technical memorandum (TM) summarizing Asset Management Best Management Practices (BMPs) for the City of Duvall (City) as part of the City's Comprehensive Water System Plan (WSP) Update. An asset management program can be an important tool for a water system to accurately plan and budget for the rehabilitations or replacement of its facilities. While the City does not currently have a formal asset management program, it performs many of the recommended asset management practices. This TM will recommend additional practices that the City can do to solidify its asset management program.

This TM provides a summary of Federal and State asset management regulations and recommendations, as well as a review of the City's current asset management practices. It then provides the City with recommended improvements to its asset management practices. These improvements can be incorporated to further assist the City in their long-term water system asset management plan.

## Federal and State Asset Management Regulations and Recommendations

Both the United States Environment Protection Agency (EPA) and Washington State Department of Health (DOH) recommend that public water systems develop and maintain an asset management program. Asset management is a planning process used by water systems to provide safe and reliable drinking water to consumers while maintaining assets at the lowest life cycle cost (EPA, 2003). Asset management involves developing plans aimed to alleviate challenges posed by increasing water demands, emergencies due to asset failures and deficiencies, and determining

optimal timeframes to repair/replace aging assets while focusing on operations and maintenance to prolong asset service life (DOH, 2019, 2020).

Washington State regulations require water systems to include an asset inventory and analysis within their WSP (*WAC 246-290-100(4)(e)(iii)).* The asset inventory and analysis serve as the basis for a system's asset management program. The asset inventory reviews the physical condition and life expectancy of each asset, encouraging the system to plan for required rehabilitation or replacement. The asset analysis reviews assets critical to meeting water demands and regulatory requirements and identifies deficiencies to be addressed in the City's Capital Improvement Plan (CIP) (DOH, 2020).

DOH provides five core questions as an asset management framework for water systems. The five core questions assist water systems in addressing the major components of an asset management plan. DOH also provides recommended BMPs to further assist water systems in assessing and managing their assets (2019). The five core questions of asset management are explained below:

1. *What is the current state of my system's assets?*

   Develop an inventory of all City-owned facilities and its condition, as well as information on each individual asset. This information may include location, useful life, value or replacement costs, and service history.

2. *What is my required "sustainable" level of service?*

   Define the City's required level of service and associated system performance goals, both short- and long-term. Required sustainable level of service is determined by the level of service customers demand and regulators require, in addition to what the City can provide.

3. *What assets are critical to sustained performance?*

   Analyze the City's assets by determining which assets are critical and which assets are required to sustain the required level of service. Critical assets have a high failure risk and will present major consequences to the City's system if the asset fails. Each asset may present a different failure risk and assets are not equally critical to the City's water system operations.

4. *What are my minimum life cycle costs?*

   Determine minimum life cycle cost options for each asset. Current conditions, operations and maintenance (O&M) efforts, and repair history of the City's assets may help manage and optimize future O&M efforts and capital budget accounts, in addition to identifying when an asset should ideally be replaced.

5. *What is my best long-term funding strategy?*

   Develop an effective long-term funding strategy to implement critical improvements and replacements of the City's assets while sustaining the required level of service. Determine the City's financial forecast by defining the economic cost of O&M within the system and generated revenue, and by identifying any external funding resources.

These EPA and DOH recommendations are used as guidelines in developing a water system's asset management plan.

## Asset Management Analysis and Recommendations

The City currently performs several asset management practices, allowing it to actively plan for the maintenance, repair, and replacement of all its major facilities. The following discussion includes a description of the City's current asset management practices, and recommendations to assist the City in its asset management program. These recommendations also consider the City's current efforts to update their WSP and conduct a RRA of the City's system.

### *Question 1 - What is the current state of my system's assets?*

#### *Current Practices:*

An important first step in any water system asset management program is an inventory of the water system assets. The City's major assets include its distribution mains, transmission mains, 15 PRV stations, two (2) storage facilities, one (1) booster pump facility, and two (2) source of supply facilities. The City currently manages an inventory of these assets using a geographical information system (GIS) database to tag each asset's type, location, and installation date.

As part of the City's WSP Update process, the City has defined expected service lives for its various assets. It assumes the expected service life for storage tanks, pump stations, and supply stations to be between 75 and 100 years, and the expected service life for watermains to be between 50 and 75 years. The City actively assesses and plans for the repair and replacement of its watermains, which they replace before the end of its expected service life. Additionally, the City assesses and plans for the maintenance, repair, and replacement of all its assets by building the cost into their annual budget.

#### *Recommended Improvements:*

As assets are replaced or new assets are installed, the City should continue to update the GIS data to maintain an accurate inventory. It is recommended that this information should be reviewed and updated by City staff at least annually to ensure that it continues to reflect current costs and facility conditions. It is also recommended that this information is used in the development of its capital improvement plan and annual budget.

In addition, the City should consider adding the following data fields to its GIS inventory. These fields would assist the City in tracking the conditions of its facilities:

- Condition assessment and rating – It is recommended that City staff develop a simplified condition assessment and rating system for staff to complete during their regularly scheduled maintenance. It is recommended that this rating be included in GIS. It may also be helpful to provide a link to the network folder storing O&M recorders, observations, and assessment data to GIS.

- Estimated useful life of the assets – City staff should determine the remaining service life of their water system assets based on historical repair and replacement records for the water system assets. Although industry standards recommend general design life for water facilities and water mains, developing remaining useful life estimates based on O&M and staff observations will be more accurate.

- Estimated replacement year – Using the estimated useful life, estimate the replacement year of each asset. Stating the estimated replacement year should help the City budget for the eventual replacement of each asset.

## *Question 2 - What is my required "sustainable" level of service?*

### *Current Practices:*

The City strives to continue to provide its customers with safe and reliable drinking water and a high level of service. It ensures that its system meets or exceeds all State and Federal requirements. To this end, the City has adopted levels of service for the water system as described in Chapter 5 of the WSP. These levels of service describe minimum and maximum water service pressures at customer nodes, fire suppression service levels provided at hydrants, and emergency storage held in its tanks. Chapter 6 of the WSP also details all water quality testing and procedures that the City uses to ensure that it continues to provide good quality water to all customers.

### *Recommended Improvements:*

The City should continue to update its level of service standards as its system and regulatory requirements/recommendations change. The City may also want to determine level of service standards for emergency operations in addition to the established, normal operations level of service goals.

## *Question 3 - What assets are critical to sustained performance?*

### *Current Practices:*

The City is completing a Risk and Resilience Assessment (RRA) for their water system, in which the City will perform a vulnerability assessment. The City will identify the critical assets for the system.

The analysis will also calculate the probability and consequence of failure and the replacement costs for all critical assets.

### *Recommended Improvements:*

As part of the RRA process, the City will identify critical assets and assign a criticality number to their assets. It is recommended that the City include these criticality numbers within the asset inventory in GIS. As changes are made to the system, it is recommended that the City review and update these criticality ratings to ensure that they reflect the current system. It is also recommended that the City regularly update is vulnerability assessment.

## *Question 4 - What are my minimum life cycle costs?*

### *Current Practices:*

The City has developed a preventative maintenance schedule for system components, including watermains, PRVs, hydrants, and the telemetry and control system when operational, that meet or exceed manufacturer's recommendations for maintenance. These practices prolong useful life of assets and prevent unscheduled repair costs that is often more expensive than scheduled maintenance. The City also has a software (work order) program to aid in estimating life cycle costs and long-range planning.

### *Recommended Improvements:*

The City should track the operations, maintenance, rehabilitation, and repair costs for each water system asset so costs for each asset can be determined. By tracking these costs for each asset, improvements that lead to more cost-effective operations and management can be identified and implemented.

## *Question 5 - What is my best long-term funding strategy?*

### *Current Practices:*

As part of the City's WSP Update, the City, with the help of FCS Group, reviews its long-term funding strategies for its capital improvement programs. Currently the City funds projects through accumulated capital cash reserves, annual revenue collections from General Facilities Charges, annual transfers of rate-funded capital or excess cash (above minimum balance targets) from operating accounts, interest earnings on capital fund balances and other miscellaneous capital resources, and revenue bond financing. As part of the current WSP update, the City is reviewing and updating its long-term funding strategy.

### *Recommended Improvements:*

The City should identify which funding program(s) will finance facility repair and/or replacement projects of the facility. It is recommended that the City develop a funding program to finance and

manage asset remaining life-cycle costs. Separate funding programs should also be established for the costs of rehabilitation and repair, as well as the eventual replacement of the City's storage, pump station, and supply facilities and watermains. It is also advised that the City explore external grant and public funding options that are feasible for the City and their long-term financial needs.

## Conclusion and Recommendations

The City currently performs many activities that are good asset management practices. The City has a detailed inventory of its water system assets, which is a fundamental step in any asset management program. Additionally, the City has a regular maintenance program that keeps infrastructure in good working order and has adequate funding sources for its historical needs. The City should continue to leverage its GIS to integrate and track additional asset management practices described in this technical memorandum. It is recommended that the City consider adding the following items to its GIS database and reviewing and updating its GIS database at least annually:

- Condition assessment and rating of each asset
- Estimated useful life of each asset
- Estimated replacement year of each asset
- Criticality rating for each asset, determined as part of the RRA.

In addition to these GIS recommendations, the City should consider the following recommendations:

- Develop level of service standards for emergency operations.
- Track the operations, maintenance, rehabilitation, and repair costs for each water system asset so costs for each asset can be determined.
- Develop a funding program to finance and manage asset remaining life-cycle costs. Separate funding programs should also be established for the costs of rehabilitation and repair, as well as the eventual replacement of the City's storage, pump station, and supply facilities and watermains.

These recommended adjustments to the City's asset management practices would improve the City's ability to maintain its assets at reduced life cycle cost as well as alleviate challenges posed by increasing water demands, emergencies due to asset failures and deficiencies, and determining optimal timeframes to repair/replace aging assets while focusing on operations and maintenance to prolong asset service life .

## References

Department of Health (DOH). (2019). *Asset Management for Small Water Systems* [Fact Sheet]. Retrieved from https://www.doh.wa.gov/portals/1/Documents/pubs/331-445.pdf

Department of Health (DOH). (2020). *Washington System Planning Guidebook: Planning and Financial Viability*. Retrieved from https://www.doh.wa.gov/Portals/1/Documents/Pubs/331-068.pdf

U.S. Environmental Protection Agency. (2003). *Asset Management: A Handbook for Small Water Systems.* Retrieved from https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U7T2.txt

Washington Administrative Code (WAC) 246-290-100(4)(e)(iii).

## Attachments

Attachment 1 – DOH Fact Sheet: Asset Management for Small Water Systems

## **Appendix Q** Water Ordinances

To be inserted after November 2021 Council Meeting

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# CITY OF DUVALL
## WASHINGTON

**ORDINANCE NO. 1288**

**AN ORDINANCE OF THE CITY OF DUVALL, WASHINGTON, AMENDING THE DUVALL MUNICIPAL CODE SECTION 9.02.090 ADOPTING THE 2021 COMPREHENSIVE WATER SYSTEM PLAN FOR THE CITY OF DUVALL.**

WHEREAS, the City of Duvall, in 2019, retained consulting engineers to prepare an update to the Comprehensive Water System Plan; and

WHEREAS, the City of Duvall has thoroughly evaluated the water, system growth, water usage, water supply, and other aspects of the Comprehensive Water System Plan; and

WHEREAS, the City Council conducted public hearings on October 19, 2021 and on November 2, 2021 on adoption of the Comprehensive Water System Plan;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF DUVALL, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. 9.02.090 Adoption of the Plan. Section 9.02.090 of the Duvall Municipal Code is hereby amended to read as follows:

The city of Duvall adopts by reference the Comprehensive Water System Plan prepared by Murraysmith, Inc., dated October 2021 and on file with the City Clerk.

Section 2. Severability. Should any section, paragraph, sentence, clause or phrase of this Resolution, or its application to any person or circumstance, be declared unconstitutional or otherwise invalid for any reason, or should any portion of this Resolution be pre-empted by state or federal law or regulation, such decision or pre-emption shall not affect the validity of the remaining portions of this Resolution or its application to other persons or circumstances.

Section 3. Effective Date. This Ordinance shall be published in the official newspaper of the City and shall take effect and be in full force five (5) days after the date of publication.

**ADOPTED** BY THE CITY COUNCIL AT A REGULAR MEETING THEREOF ON THE 18th DAY OF NOVEMBER 2021.

CITY OF DUVALL

Amy Ockerlander
Mayor Amy Ockerlander

Approved as to form:

ATTEST/AUTHENTICATED:

Daniel Kenny, City Attorney

Stephanie Goodwin
Stephanie Goodwin, Accounting Associate

# Appendix R

## Agency Review Comments

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|---|---|---|---|---|---|---|---|
| Document Title: | | | **Duvall 2019 Water System Plan - Agency Review Draft** | | | | |
| Reviewer: | | | Department of Health, Seattle Public Utilities, and King County | | | Responder: | Murraysmith and City of Duvall |
| Comments submitted to: | | | Steven Leniszewski, City of Duvall | | | Task # | |
| **Reviewer** | **Item No.** | **Section No.** | **Paragraph No.** | **Dwg/Fig No.** | **Reviewer's Comments** | **Response Code** | **Designer's Response** |
| Richard Rodriguez, DOH | 1 | n/a | Description of Water System | n/a | King County Utilities Technical Review Committee will review your WSP. Please respond to their issues. Adequate responses to their issues will be necessary in order to receive a WSP Adoption Ordinance from King County. | 4 | Yes, we will adequately respond to all King County review comments. |
| Richard Rodriguez, DOH | 2 | whole document | Description of Water System | All full page figures | Some key figures are missing from the document. Figure 2-1, Water Service Area and Figure 2-2, Existing Hydraulic Profile, for example, Please include all figures in the final copy. With the dissolution of pressure zone 485, is a future hydraulic profile warranted? | 1 | Our apologies. The figures were not appropriately attached. That has been corrected and the document now includes all figures. A future hydraulic profile is provided in Chapter 9 (Figure 9-2). |
| Richard Rodriguez, DOH | 3 | 6.5.2 | Water Quality | n/a | Regarding Table 6-3 City of Duvall Water Quality Requirements and section 6.5.2 Residual Disinfectant Monitoring, include the City's responsibility to monitor the distribution system chlorine residual at least once every calendar day. Daily residual monitoring includes the chlorine residual measured at the same time and place as routine coliform samples. | 1 | Table 6-3 and Section 6.5.2 have been updated to clearly stated that the City monitors the distribution system chlorine residual at least once per day. |
| Richard Rodriguez, DOH | 4 | App L | Water Quality | n/a | Please provide standard operating procedures for coliform routine and repeat sampling in the appendix with the Water Quality Monitoring Plan. Consider using the E. coli response plan checklists found in DOH publication 331-036 to supplement the water quality monitoring plan. | 1 | The City's current standard operating procedures for coliform routine and repeat sampling have been added to Appendix L along with the E. Coli Response Plan Checklist from DOH publication 331-036. |
| Richard Rodriguez, DOH | 5 | n/a | Operations & Maintenance | n/a | Have you adopted the Water Main Break Protocol for Chlorinated Systems? (DOH Publication 331-583 - 1/1/2017) | 4 | Yes, the City currently follows all procedures listed in the Water Main Break Protocol for Chlorinated Systems. |
| Richard Rodriguez, DOH | 6 | 7.5.1 | Operations & Maintenance | n/a | Section 7.5.1 Water Service Reliability. Include the City's emergency power capabilities and goals? | 1 | Section 7.5.1 has been updated to include information regarding emergency power. The city provides a backup generator for PS, battery backup for controls, 0.5 MG tank's control valves operate with out power, Tolt stations and larger tank are battery operated, the engineering building SCADA server host has backup power, and a gravity-based system telemetry upgrades planned in Dec 2021. |
| Richard Rodriguez, DOH | 7 | 5.4.1 | Distribution Facilities Design and Construction Standards | n/a | Please consider including the reference to AWWA C651-14 Disinfecting Water Mains in your policy or construction standards section. | 1 | A reference to AWWA C651-14 has been added to Section 5.4.1.5(2) of the Water System Plan. |
| Richard Rodriguez, DOH | 8 | App H | Distribution Facilities Design and Construction Standards | n/a | Construction standards include a standard drawing for a double detector check valve. Are there any other backflow preventer types in the system or potential for addition of other types in the system? If so, please include in the construction standard set. | 1 | In August 2021 the City updated the design standards to include other backflow preventers. These standards have been added to Appendix H. |
| Richard Rodriguez, DOH | 9 | App H | Distribution Facilities Design and Construction Standards | n/a | What are the construction standards for bedding and depth to bury new water main? What about separation between water and sewer lines? (reference Ecology's Criteria for Sewage Works) | 4 | The City's sewer standard 5-01 007 shows the pipe bedding, trench section, and asphalt section standards for the City's utilities. It can be found at https://www.duvallwa.gov/DocumentCenter/View/313/Development-Design-Standards-Details?bidId= |

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| Richard Rodriguez, DOH | 10 | App S | Other Documentation | n/a | The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the WSP, prior to DOH approval of the WSP. | 1 | Documentation of the consumer meeting has been added to Appendix S. |
| Richard Rodriguez, DOH | 11 | App S | Other Documentation | n/a | Prior to DOH approval, the City's governing body must approve and adopt the WSP. | 1 | Approval of the document by City Council has been added to Appendix S. |
| Richard Rodriguez, DOH | 12 | App R | Other Documentation | n/a | Please provide copies of any comments made by adjacent purveyors or other interested parties, along with the City's response to those comments. Has Seattle Public Utilities had the opportunity to review your WSP? | 1 | All agency review comments as well as City responses have been added to Appendix R. In addition to DOH, SPU, King County, and Water District No. 119 were invited to review the WSP. |
| Richard Rodriguez, DOH | 13 | App F & App O | Other Documentation | n/a | Provide a signed SEPA Checklist and a SEPA threshold determination with the final WSP submittal. | 1 | The SEPA checklist and a SEPA threshold determination have been added to Appendix F and Appendix O, respectively. |
| Richard Rodriguez, DOH | 14 | Front Page | Other Documentation | n/a | Please have your engineers sign and date the PE stamp page for the final copy submitted to the Department. | 1 | The final WSP has been signed and dated. |
| Richard Rodriguez, DOH | 15 | n/a | Other Documentation | n/a | Is the (water system) a member of WARN? | 4 | Yes, the water system is a member of WARN. |
| Kelly O'Rourke, SPU | 1.a | 2.4.2 | Seattle Water Supply Contract | n/a | The description is technically accurate, however an acknowledgment of the current process of updating the wholesale water supply contracts by SPU and the wholesale customers would provide a fuller description. | 1 | We have added a summary of the current process to update the wholesale water supply contract to Section 2.4.2. |
| Kelly O'Rourke, SPU | 1.b | 6.3 | Water Rights and Supply Overview | | Table 6-2 Intertie Agreements characterizes SPU's two supply connections as "not restricted", which is accurate. As you know, Exhibit II of the supply agreement does specify maximum flow rates up to which the minimum hydraulic gradient is guaranteed. However, those are not currently in effect because the SPU Transmission System operates well below capacity. | 4 | We understand that while the two supply lines are not restricted, there is a maximum flow rate that is guaranteed by the minimum hydraulic gradient. |
| Kelly O'Rourke, SPU | 1.c | 6.9 | Summary | n/a | The text characterizes the water supply contract withy SPU as an "unlimited wholesale agreement". SPU uses the term "Full Water Requirements contract". | 1 | The document has been updated to use the term "Full Water Requirement contract." |
| Kelly O'Rourke, SPU | 2.a | 4.5.1 | Projected Demands | | The demand forecast shows a higher demand than SPU had projected for Duvall in our most recent demand forecast developed in 2017 and documented in SPU's 2019 Water System Plan. For example, in Table 4-8 Future Retail Water Demand Projections, Duvall is projecting an annual demand (with conservation) in 2040 of 283,742,000 gallons, where as SPU's demand forecast for Duvall in 2040 is 200,800,000 gallons.<br>The existence of a difference between demand forecasts developed by different utilities is not necessarily unexpected. This is because there are a variety of methodologies and data sources for demand forecasting and forecasting has inherent judgement calls and uncertainties.<br>The resulting differences in the two demand forecasts is not a concern for SPU because we have a wide cushion between our firm yield and the total demand we are forecasting from Seattle and all our wholesale water customers. That cushion can accommodate the demand Duvall is projecting, especially since Duvall's demand is a small portion of the total demand on SPU's regional water system. | 4 | We appreciate the review of Duvall's 2040 water demand. We understand that while the total demand shown is higher than what SPU showed in its 2017 forecast, SPU has no concerns about accommodating this increase. |
| Kelly O'Rourke, SPU | 3.a | 2.6.3 | Water Treatment | | The summary of treatment provided by SPU's Tolt Treatment Facility does not mention that corrosion control is also provided. It would be useful to include text describing this important treatment process, which helps make the water less corrosive to piping and plumbing materials, in this section and any other relevant sections. | 1 | Information regarding SPU's corrosion control program has been added to Section 2.6.3 . |

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| Kelly O'Rourke, SPU | 3.b | 6.5 | Water Quality Monitoring | | In paragraph 2, the description of SPU's role is outdated. Each of SPU's wholesale customers are required to take the full number of coliform samples outlined in WAC 246 290 300. The reduced monitoring previously allowed under the regional plan is no longer applicable. In paragraph 3, in the last sentence the reference to Table 6-1 should be Table 6-3. | 1 | Paragraph 2 has been updated to show that the City is responsible for the full number of coliform samples as outlined in the WAC. The reference to table 6-1 has also been updated to Table 6-3. |
| Kelly O'Rourke, SPU | 3.c.i | 6.5.1 | Coliform Monitoring | | The description of SPU's role is outdated. Each of SPU's wholesale customers are required to take the full number of coliform samples outlined in WAC 246 290 300. The reduced monitoring previously allowed under the regional plan is no longer applicable. This also applies to the related content in Table 6-3 City of Duvall Water Quality Monitoring Requirements and Appendix L Water Quality Monitoring Plan. | 1 | Table 6-3 has been updated to show that the full number of coliform samples are taken as outlined in the WAC. |
| Kelly O'Rourke, SPU | 3.c.ii | 6.5.1 | Coliform Monitoring | Table 6-3 | For this row in Table 6-3 City of Duvall Water Quality Monitoring Requirements and in Table 5 Water Quality Monitoring Requirements in Appendix L Water Quality Monitoring Plan, "WAC" is misspelled as "WAX". | 1 | "WAX" as been corrected to "WAC." |
| Kelly O'Rourke, SPU | 3.c.iii | App L | Coliform Monitoring | Table 6-3 | Although responsibility for repeat sampling (if a routine sample comes back positive) is mentioned in Appendix L Water Quality Monitoring Plan, the text and referenced table (Table 6 Coliform Monitoring Sample Locations) do not appear to be complete. It would be useful to update that info or include Duvall's Total Coliform Monitoring Plan in an appendix to the WSP. | 1 | Table 6 in the Water Quality Monitoring Plan has been updated to include the two missing sample site addresses (DU-9 address is 14525 Main Street NE and DU-10 28330 Big Rock Road). |
| Kelly O'Rourke, SPU | 3.d | 6.5.2 | Residual Disinfectant Monitoring | Table 6-3 | The description of the SPU's role is outdated. Per the WAC updates implemented in 2017, Duvall should be monitoring chlorine residual in the distribution system daily (using either data from a grab sample or an online analyzer) and reporting daily residual data to DOH monthly. This also applies to the related content in Table 6-3 City of Duvall Water Quality Monitoring Requirements and Appendix L Water Quality Monitoring Plan. | 1 | The City has been and will continue to monitor chlorine residual daily and report the data to DOH monthly. Section 6.5.2 and Table 6-3 have been updated to reflect this information. |
| Kelly O'Rourke, SPU | 3.e | 6.5.3 | Disinfection Byproducts Monitoring | Table 6-3 | The text related to SPU's role is accurate. However, the disinfection byproducts information in Table 6-3 City of Duvall Water Quality Monitoring Requirements in the "SPU Responsibilities" column is outdated and does not match the text. Similarly, the disinfection byproducts information in Appendix L Water Quality Monitoring Plan (Section 4.1 Monitoring Requirements and Procedures text and Table 5 Water Quality Monitoring Requirements) are outdated and do not match the text in Section 6.5.3. | 1 | Table 6-3 has been updated to match the Section 6.5.3 text. |
| Kelly O'Rourke, SPU | 3.f | 6.5.4 | Lead and Copper Monitoring | Table 6-3 | The text related to SPU's role is accurate. However, the lead and copper information in Table 6-3 City of Duvall Water Quality Monitoring Requirements in the "Schedule" column is outdated and does not match the text. Similarly, the lead and copper information in Appendix L Water Quality Monitoring Plan (Section 4.1 Monitoring Requirements and Procedures text and Table 5 Water Quality Monitoring Requirements) are outdated and do not match the text in Section 6.5.4. | 1 | Table 6-3 has been updated to match the Section 6.5.4 text. |
| Kelly O'Rourke, SPU | 4.a | App G | Water Use Efficiency (WUE) Program | WUE Table 2 | References to the Saving Water Partnership (SWP) regional water conservation that SPU administers on behalf of itself and its participating wholesale water customers, including Duvall, are generally accurate. There is one awkward aspect in that Table 2 Summary of Water Use Efficiency Program Measures appears to be structured around an outdated DOH document, that table appears to be utilized to show conservation compliance, and yet a few of the descriptions of the SWP programs are not fully accurate. The outdated document is the Conservation Planning Requirements, which has been replaced by DOH's Water Use Efficiency Guidebook, which the section does mention. Following are the measures where the description of the SWP program is not fully accurate: | 4 | The measure descriptions were updated as described below: |
| Kelly O'Rourke, SPU | 4.a.i | App G | Program Promotion | n/a | While the SWP program does provide program promotion materials to Duvall staff for them to use in their service area, radio and television public service announcements are not provided. | 1 | Radio and public service announcements were removed from the description. |
| Kelly O'Rourke, SPU | 4.a.ii | App G | Technical Studies | n/a | The SWP does not generally conduct technical studies. Note the description states this is required for large-sized systems. | 1 | The technical studies row was removed from the table. |

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| Kelly O'Rourke, SPU | 4.a.iii | App G | Single Family/Multifamily Kits | n/a | The description says Duvall has access to kits for all water customers. While the SWP does have some ancillary materials to provide to residential customers, it does not have the quantity to supply all wholesale customers with sufficient quantity for all their customers. Note the description states this is required for medium-sized systems. | 1 | The text has been updated to state that the kits are available to customers, instead of "all" customers. |
| Kelly O'Rourke, SPU | 5.a | 4.2.5 | Average Day Demand | Table 4-5 | It is unclear whether the "Metered Retail Supply" in Table 4-5 Average Annual System Demand is intended to represent the amount of water SPU sold Duvall or the amount of water Duvall retails to its customers. The title of the column implies retail sales, however the text introducing -5 summarizes the total amount of water supplied to the City's system.....". And earlier text in that section distinguish between "water supply" as the amount of water purchased from SPU and "water consumption" as the amount used by customers and states that demand is based on water supply, rather than water consumption. Per the table below, the numbers in the column appear to be SPU sales to only years where the differences are meaningful. | 4 | As stated in note 1 under the table, "Metered Retail Supply" is the supply from SPU minus the water sold to non-retail customers. Non-retail customers is defined in Section 4.2.1 as the "five SFR connections that are within Water District (WD) 119's service area as well as water sold at hydrants." |
| Kelly O'Rourke, SPU | 5.b | 6.2.1 | SPU Source Description | Figure 6-1 | Figure 6-1 SPU's Regional Water Supply System is outdated. There is a reference on that figure to 2006. Below is a screen shot of the similar figure from our 2019 water system plan, which was created in 2017. Please let us know if you would like a high resolution version of the map. | 1 | Figure 6-1 has been updated to the map from SPU's 2019 Water System Plan. |
| Jae Hill, King County | 1 | n/a | General | n/a | With such a large document, it would be helpful to have the table of contents be live linked or for there to be more consistent navigation options within the PDF. | 1 | We will include these changes in the final version of the document. |
| Jae Hill, King County | 2 | | Water System Description | Figure 2-1 | No Future Water Service Area is depicted, though it is described in the legend. | 1 | Our apologies. The figures were not appropriately attached. That has been corrected and the Service Areas are shown in Figures 2-1 and 2-3 |
| Jae Hill, King County | 3 | 2.4 | Water Agreements and Contracts | n/a | In October 2020, Stephanie Ard of Murraysmith had a meeting with Jae Hill of the UTRC to talk about boundary revisions for the City's future service area. No revisions are depicted, but are any proposed? On Page 2-2 the plan states: "At this time the City wishes to keep its Retail Service Area intact and requires service connections as they become timely and reasonable with future expansion of the Retail Water Service Area." | 4 | There are no substantive changes to the City's identified Future Service area. I am happy to explain our thought process on these service area types. |
| Jae Hill, King County | 4 | 3.3 | Land Use | n/a | In Section 3.3 (Land Use) there's no discussion about the County's current zoning outside of city limits, the potential annexation areas, and timelines for annexation of the PAAs and how that could affect growth projections. | 4 | We are happy to discuss this further during the meeting. At this time there is no interest from the City in annexing in properties currently located in the County for residential purposes. The plan identified a small number of additional population gained through annexation. The effect of such a limited population is not of concern to the utility system. |
| Jae Hill, King County | 5 | 9.1 | Water System Improvements | n/a | Also, in Section 9-1, there are no system expansions identified for the PAAs, despite them having urban levels of service and density. | 4 | System expansion occurring as a result of approved development action, is the responsibility of the developer. At this time there is no interest from the City in annexing in properties currently located in the County for residential purposes. Project L-2 does have an ancillary benefit of accommodating growth in the City's identified UGA, and UGAR. |
| Jae Hill, King County | 6 | n/a | General | n/a | The Plan references only the PSRC goal of planning for climate change; this plan does not appear to contemplate increased usage through a warmer climate, or decreased supply from SPU Tolt Pipeline. | 4 | The City has demonstrated a history of reducing per capita consumption year over year through leak detection & conservation efforts along with higher efficiency fixtures. The City will continue to adapt to changing conditions and adopt mitigation measures as appropriate. |

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| Jae Hill, King County | 7 | 2.6.9 & 2.8.1 | Water System Description | n/a | Per 2.6.9 and 2.8.1, there is a potential for intertie with 119, but neither district reportedly has interest. Couldn't this be an effective climate and resiliency issue? | 4 | As both utilities draw service from SPU's Tolt pipeline, and do not have independent source of water; an intertie would not have a significant beneficial effect. |
| Jae Hill, King County | 8 | n/a | Water Use Efficiency (WUE) Program | n/a | The Plan only identifies two potential reclaimed users and uses, and identifies the municipal uses as a likely candidate. Are there other uses, even those further away (like the high school, etc.) which could drive a buildout of a "purple-pipe" system? | 4 | Some of the City's larger users have reduced consumption recently with changes to their sites and systems. Given the cost prohibitive nature of construction of a system for reclaimed water the City has traditionally made an assumption that potential sites would need to be located in close proximity to the source (WWTP). With recent development on nearby vacant parcels those potential sites for a large-volume reclaimed user have been further reduced. The City will continue to seek to identify a potential use and appropriate site for reclaimed water in the future. |
| Jae Hill, King County | 9 | App G | Water Use Efficiency (WUE) Program | n/a | King County requires a recycled water opportunities checklist for large purveyors, which can be found at: Microsoft Word - FINAL_12_2011_WaterReclamationChecklist.doc (kingcounty.gov) | 1 | Thank you. The checklist is included in Appendix G of the final plan. |

RESPONSE CODES

1. = Will Comply, Incorporation planned, 2. = Clarification Required. 3. = N/A 4. = No action required. 5. = Input required by others.

State of Washington
DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER REGIONAL OPERATIONS
20425 72nd Avenue South, Suite 310 • Kent Washington 98032-2388

July 27, 2021

STEVE LENISZEWSKI
PUBLIC WORKS DIRECTOR
DUVALL CITY OF
PO BOX 1300
DUVALL WA 98017

RE: Duvall, City of (ID# 20750)
King County
Water System Plan
Submittal # 21-0505

Dear Mr. Leniszewski:

Thank you for submitting the Water System Plan (WSP) for the City of Duvall (the City), received in this office on May 18, 2021. We have reviewed the plan and offer the following comments. These comments must be adequately addressed prior to approval of the WSP.

**Description of Water System**

1. King County Utilities Technical Review Committee will review your WSP. Please respond to their issues. Adequate responses to their issues will be necessary in order to receive a WSP Adoption Ordinance from King County.
2. Some key figures are missing from the document. Figure 2-1, Water Service Area and Figure 2-2, Existing Hydraulic Profile, for example. Please include all figures in the final copy. With the dissolution of pressure zone 485, is a future hydraulic profile warranted?

**Basic Planning Data**

No comments.

**System Analysis**

No comments.

**Water Use Efficiency / Water Rights**

No comments.

**Source Protection**

No comments.

**Water Quality**

3. Regarding Table 6-3 City of Duvall Water Quality Requirements and section 6.5.2 Residual Disinfectant Monitoring, include the City's responsibility to monitor the distribution system chlorine residual at least once every calendar day. Daily residual monitoring includes the chlorine residual measured at the same time and place as routine coliform samples.
4. Please provide standard operating procedures for coliform routine and repeat sampling in the appendix with the Water Quality Monitoring Plan. Consider using the *E. coli* response plan checklists found in DOH publication 331-036 to supplement the water quality monitoring plan.

**Operations & Maintenance**

5. Have you adopted the Water Main Break Protocol for Chlorinated Systems? (DOH Publication 331-583 – 1/1/2017)
6. Section 7.5.1 Water Service Reliability. Include the City's emergency power capabilities and goals?

**Distribution Facilities Design and Construction Standards**

7. Please consider including the reference to AWWA C651-14 Disinfecting Water Mains in your policy or construction standards section.
8. Construction standards include a standard drawing for a double detector check valve. Are there any other backflow preventer types in the system or potential for addition of other types in the system? If so, please include in the construction standard set.
9. What are the construction standards for bedding and depth to bury new water main? What about separation between water and sewer lines? (reference Ecology's Criteria for Sewage Works)

**Improvement Plan**

No comments

**Financial Planning**

No comments.

**Other Documentation**

10. The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the WSP, prior to DOH approval of the WSP.
11. Prior to DOH approval, the City's governing body must approve and adopt the WSP.
12. Please provide copies of any comments made by adjacent purveyors or other interested parties, along with the City's response to those comments. Has Seattle Public Utilities had the opportunity to review your WSP?

13. Provide A signed SEPA Checklist and a SEPA threshold determination with the final WSP submittal.
14. Please have your engineers sign and date the PE stamp page for the final copy submitted to the Department.
15. Is the (water system) a member of WARN?

**Closing**

We hope that you have found these comments to be clear, constructive and helpful in the development of your final draft WSP. We ask that you submit the revised WSP on or before **October 27, 2021.** In order to expedite the review of your revised submittal, please include a cover letter summarizing how each of the above comments was addressed in the revised WSP and where each response is located (i.e., page numbers, Appendices, etc.)

Regulations establishing a schedule of fees for review of planning, engineering, and construction documents have been adopted (WAC 246-290-990). The total cost is **$3,705.00**. An itemized invoice for the review of this project has been sent to the primary contact on file for your water system. Please note that this fee covers our current review and one more submittal for this project. If additional submittals are required, then an invoice for additional fees will be included with our final approval letter. Please remit complete payment in the form of a check or money order within thirty days of the date of this letter in the enclosed envelope or mail payment to: WSDOH, Revenue Section, PO Box 1099, Olympia WA 98507-1099.

Thank you again for submitting your revised Water System Plan for our review. If you have any comments or questions concerning our review, please contact me at (253) 395-6771.

Sincerely,

Richard Rodriguez
Regional Planner

Enclosure (invoice)

cc: Jae Hill, King County UTRC
Seattle/King County Health
Ria Berns, WSDOE – NWRO
Mike Fisher, Public Works Superintendent, City of Duvall

ecc: Brietta Carter, PE, Regional Engineer, DOH

Seattle Public Utilities

September 21, 2021

Steven Leniszewski
Public Works Director
City of Duvall
PO Box 1300
Duvall, WA 98019
(emailed steven.leniszewski@duvallwa.gov)

Re: Review of City of Duvall Comprehensive Water System Plan

Dear Mr. Leniszewki,

Thank you for the opportunity for Seattle Public Utilities (SPU) to review Duvall's agency review version of your Comprehensive Water System Plan. Our comments are provided below.

The nature of our review was limited to content related to SPU contracts, infrastructure, and programs. This translates to the following topics in your water system plan: wholesale water supply contract, SPU supply stations, demand forecast, water quality, and water conservation. SPU's comments reflect reviews of your water system plan by the following SPU staff: Kathy Curry, Terri Gregg, Eugene Mantchev, Elizabeth Garcia, Paige Igoe, and myself.

SPU's comments fall into two categories: 1) true corrections, and 2) suggestions for clarification or nuance. The comments below that are in the true corrections category are generally related to water quality.

As you know, our review was delayed by staffing issues on our end. We apologize for the delay and understand it may affect your ability to incorporate our comments into the final version of your plan.

1. **Wholesale Water Supply Contract**
   a. **Section 2.4.2 Seattle Water Supply Contract:** The description is technically accurate, however an acknowledgment of the current process of updating the wholesale water supply contracts by SPU and the wholesale customers would provide a fuller description.
   b. **Section 6.3 Water Rights and Supply Overview:** *Table 6-2 Intertie Agreements* characterizes SPU's two supply connections as "not restricted", which is accurate. As you know, Exhibit II of the supply agreement does specify maximum flow rates up to which the minimum hydraulic gradient is guaranteed. However, those are not currently in effect because the SPU Transmission System operates well below capacity.
   c. **Section 6.7 Summary:** The text characterizes the water supply contract with SPU as an "unlimited wholesale agreement". SPU uses the term "Full Water Requirements contract".

2. **Demand Forecast**
   a. **Section 4.5.1 Projected Demands:** The demand forecast shows a higher demand than SPU had projected for Duvall in our most recent demand forecast developed in 2017 and documented in SPU's 2019 Water System Plan. For example, in *Table 4-8 Future Retail Water Demand Projections*, Duvall is projecting an annual demand (with conservation) in 2040 of 283,742,000 gallons, where as SPU's demand forecast for Duvall in 2040 is 200,800,000 gallons.

      The existence of a difference between demand forecasts developed by different utilities is not necessarily unexpected. This is because there are a variety of methodologies and data sources for demand forecasting and forecasting has inherent judgement calls and uncertainties.

      The resulting differences in the two demand forecasts is not a concern for SPU because we have a wide cushion between our firm yield and the total demand we are forecasting from Seattle and all our wholesale water customers. That cushion can accommodate the demand Duvall is projecting, especially since Duvall's demand is a small portion of the total demand on SPU's regional water system.

3. **Water Quality**
   a. **Section 2.6.3 Water Treatment:** The summary of treatment provided by SPU's Tolt Treatment Facility does not mention that corrosion control is also provided. It would be useful to include text describing this important treatment process, which helps make the water less corrosive to piping and plumbing materials, in this section and any other relevant sections.
   b. **Section 6.5 Water Quality Monitoring:** In paragraph 2, the description of SPU's role is outdated. Each of SPU's wholesale customers are required to take the full number of coliform samples outlined in WAC 246 290 300. The reduced monitoring previously allowed under the regional plan is no longer applicable. In paragraph 3, in the last sentence the reference to Table 6-1 should be Table 6-3.
   c. **Section 6.5.1 Coliform Monitoring:**
      i. The description of SPU's role is outdated. Each of SPU's wholesale customers are required to take the full number of coliform samples outlined in WAC 246 290 300. The reduced monitoring previously allowed under the regional plan is no longer applicable. This also applies to the related content in *Table 6-3 City of Duvall Water Quality Monitoring Requirements* and *Appendix L Water Quality Monitoring Plan*.
      ii. For this row in *Table 6-3 City of Duvall Water Quality Monitoring Requirements* and in *Table 5 Water Quality Monitoring Requirements in Appendix L Water Quality Monitoring Plan*, "WAC" is misspelled as "WAX".
      iii. Although Duvall's responsibility for repeat sampling (if a routine sample comes back positive) is mentioned in *Appendix L Water Quality Monitoring Plan*, the text and referenced table (*Table 6 Coliform Monitoring Sample Locations*) do not appear to be complete. It would be useful to update that info or include Duvall's Total Coliform Monitoring Plan in an appendix to the WSP.
   d. **Section 6.5.2 Residual Disinfectant Monitoring:** The description of SPU's role is outdated. Per the WAC updates implemented in 2017, Duvall should be monitoring chlorine residual in the distribution system daily (using either data from a grab sample or an online analyzer) and reporting daily residual data to DOH monthly. This also applies to the related content in *Table 6-3 City of Duvall Water Quality Monitoring Requirements* and *Appendix L Water Quality Monitoring Plan*.
   e. **Section 6.5.3 Disinfection Byproducts Monitoring:** The text related to SPU's role is accurate. However, the disinfection byproducts information in *Table 6-3 City of Duvall Water Quality Monitoring Requirements* in the "SPU Responsibilities" column is outdated and does not match the

text. Similarly, the disinfection byproducts information in *Appendix L Water Quality Monitoring Plan* (*Section 4.1 Monitoring Requirements and Procedures* text and *Table 5 Water Quality Monitoring Requirements*) are outdated and do not match the text in Section 6.5.3.

f. **Section 6.5.4 Lead and Copper Monitoring:** The text related to SPU's role is accurate. However, the lead and copper information in *Table 6-3 City of Duvall Water Quality Monitoring Requirements* in the "Schedule" column is outdated and does not match the text. Similarly, the lead and copper information in *Appendix L Water Quality Monitoring Plan* (*Section 4.1 Monitoring Requirements and Procedures* text and *Table 5 Water Quality Monitoring Requirements*) are outdated and do not match the text in Section 6.5.4.

**4. Water Conservation**

a. **Appendix G Water Use Efficiency (WUE) Program:** References to the Saving Water Partnership (SWP) regional water conservation that SPU administers on behalf of itself and its participating wholesale water customers, including Duvall, are generally accurate. There is one awkward aspect in that *Table 2 Summary of Water Use Efficiency Program Measures* appears to be structured around an outdated DOH document, that table appears to be utilized to show conservation compliance, and yet a few of the descriptions of the SWP programs are not fully accurate. The outdated document is the *Conservation Planning Requirements,* which has been replaced by DOH's *Water Use Efficiency Guidebook*, which the section does mention. Following are the measures where the description of the SWP program is not fully accurate:

i. **Program Promotion (pg 5):** While the SWP program does provide program promotion materials to Duvall staff for them to use in their service area, radio and television public service announcements are not provided.

ii. **Technical Studies (pg 6):** The SWP does not generally conduct technical studies. Note the description states this is required for large-sized systems.

iii. **Single Family/Multifamily Kits (pg 8):** The description says Duvall has access to kits for all water customers. While the SWP does have some ancillary materials to provide to residential customers, it does not have the quantity to supply all wholesale customers with sufficient quantity for all their customers. Note the description states this is required for medium-sized systems.

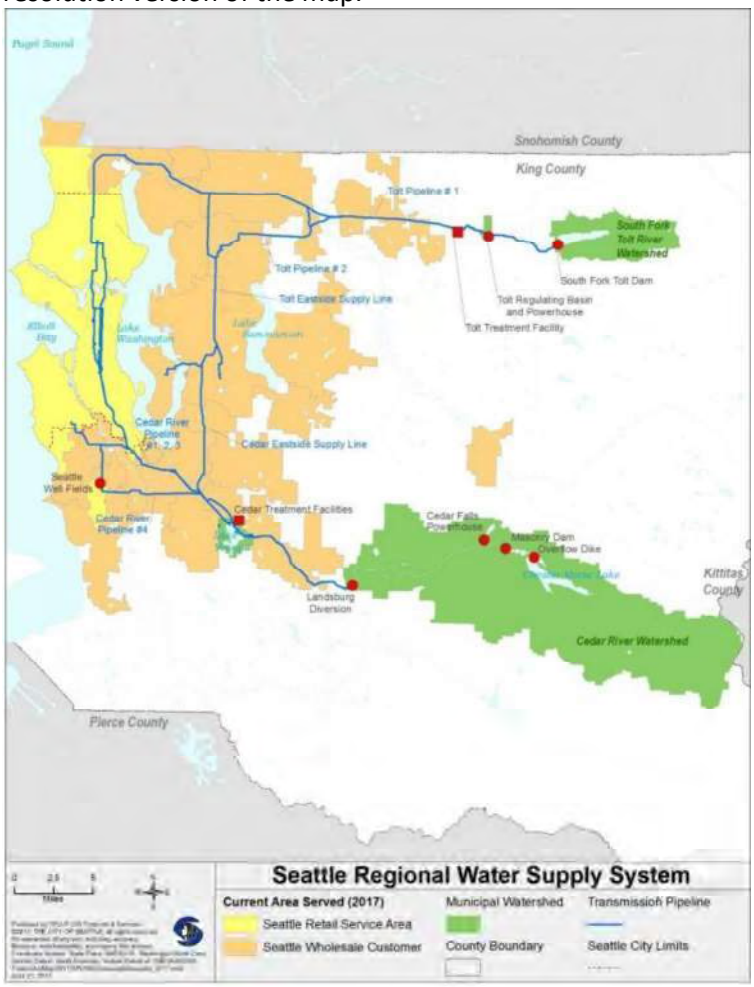
**5. General**

a. **Section 4.2.5 Average Day Demand:** It is unclear whether the "Metered Retail Supply" in *Table 4-5 Average Annual System Demand* is intended to represent the amount of water SPU sold Duvall or the amount of water Duvall retails to its customers. The title of the column implies retail sales, however the text introducing the table says, "Table 4-5 summarizes the total amount of water supplied to the City's system….". And earlier text in that section distinguish between "water supply" as the amount of water purchased from SPU and "water consumption" as the amount used by customers and states that demand is based on water supply, rather than water consumption. Per the table below, the numbers in the "Metered Retail Supply" column appear to be SPU sales to Duvall, although they do not match 100% with SPU's own records. Years 2018 and 2019 are the only years where the differences are meaningful.

| Year | SPU Sales to Duvall[1] (ccf) | Duvall Retail Sales[2] (ccf) | "Metered Retail Supply"[3] | | "Metered Retail Supply" as % of SPU Sales to Duvall | "Metered Retail Supply" as % of Duvall Retail Sales |
|---|---|---|---|---|---|---|
| | | | gpd | ccf | | |
| 2012 | 232,947 | 216,172 | 475,352 | 231,957 | 99.6% | 107% |
| 2013 | 235,508 | 213,225 | 480,561 | 234,498 | 99.6% | 110% |
| 2014 | 243,416 | 229,374 | 496,770 | 242,408 | 99.6% | 106% |
| 2015 | 260,014 | 228,157 | 528,681 | 257,979 | 99% | 113% |
| 2016 | 249,931 | 231,285 | 507,637 | 247,711 | 99% | 107% |
| 2017 | 260,769 | 240,887 | 531,370 | 259,292 | 99% | 108% |
| 2018 | 261,715 | 225,971 | 498,172 | 243,092 | 93% | 108% |
| 2019 | 265,875 | 242,548 | 511,667 | 249,677 | 94% | 103% |

1. Source is 2020 Annual Survey of Wholesale Customers: Summary of Results; Table 2.1 Direct Purchases from SPU 2005-2019.
2. Source is 2020 Annual Survey of Wholesale Customers: Summary of Results; Table 2.2 Retail Sales 2005-2019.
3. Source is Duvall WSP Table 4-5 Average Annual System Demand.

b. **Section 6.2.1 SPU Source Description:** *Figure 6-1 SPU's Regional Water Supply System* is outdated. There is a reference on that figure to 2006. Below is a screen shot of the similar figure from our 2019 water system plan, which was created in 2017. Please let us know if you would like a high resolution version of the map.



Thank you again for the review opportunity.

Sincerely,

Kelly O'Rourke, Water Conservation Manager

Cc: Paul Faulds, SPU Water Planning and Program Manager Interim Division Director (emailed)
Kathy Curry, SPU Wholesale Contracts Manager (emailed)
Terri Gregg, SPU Wholesale Contracts (emailed)
Tom Lindberg, Murraysmith, Inc. (emailed tom.lindberg@murraysmith.us)

King County
**Utilities Technical Review Committee**
Department of Local Services
35030 SE Douglas St #210
Snoqualmie, WA 98065
www.kingcounty.gov

# City of Duvall Water System Plan – Initial Review

The City of Duvall submitted their draft Water System Plan for review by the King County Utilities Technical Review Committee (UTRC). On August 25, 2021, the UTRC held an open public meeting and deliberated the plan content, then directed Staff to issue this comment letter. The UTRC would like to see the following clarifications and revisions as detailed below.

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With such a large document, it would be helpful to have the table of contents be live linked or for there to be more consistent navigation options within the PDF.

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Figure 2-1—No Future Water Service Area is depicted, though it is described in the legend.

---

In October 2020, Stephanie Ard of Murraysmith had a meeting with Jae Hill of the UTRC to talk about boundary revisions for the City's future service area. No revisions are depicted, but are any proposed? On Page 2-2 the plan states: "At this time the City wishes to keep its Retail Service Area intact and requires service connections as they become timely and reasonable with future expansion of the Retail Water Service Area."

---

In Section 3.3 (Land Use) there's no discussion about the County's current zoning outside of city limits, the potential annexation areas, and timelines for annexation of the PAAs and how that could affect growth projections.

Also, in Section 9-1, there are no system expansions identified for the PAAs, despite them having urban levels of service and density.

---

The Plan references only the PSRC goal of planning for climate change; this plan does not appear to contemplate increased usage through a warmer climate, or decreased supply from SPU Tolt Pipeline.

---

Per 2.6.9 and 2.8.1, there is a potential for intertie with 119, but neither district reportedly has interest. Couldn't this be an effective climate and resiliency issue?

---

The Plan only identifies two potential reclaimed users and uses, and identifies the municipal uses as a likely candidate. Are there other uses, even those further away (like the high school, etc.) which could drive a buildout of a "purple-pipe" system?

---

King County requires a recycled water opportunities checklist for large purveyors, which can be found at: Microsoft Word - FINAL_12_2011_WaterReclamationChecklist.doc (kingcounty.gov)

# Appendix S

## Public Meeting Documentation

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**CITY OF DUVALL**
**DRAFT COUNCIL MEETING MINUTES**
**October 19, 2021**
**7:00 P.M. – Virtual Meeting via Zoom**

*Due to public health emergency, this meeting was held remotely. All Councilmembers and staff attended via Zoom webinar.*

**The City Council Meeting was called to order by Mayor Ockerlander at 7:01 P.M.**

**Roll Call**

**Council Present:** Amy McHenry, Mike Remington, Jennifer Knaplund, Dianne Brudnicki, Michelle Hogg, Dorothy Lengyel, Rick Shaffer

**Staff Present:** Kevin Opple, Ryan Cotton, Lara Thomas, Steve Leniszewski, Dana Mason, Michael DeBock, Troy Davis, City Attorney Daniel P. Kenny, Stephanie Goodwin

**I. Additions or Corrections to the Agenda:**
Under Consent Agenda add: Claims for October 8, 2021 through October 19, 2021 in the amount of $242,237.84.

**II. Adoption of Council Agenda:**
*It was moved and seconded (McHenry-Brudnicki) to approve the 10/19/21 Council Agenda. The motion carried (7 ayes).*

**III. Approval of Consent Agenda:**
*It was moved and seconded (McHenry-Hogg) to approve the consent agenda which includes approving the Committee of the Whole and City Council meeting minutes of 10/05/21; and Claims for 10/8/21 through 10/19/21 Checks #52370-52423 including ETF's in the amount of $242,237.84. The motion carried (7 ayes).*

**IV. Comments from the Audience:** *None.*

**V. Closed Session: 15 Minutes- Collective Bargaining RCW 42.30.140.(4)(b)**

City Council went into Closed Session at 7:26pm.

In attendance in the Closed Session: Mayor Ockerlander, Councilmembers Brudnicki, Shaffer, McHenry, Remington, Hogg, Knaplund and Lengyel.

The Closed Session was extended in increments of 5 minutes for a total of 40 minutes.

The City Council meeting resumed at 8:06pm.

Director Thomas notified the Council that Councilmember Lengyel left the meeting due to a family emergency.

**VI. Scheduled Items:**
**1. King County Fire District 45-** Josh Erskine, Interim Fire Chief, gave an update on recent calls. King County IT has been working with the Puget Sound Emergency Network Project to determine

where there may need to be some radio upgrades and proper equipment. Interim Chief Erskine also spoke about continuing the relationships with the City and the Riverview School District. Interim Chief Erskine spoke about the "Sound the Alarm" program regarding providing smoke detectors to those in need. Interim Chief Erskine answered questions from Council.

**2. Mayor:** Mayor Ockerlander gave the Oath of Office to incoming City Administrator, Kevin Opple. Mayor Ockerlander spoke on the SVGA agenda and asked Council to have the 2022 SVGA agenda on the next meeting. Mayor Ockerlander stated that we have 2 possible future vacancies on City Council and reviewed the process with Council.
Public Works Director, Steve Leniszewski, reminded Council about the "Adopt A Drain" program. Director Leniszewski stated that 21 storm drains have so far been adopted.
Mayor Ockerlander lauded Interim City Administrator, Ryan Cotton, his successes while here and how he set up our new City Administrator to succeed as well. Mr. Cotton thanked Council and staff. Councilmembers praised Interim City Administrator, Ryan Cotton, for his professionalism and successes.

**3. Council Reports:**

a. **Finance and Administration:** Mayor Pro Tem Remington stated the Committee met on the strategic fund, the audit and resumed work on the procurement policy.

b. **Land Use:** Councilmember Knaplund stated the Committee will be meeting tomorrow, October 6th at 11:00am.

c. **Public Safety:** None

d. **Public Works:** None

e. **Ad-Hoc Committees:**
**Council Procedures Update/Code of Conduct Ad-Hoc:** Councilmembers Hogg, Brudnicki, and McHenry met made it through Chapter 5.9 through 6.0. The Committee would like to bring Chapters 5.6 and 7.1 to a future Committee of the Whole meeting.

**4. Council Reports:** Councilmember Hogg spoke on the Board of Health considering repealing the helmet law for bicycles. Councilmembers discussed the issue. Councilmember McHenry is on the Public Safety Committee and will be happy to look further into the situation.

Councilmember McHenry reminded Council that there is a Virtual Council Chat, 12:00pm-1:00pm, on October 21st.

**5. Administration:** City Administrator Kevin Opple, stated he is looking forward to working with everyone. Deputy City Administrator/Community Development Director Lara Thomas stated we had 18 applicants for the open City Clerk position. Three were interviewed. Mayor thanked Staff for getting the job posting out promptly.

**VII. Presentation:** None

**VIII. Public Hearing: 2021/2022 Biennium Budget-Mid Biennium Review and Modification**
8:56 PM: The Public Hearing was opened.

Director Mason provided a presentation for the 2021/2022 Mid-Biennium Review and Modifications and the upcoming processes.

There were no public comments.

The Public Hearing closed at 9:08pm.

**Public Hearing:** **Property Tax Levy**
9:08 PM: The Public Hearing was opened.

Director Mason showed a presentation regarding 2022 calculations, the Levy Rate and the upcoming processes.

John Isaacson, resident, asked why we need to raise the taxes.

The Public Hearing closed at 9:18pm.

**Public Hearing:** **Comprehensive Water System Plan Update**
9:18 PM: The Public Hearing was opened.

Steve introduced Stephanie Ard and Elisheva Walters from Murraysmith. They presented the Water System Plan Update and explained what the plan is and what its purpose is.

The Public Hearing ended at 9:38pm.

The Public Hearing will remain open until the next meeting.

## IX. New Business:

**1. (AB21-102a) 2021/2022 Biennium Budget-Mid Biennium Review and Modification**
Mayor Ockerlander, Director Mason and Director Leniszewski answered questions from Council.

**2. (AB21-103a) Ordinance-2022 Property Tax Levy**
Director Mason answered questions from Council.

**3. (AB21-104a) Comprehensive Water System Plan Update**

*Pursuant to Council Procedures, it was moved and seconded (Remington-McHenry) to extend the meeting beyond 9:30 p.m. The motion carried (6 ayes).*

Director Leniszewski answered questions from Council.

## X. Unfinished Business:

**None**

## XI. Adjournment:

*There being no further business and no objections, Mayor Ockerlander adjourned the meeting at 10:44 p.m.*

Signed Amy Ockerlander
Amy Ockerlander, Mayor

Attest Stephanie Goodwin
Stephanie Goodwin, Accounting Associate

**CITY OF DUVALL**
**DRAFT COUNCIL MEETING MINUTES**
**November 2, 2021**
**7:00 P.M. – Virtual Meeting via Zoom**

*Due to public health emergency, this meeting was held remotely. All Councilmembers and staff attended via Zoom webinar.*

**The City Council Meeting was called to order by Mayor Ockerlander at 7:03 P.M.**

**Roll Call**

**Council Present:** Amy McHenry, Mike Remington, Jennifer Knaplund, Dianne Brudnicki, Michelle Hogg, Dorothy Lengyel, Rick Shaffer

**Staff Present:** Kevin Opple, Steve Leniszewski, Dana Mason, Michael DeBock, City Attorney Daniel P. Kenny, Stephanie Goodwin

**I. Additions or Corrections to the Agenda:**
Under Consent Agenda add: Payroll for October 20, 2021 in the amount of $199,619.39 and for Claims for October 20,2021 through November 2, 2021 in the amount of $318,624.83. Council Reports will be moved to the end of the meeting.

**II. Adoption of Council Agenda:**
*It was moved and seconded (Remington-Hogg) to approve the 11/02/21 Council Agenda. The motion carried (7 ayes).*

**III. Approval of Consent Agenda:**
*It was moved and seconded (Brudnicki-Remington) to approve the consent agenda which includes approving the Committee of the Whole and City Council meeting minutes of 10/19/21; Payroll for 10/20/21 including EFTs in the amount of $199,619.39 and Claims for October 20, 2021 through November 2, 2021; Checks #52424-52426 and #52427-52478 including ETF's in the amount of $318,624.83. The motion carried (7 ayes).*

**IV. Comments from the Audience:** *None.*

**V. Scheduled items:**

**MAYOR'S REPORT:** Mayor Ockerlander spoke on the children's vaccinations and the message is that we will continue to have stringent public health guidelines for the near future. Mayor Ockerlander spoke on the Snoqualmie Valley Mayors meeting she attended. She also spoke on the other meetings she attended.

**VI.**

**2. COUNCIL COMMITTEE REPORTS:**
**a. Finance & Administration:** Chair Remington stated that most items have been brought to Council tonight. Chair Remington said there is continued work on the Procurement policy and On-Call contracts that may need to be brought back as a package if extension is needed.

**b. Land Use:** Chair Hogg reviewed the items they reviewed, and she stated that the next meeting will be November 17th.

**c. Public Safety:** Chair Brudnicki gave the updates for Police recruitment and open positions. Kevin Opple, City Administrator; Dana Mason, Finance Director; and Dianne Brudnicki, City Council member answered questions from Council.

**d. Public Works:** Chair McHenry stated they have not met. Chair McHenry stated that Councilmember Shaffer has volunteered to be on the interview panel for the wastewater treatment plant train project.

**e. Ad Hoc Committee:** Chair Hogg stated they will have a meeting on Monday, November 8th at 12:30pm

**3. Administration:** Kevin Opple, City Administrator stated the City was awarded a Commerce Grant for the Housing Needs Assessment and Action Plan in the amount of $75,000. Mr. Opple also stated there has been a conditional offer for the City Clerk position. Mr. Opple referenced the September 30th expiration of Governor Inslee's deferment on late fees and stated the City is offering payment arrangements. Mr. Opple stated they are hoping to open the Duvall Visitor Center for hybrid meetings beginning in 2022.

**Presentations:** *None*

## VII. Public Hearing: Six Month Moratorium-Emergency Ordinance 1286 for Connections to the Sewer System

7:30 PM: The Public Hearing was opened.

Public Comments: Jack Doyle, resident, 143rd and Main Street. They purchased the land in hopes of opening a farm/brewery.
Email received by the City Clerk was read into the record.

The Public Hearing closed at 7:35pm.

**Public Hearing: 2021 Comprehensive Water System Plan-Continued Public Hearing**

7:35 PM: The Public Hearing was opened.

Public comments: None

7:35 PM: The Public Hearing was closed.

## VIII. New Business:

**1. (AB21-105a) Amendment of Murraysmith, Inc. contract #2019-30 for the Comprehensive Water System Plan Update**

It was moved and seconded (Lengyel/Shaffer) to suspend Council rules. Motion passed (Ayes:7)

It was moved and seconded (Lengyel/Shaffer) to approve AB21-105a Amendment of Murraysmith Inc. contract #2019-30 for the Comprehensive Water System Plan Update. Motion passed (Ayes: 7)

**2. (AB21-106a) Sewer Program CIP Update**
Randy Raymond, Parametrix, presented the wastewater system evaluation and planning. Mr. Raymond and Steve Leniszewski, Public Work Director, answered questions from Council.

**3. (AB21-107a) Sewer Program GFC Update**
John Ghilarducci, FCS Group, reviewed a rate study and capital funding. Mr. Ghilarducci and Public Works Director Steve Leniszewski answered questions from Council.

**4. (AB21-108a) Eastside Transportation Partnership Agreement Amendment**
Mayor Ockerlander stated this amendment adds a Snohomish County member as a voting member and gave an overview of what the Eastside Transportation Partnership does. Mayor Ockerlander answered questions from Council.

It was moved and seconded (Shaffer/McHenry) to suspend Council rules. Motion passed (Ayes:7)

It was moved and seconded (McHenry/Shaffer) to approve AB21-108a authorizing the Mayor to sign the Eastside transportation Partnership Agreement Amendment. Motion passed (Ayes: 7)

**5. (AB21-109a) SVGA and City Legislative Goals**
Mayor Ockerlander stated she would specify SVGA funding of the full SR203 highway study.

*Pursuant to Council Procedures, it was moved and seconded (Remington-McHenry) to extend the meeting beyond 9:30 p.m. The motion carried (6 ayes).*

## IX. Unfinished Business:

**1. (AB21-104b) Comprehensive Water Plan Update**
Public Works Director introduced Stephanie Ard, Murraysmith, and John Ghilarducci, FCS Group. They explained the Water Plan Update and process. Ms. Ard and Director Leniszewski answered questions from Council.

**2. (AB21-102b) Mid Biennium Budget**
This is a continued discussion from the Committee of the Whole meeting. Kevin Opple, City Administrator, addressed the various proposed positions. Questions from Council were answered by Mr. Opple and Steve Leniszewski, Public Works Director.

It was moved and seconded (Remington/Shaffer) to suspend Council procedures and go beyond 9:30pm. Motion passed. (Ayes: 7)

Councilmember Lengyel was excused from the meeting at 9:39pm.

Finance Director Dana Mason gave a presentation on the Cost of Living Adjustments and asked for any other biennium budget adjustments for the next meeting. There was Council consensus to move forward with the Cost of Living Adjustments.

Mayor Ockerlander took a poll of Council on which positions they are comfortable moving forward with. The following positions were moved forward: Police Recruit and Storm Water Program Manager. The remaining positions will continue to be discussed at future meetings.

**3. (AB21-103b) Ordinance-2022 Property Tax Levy**
Finance Director Dana Mason reviewed the calculations for the Property Tax Levy.

**X. Council Reports:**
Councilmember Remington stated that sometimes the working relationships aren't working as well as they used to. Councilmember Remington recommends selecting a consultant to work on communications and teamwork and improving processes. Councilmember Remington then resigned from City Council and gave thanks to his wife, Sue, for all her support.

**XI. <u>Adjournment:</u>**
*There being no further business and no objections, Mayor Ockerlander adjourned the meeting at 11:13 p.m.*

Signed Amy Ockerlander
Amy Ockerlander, Mayor

Attest Stephanie Goodwin
Stephanie Goodwin, Accounting Associate

# Appendix T

## Cost Estimating Methodology

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Appendix T

# Cost Estimating Methodology

## T.1 Introduction

This document summarizes the approach used in development of unit costs and project costs used in the Capital Improvement Plan (CIP) for the City of Duvall (City) Water System Plan (WSP).

## T.2 Cost Estimating

The probable costs estimated for each improvement are based on average costs from the 2019 RSMeans Heavy Construction Cost Data (RSMeans), City input, construction costs for similar projects across the Northwest, and local contractor and supplier rates. All costs identified in this section reference U.S. dollars. The *Engineering News Record Construction Cost Index* basis is 11,392 (20-City Average, January 2020).

Project cost estimates are prepared in accordance with the guidelines of AACE International. (AACE International Recommended Practice No. 56R-08 Cost Estimate Classification System - As Applied For The Building and General Construction Industries - TCM Framework: 7.3 - Cost Estimating and Budgeting Rev. December 31, 2011). The project cost estimates in this WSP are categorized Class 5, as defined by AACE International:

> *Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner.*
>
> *Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.*
>
> *Typical accuracy ranges for Class 5 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.*

All project descriptions and cost estimates in this WSP represent planning-level accuracy and opinions of costs (+50 percent, -30 percent). During the design phase of each improvement project, project definition, scope, and specific information (e.g., pipe diameter and length) should be verified. The final cost of individual projects will depend on actual labor and material costs, site

conditions, competitive market conditions, regulatory requirements, project schedule and other factors. Because of these factors, project feasibility and risks must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

The project costs presented in this WSP include estimated construction costs and allowances for permitting, legal, administrative, and engineering fees. A contingency factor is also added to each cost to help account for any unanticipated components of the project costs. Construction costs are based on the preliminary concepts and layouts of the water system components developed during the system analysis.

Total estimated project costs were developed through a progression of steps and multiple methodologies. The steps included development of component unit costs, construction costs and, finally, project costs. The component unit cost includes the sum of materials, labor, and equipment of a project's basic features. The construction cost is the sum of component costs and mark-ups to determine the probable cost of construction (i.e., the contractor bid price). The project cost is the sum of construction costs with additional cost allowances for engineering, legal and administrative fees to determine the total project cost to the City.

The following costs are not included:

- Land or right-of-way acquisition
- Maintenance expenses
- Operation expenses

# T.3 Component Unit Costs

## T.3.1 Pipelines

The estimates for water system pipelines include the costs for pipe, valves, fittings, water connections, special pipe crossings, and appurtenances. The pipe material assumed for waterlines is ductile iron with non-restrained push on joints, fittings are assumed to have mechanical joints.

## T.3.2 Pipe

For all pipeline installations including new and replacement projects, the base water pipeline costs per linear foot is based on a cover depth of 42 inches and includes:

- Excavation
- Waste of material associated with the trenching (which includes haul, load, and dump fees)
- Native backfill (which includes minimal haul and compaction of material)
- Testing and disinfection
- Trench box costs
- Removal of large rocks

The following potential costs were assumed to be negligible for projects in Duvall:

- Dewatering (most projects are planned for summer, and high groundwater is not typically observed)
- Rock excavation (shallow bedrock not observed in Duvall)
- Imported bedding and zone material

As the diameter of pipe and the trench width increase, the costs also increase. Therefore, a specific base cost has been identified for each pipe diameter. See **Table T-1** for base estimated construction costs per linear foot of pipe.

## Table T-1
## Water Pipeline Base Costs per Linear Foot (from supplier)

| Pipe Diameter (inch) | Cost[1] ($/linear foot) |
|---|---|
| 4 | $47 |
| 6 | $44 |
| 8 | $54 |
| 10 | $62 |
| 12 | $72 |
| 14 | $85 |
| 16 | $96 |

[1]Costs do not include pavement or other add-ons; see T-5 for combined costs

### *T.3.2.1 Valves and Fittings*

To account for fittings and valves an additional 25 percent of pipeline cost is added.

### *T.3.2.2 Water Connections*

To account for connections to existing water mains, an additional 3 percent is added to pipeline costs. New and replacement service connections are estimated at $2,000 per 50 linear feet of pipe.

### *T.3.2.3 Special Pipe Crossings*

Special pipe crossings are required for crossing the river, railroads and highways, or areas where traditional open cut construction is not possible. To approximate the cost of trenchless construction for crossings, a factor of 1.75 is applied to the water pipeline cost per linear foot from **Table T-1** for the crossing length based on creek crossing costs provided by the City in July 2020.

A summary of additional pipeline costs is provided in **Table T-2**.

### Table T-2
### Additional Pipeline Costs

| Additional Pipeline Cost Factor | Additional Factor |
|---|---|
| Valves and Fittings | 25% |
| Water Service Connections | $2,000 per 50 linear feet of pipe |
| Connections to Existing Mains | 3% |
| Special Pipe Crossings | 10 times pipe cost per linear foot for crossing length |

## T.3.3 Surface Restoration

Surface restoration of construction sites is required to complete every project. For all non-development projects located in a road, costs are assumed to include overlay of the full road. Per City standard details, both arterial and local road costs are estimated for a 6-inch asphalt section with 12 inches of crushed rock. A width of 40 feet is assumed for both local and arterial roads per City standards. **Table T-3** shows surface restoration costs by pipe diameter (restoration includes trench restoration, so costs increase with pipe diameter). The surface restoration is developed from local supplier and RSMeans costs.

### Table T-3
### Restoration Construction Costs per Linear Foot

| Pipe Diameter (inch) | Arterial Road Restoration Cost ($/linear foot) | Local Road Restoration Cost ($/linear foot |
|---|---|---|
| 4 | $85 | $80 |
| 6 | $86 | $81 |
| 8 | $87 | $82 |
| 10 | $88 | $83 |
| 12 | $88 | $84 |
| 14 | $89 | $85 |
| 16 | $90 | $86 |

## T.3.4 Facility

Facility project costs were developed for each individual facility project based on previous City projects, other similar projects in the Northwest, and relevant planning documents. In particular, analysis referenced the following planning documents, each of which is attached, following this document:

- Big Rock Road Reservoir and Crestview Estates Reservoir Improvements, by Murray Smith & Associates (now Murraysmith), dated October 17, 2014

- City of Duvall Water System Telemetry & Controls, SCADA Master Plan, Draft Revision A, by Industrial Systems, dated July 2020.

For each facility, the project cost includes basic site, civil, mechanical, electrical, and instrumentation and control facilities.

# T.4 Construction Cost Allowances

The construction cost is the sum of pipe cost and adders, labor, equipment, mobilization, contractor's overhead and profit, and contingency for each project.

## T.4.1 Traffic Control

Traffic control will be required for all projects that occur in roadways. The cost and level of effort for traffic control should be evaluated based on the scope and size of each project and as local conditions at the time of construction dictate. For planning purposes, the cost of traffic control is estimated at 2 percent for low traffic control areas in local streets or 4 percent for high traffic control areas in arterial streets depending on project location. Traffic control mark-up accounts for the cost of signage, flagging and temporary barriers, street widening, pavement markings, lane delineators and lighting at flagging locations.

## T.4.2 Erosion Control

Erosion control will be required for all projects. For planning purposes, the erosion control is estimated at 2 percent of the construction costs. Erosion control mark-up accounts for materials and practices to protect adjacent property, storm water systems, and surface water in accordance with regulatory requirements. The level of effort and cost for erosion control depends on the size and scope of a project, and the local conditions at the time of construction.

## T.4.3 Contractor Overhead and Profit

A 10 percent mark-up accounts for the contractor's indirect project costs and anticipated profit.

## T.4.4 Mobilization

A 10 percent mobilization mark-up accounts for the cost of the contractor's administrative and direct expenses to mobilize equipment, materials, and labor to the work site.

## T.4.5 Contingency

A 25 percent increase is added in each project's construction cost to account for a contingency factor to cover the uncertainties inherent to planning-level development. The contingency is provided to account for factors such as:

- Unanticipated utilities
- Relocation and connection to existing infrastructure
- Minor elements of work not addressed in component unit cost development
- Details of construction
- Changes in site conditions
- Variability in construction bid climate

The contingency excludes:

- Major scope changes such as end product specification, capacities, and location of project
- Extraordinary events such as strikes or natural disasters
- Management reserves
- Escalation and currency effects

A summary of construction mark-ups is provided in **Table T-4**.

### Table T-4
### Additional Construction Costs

| Additional Cost Factor | Percent |
|---|---|
| Low Traffic Control | 2% |
| High Traffic Control | 4% |
| Erosion Control (pipe projects only) | 2% |
| Contractor Overhead and Profit | 10% |
| Mobilization | 10% |
| Contingency | 25% |

# T.5 Total Project Cost

The total project cost is the sum of construction cost with additional cost allowances for legal, tax, administrative, and engineering fees. **Table T-5**, shown below, presents the cost allowances for each additional project cost. The engineering costs include design and surveying. Construction administration is the cost associated with managing the construction of the project. **Table T-6** shows example project unit costs per linear foot of pipe, assuming new pipe, open-cut, high erosion and traffic control costs, and full road overlay.

## Table T-5
## Summary of Additional Costs

| Additional Cost Factor | Percent |
|---|---|
| Legal/Admin. Coordination | 10% |
| Engineering Design | 15% |
| Sales Tax | 8.8% |
| Construction Engineering | 5% |

## Table T-6
## Example Open-Cut Water Pipeline Project Costs per Linear Foot[1]

| Pipe Diameter (inch) | Arterial Project Cost ($/linear foot) | Local Street Project Cost ($/linear foot) |
|---|---|---|
| 4 | $391 | $380 |
| 6 | $385 | $374 |
| 8 | $414 | $404 |
| 10 | $438 | $427 |
| 12 | $465 | $457 |
| 14 | $502 | $494 |
| 16 | $534 | $526 |

[1]Assumes open-cut, full road overlay, new pipe, high traffic, and erosion control.

# Appendix U

## Financial Model Summary

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| Operating Revenues & Expenditures | | 2020 Actual | 2021 Budget | 2022 Budget | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | 2027 Forecast | 2028 Forecast | 2029 Forecast | 2030 Forecast |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Annual Rate Increases** | | | 1.60% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% | 2.50% |
| **Single-Family Monthly Rate** | | $54.03 | $54.89 | $56.27 | $57.67 | $59.12 | $60.59 | $62.11 | $63.66 | $65.25 | $66.88 | $68.56 |
| **Beginning Operating Balance** | | $ 3,274,156 | $ 3,529,800 | $ 536,627 | $ 555,505 | $ 577,487 | $ 600,712 | $ 623,644 | $ 642,067 | $ 663,137 | $ 684,914 | $ 707,423 |
| **Operating Revenues** | | | | | | | | | | | | |
| Water Charges | 401-00-343-40-00-00 | $ 2,093,574 | $ 2,184,052 | $ 2,297,058 | $ 2,414,004 | $ 2,538,198 | $ 2,660,550 | $ 2,749,423 | $ 2,841,076 | $ 2,935,594 | $ 3,033,062 | $ 3,133,568 |
| Water Main/Hydrant Repairs | 401-00-343-47-00-00 | - | - | - | - | - | - | - | - | - | - | - |
| Water Hook-Up Fees | 401-00-343-48-00-00 | 94,445 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 |
| Misc Penalties | 401-00-359-49-00-02 | 9,663 | 14,400 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 |
| Rental of Hydrant | 401-00-362-10-00-00 | 7,900 | - | - | - | - | - | - | - | - | - | - |
| Sales of Scrap & Junk | 401-00-369-10-00-00 | 3,733 | - | - | - | - | - | - | - | - | - | - |
| Miscellaneous Revenues | 401-00-369-91-00-00 | 6,049 | - | - | - | - | - | - | - | - | - | - |
| Interest Earnings | 401-00-361-11-00-00 | 33,755 | 17,649 | 2,683 | 2,778 | 2,887 | 3,004 | 3,118 | 3,210 | 3,316 | 3,425 | 3,537 |
| **Total Operating Reveunes** | | $ 2,249,119 | $ 2,238,101 | $ 2,379,341 | $ 2,496,381 | $ 2,620,686 | $ 2,743,154 | $ 2,832,141 | $ 2,923,886 | $ 3,018,509 | $ 3,116,086 | $ 3,216,705 |
| | | 6.7% | -0.5% | 6.3% | 4.9% | 5.0% | 4.7% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% |
| **Budgeted Operating Expenses** | | | | | | | | | | | | |
| Salaries & Wages | 401-25-534-80-11-00 | $ 442,951 | $ 508,000 | $ 547,000 | $ 563,410 | $ 580,312 | $ 597,722 | $ 615,653 | $ 634,123 | $ 653,147 | $ 672,741 | $ 692,923 |
| Overtime and Buyouts | 401-25-534-80-11-01 | 21,858 | 15,000 | 15,000 | 15,450 | 15,914 | 16,391 | 16,883 | 17,389 | 17,911 | 18,448 | 19,002 |
| Personnel Benefits | 401-25-534-80-21-00 | 190,301 | 240,500 | 267,500 | 280,875 | 294,919 | 309,665 | 325,148 | 341,405 | 358,476 | 376,399 | 398,983 |
| Overtime and Buyout Benefits | 401-25-534-80-21-01 | 5,713 | 3,500 | 3,500 | 3,675 | 3,859 | 4,052 | 4,254 | 4,467 | 4,690 | 4,925 | 5,220 |
| Meters/Valves/Hydrant Supplies | 401-25-534-50-35-00 | 12,209 | 58,725 | 58,725 | 60,193 | 61,698 | 63,240 | 64,821 | 66,442 | 68,103 | 69,806 | 71,551 |
| Office & Operating Expenses | 401-25-534-80-31-00 | 29,223 | 27,463 | 27,528 | 28,217 | 28,922 | 29,645 | 30,386 | 31,146 | 31,925 | 32,723 | 33,541 |
| Fuel | 401-25-534-80-32-00 | 4,545 | - | - | - | - | - | - | - | - | - | - |
| City of Seattle Water Purchase | 401-25-534-80-33-00 | 530,314 | 565,685 | 605,753 | 635,667 | 667,392 | 698,676 | 721,682 | 745,400 | 769,853 | 795,060 | 821,046 |
| Small Tools & Minor Equipment | 401-25-534-80-35-00 | 3,314 | 5,550 | 1,850 | 1,896 | 1,944 | 1,992 | 2,042 | 2,093 | 2,145 | 2,199 | 2,254 |
| Computer Hardware & Equipment | 401-25-534-80-35-02 | - | 2,600 | 500 | 513 | 525 | 538 | 552 | 566 | 580 | 594 | 609 |
| Travel | 401-25-534-40-43-00 | 8 | 2,500 | 2,500 | 2,563 | 2,627 | 2,692 | 2,760 | 2,829 | 2,899 | 2,972 | 3,046 |
| Training | 401-25-534-40-49-00 | 500 | 4,500 | 4,500 | 4,613 | 4,728 | 4,846 | 4,967 | 5,091 | 5,219 | 5,349 | 5,483 |
| Professional Services | 401-25-534-80-41-00 | 63,908 | 69,520 | 64,520 | 66,133 | 67,786 | 69,481 | 71,218 | 72,998 | 74,823 | 76,694 | 78,611 |
| Advertising | 401-25-534-80-41-01 | - | 300 | 300 | 308 | 315 | 323 | 331 | 339 | 348 | 357 | 366 |
| Water City Attorney Services | 401-25-515-30-41-00 | - | 3,000 | 3,000 | 3,075 | 3,152 | 3,231 | 3,311 | 3,394 | 3,479 | 3,566 | 3,655 |
| Communications & Postage | 401-25-534-80-42-00 | 12,376 | 12,642 | 13,265 | 13,596 | 13,936 | 14,285 | 14,642 | 15,008 | 15,383 | 15,768 | 16,162 |
| Travel & Meals | 401-25-534-80-43-00 | - | 1,000 | 1,000 | 1,025 | 1,051 | 1,077 | 1,104 | 1,131 | 1,160 | 1,189 | 1,218 |
| Insurance | 401-25-534-80-46-00 | 42,335 | 31,952 | 34,519 | 35,382 | 36,267 | 37,173 | 38,102 | 39,055 | 40,031 | 41,032 | 42,058 |
| Public Utilities | 401-25-534-80-47-00 | 6,536 | 60,600 | 60,780 | 62,300 | 63,857 | 65,453 | 67,090 | 68,767 | 70,486 | 72,248 | 74,055 |
| Janitorial/HVAC/Fac Maint | 401-25-534-80-48-00 | 16,435 | 7,091 | 7,346 | 7,530 | 7,718 | 7,911 | 8,109 | 8,312 | 8,520 | 8,733 | 8,951 |
| Memberships Dues / Fees | 401-25-534-80-49-00 | 8,834 | 9,091 | 9,346 | 9,580 | 9,820 | 10,065 | 10,317 | 10,575 | 10,839 | 11,110 | 11,388 |
| Miscellaneous - Note - do not use | 401-25-534-80-49-01 | - | - | - | - | - | - | - | - | - | - | - |
| Bank Fees/Charges | 401-25-534-80-49-12 | 9,591 | 11,791 | 12,558 | 12,872 | 13,193 | 13,523 | 13,861 | 14,208 | 14,563 | 14,927 | 15,300 |
| I/F to 501 | 401-99-534-80-41-01 | 25,495 | 53,021 | 53,183 | 54,512 | 55,875 | 57,272 | 58,704 | 60,171 | 61,676 | 63,217 | 64,798 |
| I/F to IT 502 | 401-99-534-80-41-02 | 34,924 | 45,663 | 42,932 | 44,005 | 45,105 | 46,233 | 47,389 | 48,574 | 49,788 | 51,033 | 52,308 |
| I/F to 503 Building | 401-99-534-80-41-03 | 5,930 | 12,427 | 8,621 | 8,837 | 9,058 | 9,284 | 9,516 | 9,754 | 9,998 | 10,248 | 10,504 |
| Transfer Out-001 Gen Admin | 401-99-597-00-01-00 | 51,914 | 69,370 | 37,846 | 38,792 | 39,762 | 40,756 | 41,775 | 42,819 | 43,890 | 44,987 | 46,112 |
| Sensus FlexNet System | 401-25-594-34-63-01 | 3,665 | 28,000 | 28,000 | 28,700 | 29,418 | 30,153 | 30,907 | 31,679 | 32,471 | 33,283 | 34,115 |
| State Excise and B&O Tax | 401-99-534-10-44-00 | 97,338 | 123,184 | 130,004 | 136,200 | 143,491 | 148,589 | 144,772 | 149,535 | 154,446 | 159,510 | 164,732 |
| City Utility Tax | 401-99-534-10-44-06 | 197,452 | 218,405 | 229,706 | 241,400 | 253,820 | 266,055 | 274,942 | 284,108 | 293,559 | 303,306 | 313,357 |
| **Total Budgeted Operating Expenses** | | $ 1,817,668 | $ 2,181,489 | $ 2,261,436 | $ 2,351,225 | $ 2,446,117 | $ 2,539,720 | $ 2,614,370 | $ 2,700,238 | $ 2,788,988 | $ 2,880,720 | $ 2,979,352 |
| | | 0.6% | 20.0% | 3.7% | 4.0% | 4.0% | 3.8% | 2.9% | 3.3% | 3.3% | 3.3% | 3.4% |
| **Other Activity** | | | | | | | | | | | | |
| New Debt Service | | - | - | - | - | - | - | - | - | - | - | - |
| Transfer to Capital | | 3,257,415 | 3,049,785 | 99,027 | 123,175 | 151,343 | 180,502 | 199,349 | 202,578 | 207,744 | 212,857 | 213,146 |
| **Total Other Activity** | | $ 3,257,415 | $ 3,049,785 | $ 99,027 | $ 123,175 | $ 151,343 | $ 180,502 | $ 199,349 | $ 202,578 | $ 207,744 | $ 212,857 | $ 213,146 |
| Revenues Less Obligations | | $ (2,825,964) | $ (2,993,173) | $ 18,878 | $ 21,982 | $ 23,226 | $ 22,932 | $ 18,422 | $ 21,070 | $ 21,777 | $ 22,509 | $ 24,208 |
| **Ending Operating Balance** | | $ 448,192 | $ 536,627 | $ 555,505 | $ 577,487 | $ 600,712 | $ 623,644 | $ 642,067 | $ 663,137 | $ 684,914 | $ 707,423 | $ 731,631 |
| *Target Minimum (120 Days of O&M)* | | *$ 448,192* | *$ 536,627* | *$ 555,505* | *$ 577,487* | *$ 600,712* | *$ 623,644* | *$ 642,067* | *$ 663,137* | *$ 684,914* | *$ 707,423* | *$ 731,631* |

| Operating Revenues & Expenditures | | 2031 Forecast | 2032 Forecast | 2033 Forecast | 2034 Forecast | 2035 Forecast | 2036 Forecast | 2037 Forecast | 2038 Forecast | 2039 Forecast |
|---|---|---|---|---|---|---|---|---|---|---|
| **Annual Rate Increases** | | **2.50%** | **2.50%** | **2.50%** | **2.50%** | **2.50%** | **2.50%** | **2.50%** | **2.50%** | **2.50%** |
| **Single-Family Monthly Rate** | | **$70.27** | **$72.03** | **$73.83** | **$75.67** | **$77.56** | **$79.50** | **$81.49** | **$83.53** | **$85.62** |
| **Beginning Operating Balance** | | **$ 731,631** | **$ 756,727** | **$ 782,747** | **$ 809,729** | **$ 837,714** | **$ 866,742** | **$ 896,858** | **$ 928,107** | **$ 960,536** |
| **Operating Revenues** | | | | | | | | | | |
| Water Charges | 401-00-343-40-00-00 | $ 3,237,205 | $ 3,344,064 | $ 3,454,243 | $ 3,567,842 | $ 3,684,961 | $ 3,805,706 | $ 3,930,186 | $ 4,058,511 | $ 4,190,795 |
| Water Main/Hydrant Repairs | 401-00-343-47-00-00 | - | - | - | - | - | - | - | - | - |
| Water Hook-Up Fees | 401-00-343-48-00-00 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 | 22,000 |
| Misc Penalties | 401-00-359-49-00-02 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 | 57,600 |
| Rental of Hydrant | 401-00-362-10-00-00 | - | - | - | - | - | - | - | - | - |
| Sales of Scrap & Junk | 401-00-369-10-00-00 | - | - | - | - | - | - | - | - | - |
| Miscellaneous Revenues | 401-00-369-91-00-00 | - | - | - | - | - | - | - | - | - |
| Interest Earnings | 401-00-361-11-00-00 | 3,658 | 3,784 | 3,914 | 4,049 | 4,189 | 4,334 | 4,484 | 4,641 | 4,803 |
| **Total Operating Reveunes** | | **$ 3,320,463** | **$ 3,427,448** | **$ 3,537,757** | **$ 3,651,490** | **$ 3,768,750** | **$ 3,889,640** | **$ 4,014,270** | **$ 4,142,751** | **$ 4,275,198** |
| | | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% |
| **Budgeted Operating Expenses** | | | | | | | | | | |
| Salaries & Wages | 401-25-534-80-11-00 | $ 713,711 | $ 735,122 | $ 757,176 | $ 779,891 | $ 803,288 | $ 827,387 | $ 852,208 | $ 877,774 | $ 904,108 |
| Overtime and Buyouts | 401-25-534-80-11-01 | 19,572 | 20,159 | 20,764 | 21,386 | 22,028 | 22,689 | 23,370 | 24,071 | 24,793 |
| Personnel Benefits | 401-25-534-80-21-00 | 422,922 | 448,298 | 475,196 | 503,707 | 533,930 | 565,965 | 599,923 | 635,919 | 674,074 |
| Overtime and Buyout Benefits | 401-25-534-80-21-01 | 5,534 | 5,866 | 6,218 | 6,591 | 6,986 | 7,405 | 7,849 | 8,320 | 8,820 |
| Meters/Valves/Hydrant Supplies | 401-25-534-50-35-00 | 73,339 | 75,173 | 77,052 | 78,979 | 80,953 | 82,977 | 85,051 | 87,178 | 89,357 |
| Office & Operating Expenses | 401-25-534-80-31-00 | 34,379 | 35,239 | 36,120 | 37,023 | 37,948 | 38,897 | 39,869 | 40,866 | 41,888 |
| Fuel | 401-25-534-80-32-00 | - | - | - | - | - | - | - | - | - |
| City of Seattle Water Purchase | 401-25-534-80-33-00 | 847,834 | 875,446 | 903,908 | 933,244 | 963,481 | 994,646 | 1,026,765 | 1,059,867 | 1,093,981 |
| Small Tools & Minor Equipment | 401-25-534-80-35-00 | 2,310 | 2,368 | 2,427 | 2,488 | 2,550 | 2,614 | 2,679 | 2,746 | 2,815 |
| Computer Hardware & Equipment | 401-25-534-80-35-02 | 624 | 640 | 656 | 672 | 689 | 706 | 724 | 742 | 761 |
| Travel | 401-25-534-40-43-00 | 3,122 | 3,200 | 3,280 | 3,362 | 3,446 | 3,532 | 3,621 | 3,711 | 3,804 |
| Training | 401-25-534-40-49-00 | 5,620 | 5,760 | 5,904 | 6,052 | 6,203 | 6,358 | 6,517 | 6,680 | 6,847 |
| Professional Services | 401-25-534-80-41-00 | 80,577 | 82,591 | 84,656 | 86,772 | 88,942 | 91,165 | 93,444 | 95,780 | 98,175 |
| Advertising | 401-25-534-80-41-01 | 375 | 384 | 394 | 403 | 414 | 424 | 434 | 445 | 456 |
| Water City Attorney Services | 401-25-515-30-41-00 | 3,747 | 3,840 | 3,936 | 4,035 | 4,136 | 4,239 | 4,345 | 4,454 | 4,565 |
| Communications & Postage | 401-25-534-80-42-00 | 16,566 | 16,980 | 17,404 | 17,840 | 18,286 | 18,743 | 19,211 | 19,692 | 20,184 |
| Travel & Meals | 401-25-534-80-43-00 | 1,249 | 1,280 | 1,312 | 1,345 | 1,379 | 1,413 | 1,448 | 1,485 | 1,522 |
| Insurance | 401-25-534-80-46-00 | 43,109 | 44,187 | 45,292 | 46,424 | 47,585 | 48,774 | 49,994 | 51,244 | 52,525 |
| Public Utilities | 401-25-534-80-47-00 | 75,906 | 77,804 | 79,749 | 81,742 | 83,786 | 85,881 | 88,028 | 90,228 | 92,484 |
| Janitorial/HVAC/Fac Maint | 401-25-534-80-48-00 | 9,175 | 9,404 | 9,639 | 9,880 | 10,127 | 10,380 | 10,640 | 10,906 | 11,179 |
| Memberships Dues / Fees | 401-25-534-80-49-00 | 11,672 | 11,964 | 12,263 | 12,570 | 12,884 | 13,206 | 13,536 | 13,875 | 14,222 |
| Miscellaneous - Note - do not use | 401-25-534-80-49-01 | - | - | - | - | - | - | - | - | - |
| Bank Fees/Charges | 401-25-534-80-49-12 | 15,683 | 16,075 | 16,477 | 16,889 | 17,311 | 17,744 | 18,187 | 18,642 | 19,108 |
| I/F to 501 | 401-99-534-80-41-01 | 66,418 | 68,078 | 69,780 | 71,525 | 73,313 | 75,146 | 77,024 | 78,950 | 80,924 |
| I/F to IT 502 | 401-99-534-80-41-02 | 53,616 | 54,957 | 56,330 | 57,739 | 59,182 | 60,662 | 62,178 | 63,733 | 65,326 |
| I/F to 503 Building | 401-99-534-80-41-03 | 10,767 | 11,036 | 11,312 | 11,595 | 11,885 | 12,182 | 12,486 | 12,798 | 13,118 |
| Transfer Out-001 Gen Admin | 401-99-597-00-01-00 | 47,264 | 48,446 | 49,657 | 50,899 | 52,171 | 53,475 | 54,812 | 56,183 | 57,587 |
| Sensus FlexNet System | 401-25-594-34-63-01 | 34,968 | 35,842 | 36,738 | 37,657 | 38,598 | 39,563 | 40,552 | 41,566 | 42,605 |
| State Excise and B&O Tax | 401-99-534-10-44-00 | 170,117 | 175,668 | 181,392 | 187,294 | 193,378 | 199,650 | 206,116 | 212,782 | 219,653 |
| City Utility Tax | 401-99-534-10-44-06 | 323,720 | 334,406 | 345,424 | 356,784 | 368,496 | 380,571 | 393,019 | 405,851 | 419,080 |
| **Total Budgeted Operating Expenses** | | **$ 3,081,599** | **$ 3,187,610** | **$ 3,297,538** | **$ 3,411,545** | **$ 3,529,801** | **$ 3,652,482** | **$ 3,779,774** | **$ 3,911,871** | **$ 4,048,976** |
| | | 3.4% | 3.4% | 3.4% | 3.5% | 3.5% | 3.5% | 3.5% | 3.5% | 3.5% |
| **Other Activity** | | | | | | | | | | |
| New Debt Service | | - | - | - | - | - | - | - | - | - |
| Transfer to Capital | | 213,768 | 213,818 | 213,237 | 211,961 | 209,921 | 207,043 | 203,248 | 198,451 | 192,562 |
| **Total Other Activity** | | **$ 213,768** | **$ 213,818** | **$ 213,237** | **$ 211,961** | **$ 209,921** | **$ 207,043** | **$ 203,248** | **$ 198,451** | **$ 192,562** |
| Revenues Less Obligations | | $ 25,096 | $ 26,020 | $ 26,983 | $ 27,985 | $ 29,028 | $ 30,116 | $ 31,249 | $ 32,429 | $ 33,660 |
| **Ending Operating Balance** | | **$ 756,727** | **$ 782,747** | **$ 809,729** | **$ 837,714** | **$ 866,742** | **$ 896,858** | **$ 928,107** | **$ 960,536** | **$ 994,196** |
| *Target Minimum (120 Days of O&M)* | | *$ 756,727* | *$ 782,747* | *$ 809,729* | *$ 837,714* | *$ 866,742* | *$ 896,858* | *$ 928,107* | *$ 960,536* | *$ 994,196* |

| Capital Expenditures | 2020 Budget | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | 2027 Forecast | 2028 Forecast | 2029 Forecast | 2030 Forecast |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Beginning Capital Balance** | **$ 1,648,069** | **$ 2,550,063** | **$ 4,820,809** | **$ 4,505,196** | **$ 3,422,199** | **$ 3,162,150** | **$ 3,713,679** | **$ 3,599,026** | **$ 2,839,779** | **$ 2,708,492** | **$ 3,101,898** |
| **Capital Revenues** | | | | | | | | | | | |
| Rate Revenue for Capital Projects | $ 3,257,415 | $ 3,049,785 | $ 99,027 | $ 123,175 | $ 151,343 | $ 180,502 | $ 199,349 | $ 202,578 | $ 207,744 | $ 212,857 | $ 213,146 |
| GFC Revenue | 1,462,120 | 726,341 | 748,131 | 766,120 | 825,807 | 765,523 | 292,033 | 300,794 | 309,818 | 319,112 | 328,685 |
| Revenue Bonds | - | - | - | - | - | - | - | - | - | - | - |
| Investment Interest | 17,896 | 12,750 | 24,104 | 22,526 | 17,111 | 15,811 | 18,568 | 17,995 | 14,199 | 13,542 | 15,509 |
| AT&T Cell Tower Lease-Wtr Tank | 34,130 | 35,870 | 35,858 | 36,754 | 37,673 | 38,615 | 39,580 | 40,570 | 41,584 | 42,623 | 43,689 |
| Verizon Cell Tower Lease | 22,757 | 29,310 | 24,143 | 24,867 | 25,613 | 26,382 | 27,173 | 27,988 | 28,828 | 29,693 | 30,584 |
| Total Revenues with Rate Increases | $ 4,794,318 | $ 3,854,057 | $ 931,263 | $ 973,442 | $ 1,057,547 | $ 1,026,831 | $ 576,703 | $ 589,925 | $ 602,172 | $ 617,828 | $ 631,614 |
| **Capital Expenditures** | | | | | | | | | | | |
| Budgeted Capital | | | | | | | | | | | |
| 407-99-534-10-40-00 Admin Fee - Cell Tower Leases | $ - | $ 6,017 | $ 6,365 | $ 6,556 | $ 6,753 | $ 6,956 | $ 7,164 | $ 7,379 | $ 7,601 | $ 7,829 | $ 8,063 |
| 401-25-594-34-63-01 Sensus FlexNet System | - | 334,750 | - | - | - | - | - | - | - | - | - |
| Water Meter (old) Replacements | - | - | - | - | - | - | - | - | - | - | - |
| Watermain Replacement | - | - | - | - | - | - | - | - | - | - | - |
| 12" Tolt 2 Supply Line from Tolt Supply Station to NE Big Rock Rd | - | 286,443 | 885,109 | 810,366 | - | - | - | - | - | - | - |
| 8" Water Main in Bruett Rd from 3rd Ave NE to 3rd Pl NE | - | - | - | - | - | - | - | - | - | - | - |
| 8" Water Main in 1st Ave from NE Stephens to NE Valley Street | - | - | - | - | - | 381,401 | - | - | - | - | - |
| 12" Water Main in 266th Pl NE from 266th Pl NE to 266th Circle NE | - | - | - | - | - | - | - | - | - | - | - |
| Looping | - | - | - | - | - | - | - | - | - | - | - |
| 8" Water Main in 1st Ave from NE Virginia Street to NE Stephens | - | - | - | - | - | - | - | - | - | 144,830 | - |
| 12" Water Main in Batten Rd NE from NE 140th Pl to Big Rock Rd | - | - | - | - | - | - | 618,519 | 1,274,149 | 656,187 | - | - |
| Facilities | - | - | - | - | - | - | - | - | - | - | - |
| Remove 555/485 PRV's on NE Big Rock Road and 275th Ave NE | - | 226,600 | - | - | - | - | - | - | - | - | - |
| Crestview Estates Reservoir Improvements and Recoating | - | - | - | - | - | - | - | - | - | - | 735,122 |
| Big Rock Road Reservoir Re-coating and Inlet/ Outlet Improvements | - | - | 233,398 | 1,049,746 | 540,619 | - | - | - | - | - | - |
| 615 Zone Pump Station Improvements | - | - | 63,654 | 129,670 | 66,780 | - | - | - | - | - | - |
| Tolt 1 Supply Station Improvements | - | - | - | - | 327,523 | - | - | - | - | - | - |
| Tolt 2 Supply Station Improvements | - | - | - | - | 314,017 | - | - | - | - | - | - |
| Telemetry and Control Improvements | - | 412,000 | - | - | - | - | - | - | - | - | - |
| Taylors Landing Well Arsenic Treatment | - | - | - | - | - | - | - | - | - | - | - |
| Water Department Building | - | 206,000 | - | - | - | - | - | - | - | - | - |
| Citywide Program | - | - | - | - | - | - | - | - | - | - | - |
| Conservation and Leak Detection | - | 10,300 | 10,609 | 10,927 | 11,255 | 11,593 | 11,941 | 12,299 | 12,668 | 13,048 | 13,439 |
| Water Reclamation | - | 5,150 | 5,305 | 5,464 | 5,628 | 5,796 | 5,970 | 6,149 | 6,334 | 6,524 | 6,720 |
| Cross Connection Control | - | 5,150 | 5,305 | 5,464 | 5,628 | 5,796 | 5,970 | 6,149 | 6,334 | 6,524 | 6,720 |
| Comprehensive Plan | - | - | - | - | - | - | - | - | - | - | 302,381 |
| Risk and Resiliency Plan | - | - | - | - | - | 23,185 | - | - | - | - | 26,878 |
| GIS Asset Management Program | - | 10,300 | 10,609 | 10,927 | 11,255 | 11,593 | 11,941 | 12,299 | 12,668 | 13,048 | 13,439 |
| Well Protection Program | - | 5,150 | 5,305 | 5,464 | 5,628 | 5,796 | 5,970 | 6,149 | 6,334 | 6,524 | 6,720 |
| Service Line Repairs | - | 20,600 | 21,218 | 21,855 | 22,510 | 23,185 | 23,881 | 24,597 | 25,335 | 26,095 | 26,878 |
| Other Capital | - | - | - | - | - | - | - | - | - | - | - |
| Comprehensive Plan | 187,723 | 54,850 | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-63-11 Various Capital Projects | 48,467 | - | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-63-12 Kennedy Watermain Replacement | 481,783 | - | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-64-00 Water System Telemetry | 15,655 | - | - | - | - | - | - | - | - | - | - |
| 401-25-594-34-63-01 New Meter Installations | 3,665 | - | - | - | - | - | - | - | - | - | - |
| 401-25-594-34-63-02 Water Meter Replacements | 177,554 | - | - | - | - | - | - | - | - | - | - |
| Total Capital Expenditures | $ 914,847 | $ 1,583,310 | $ 1,246,876 | $ 2,056,439 | $ 1,317,596 | $ 475,302 | $ 691,356 | $ 1,349,172 | $ 733,460 | $ 224,421 | $ 1,146,361 |
| Revenues less Expenditures | $ 3,879,471 | $ 2,270,746 | $ (315,613) | $ (1,082,997) | $ (260,049) | $ 551,529 | $ (114,653) | $ (759,247) | $ (131,287) | $ 393,407 | $ (514,747) |
| **Ending Capital Balance** | **$ 5,527,540** | **$ 4,820,809** | **$ 4,505,196** | **$ 3,422,199** | **$ 3,162,150** | **$ 3,713,679** | **$ 3,599,026** | **$ 2,839,779** | **$ 2,708,492** | **$ 3,101,898** | **$ 2,587,151** |
| *Target Minimum* | *$ 708,611* | *$ 740,277* | *$ 765,215* | *$ 806,343* | *$ 832,695* | *$ 842,201* | *$ 856,029* | *$ 883,012* | *$ 897,681* | *$ 902,170* | *$ 925,097* |

| Capital Expenditures | 2031 Forecast | 2032 Forecast | 2033 Forecast | 2034 Forecast | 2035 Forecast | 2036 Forecast | 2037 Forecast | 2038 Forecast | 2039 Forecast |
|---|---|---|---|---|---|---|---|---|---|
| **Beginning Capital Balance** | **$ 2,587,151** | **$ 1,126,955** | **$ 372,409** | **$ 937,559** | **$ 1,514,524** | **$ 544,935** | **$ 1,104,373** | **$ 1,706,108** | **$ 2,317,583** |
| **Capital Revenues** | | | | | | | | | |
| Rate Revenue for Capital Projects | $ 213,768 | $ 213,818 | $ 213,237 | $ 211,961 | $ 209,921 | $ 207,043 | $ 203,248 | $ 198,451 | $ 192,562 |
| GFC Revenue | 338,546 | 348,702 | 359,163 | 369,938 | 381,036 | 392,468 | 404,242 | 416,369 | 428,860 |
| Revenue Bonds | - | - | - | - | - | - | - | - | - |
| Investment Interest | 12,936 | 5,635 | 1,862 | 4,688 | 7,573 | 2,725 | 5,522 | 8,531 | 11,588 |
| AT&T Cell Tower Lease-Wtr Tank | 44,781 | 45,901 | 47,048 | 48,224 | 49,430 | 50,666 | 51,932 | 53,231 | 54,561 |
| Verizon Cell Tower Lease | 31,501 | 32,446 | 33,420 | 34,422 | 35,455 | 36,519 | 37,614 | 38,743 | 39,905 |
| Total Revenues with Rate Increases | $ 641,532 | $ 646,502 | $ 654,730 | $ 669,234 | $ 683,415 | $ 689,419 | $ 702,558 | $ 715,324 | $ 727,476 |
| **Capital Expenditures** | | | | | | | | | |
| Budgeted Capital | | | | | | | | | |
| 407-99-534-10-40-00 Admin Fee - Cell Tower Leases | $ 8,305 | $ 8,555 | $ 8,811 | $ 9,076 | $ 9,348 | $ 9,628 | $ 9,917 | $ 10,215 | $ 10,521 |
| 401-25-594-34-63-01 Sensus FlexNet System | - | - | - | - | - | - | - | - | - |
| Water Meter (old) Replacements | - | - | - | - | - | - | - | - | - |
| Watermain Replacement | | | | | | | | | |
| 12" Tolt 2 Supply Line from Tolt Supply Station to NE Big Rock Rd | - | - | - | - | - | - | - | - | - |
| 8" Water Main in Bruett Rd from 3rd Ave NE to 3rd Pl NE | - | 275,172 | - | - | - | - | - | - | - |
| 8" Water Main in 1st Ave from NE Stephens to NE Valley Street | - | - | - | - | - | - | - | - | - |
| 12" Water Main in 266th Pl NE from 266th Pl NE to 266th Circle NE | - | - | - | - | - | - | - | - | - |
| Looping | | | | | | | | | |
| 8" Water Main in 1st Ave from NE Virginia Street to NE Stephens | - | - | - | - | - | - | - | - | - |
| 12" Water Main in Batten Rd NE from NE 140th Pl to Big Rock Rd | - | - | - | - | - | - | - | - | - |
| Facilities | | | | | | | | | |
| Remove 555/485 PRV's on NE Big Rock Road and 275th Ave NE | - | - | - | - | - | - | - | - | - |
| Crestview Estates Reservoir Improvements and Recoating | 2,017,290 | 1,038,904 | - | - | - | - | - | - | - |
| Big Rock Road Reservoir Re-coating and Inlet/ Outlet Improvements | - | - | - | - | - | - | - | - | - |
| 615 Zone Pump Station Improvements | - | - | - | - | - | - | - | - | - |
| Tolt 1 Supply Station Improvements | - | - | - | - | - | - | - | - | - |
| Tolt 2 Supply Station Improvements | - | - | - | - | - | - | - | - | - |
| Telemetry and Control Improvements | - | - | - | - | - | - | - | - | - |
| Taylors Landing Well Arsenic Treatment | - | - | - | - | - | - | - | - | 1,139,779 |
| Water Department Building | - | - | - | - | 1,557,967 | - | - | - | - |
| Citywide Program | | | | | | | | | |
| Conservation and Leak Detection | 13,842 | 14,258 | 14,685 | 15,126 | 15,580 | 16,047 | 16,528 | 17,024 | 17,535 |
| Water Reclamation | 6,921 | 7,129 | 7,343 | 7,563 | 7,790 | 8,024 | 8,264 | 8,512 | 8,768 |
| Cross Connection Control | 6,921 | 7,129 | 7,343 | 7,563 | 7,790 | 8,024 | 8,264 | 8,512 | 8,768 |
| Comprehensive Plan | - | - | - | - | - | - | - | - | 394,539 |
| Risk and Resiliency Plan | - | - | - | - | - | 32,094 | - | - | 35,070 |
| GIS Asset Management Program | 13,842 | 14,258 | 14,685 | 15,126 | 15,580 | 16,047 | 16,528 | 17,024 | 17,535 |
| Well Protection Program | 6,921 | 7,129 | 7,343 | 7,563 | 7,790 | 8,024 | 8,264 | 8,512 | 8,768 |
| Service Line Repairs | 27,685 | 28,515 | 29,371 | 30,252 | 31,159 | 32,094 | 33,057 | 34,049 | 35,070 |
| Other Capital | | | | | | | | | |
| Comprehensive Plan | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-63-11 Various Capital Projects | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-63-12 Kennedy Watermain Replacement | - | - | - | - | - | - | - | - | - |
| 407-25-594-34-64-00 Water System Telemetry | - | - | - | - | - | - | - | - | - |
| 401-25-594-34-63-01 New Meter Installations | - | - | - | - | - | - | - | - | - |
| 401-25-594-34-63-02 Water Meter Replacements | - | - | - | - | - | - | - | - | - |
| Total Capital Expenditures | $ 2,101,728 | $ 1,401,048 | $ 89,581 | $ 92,268 | $ 1,653,003 | $ 129,981 | $ 100,824 | $ 103,848 | $ 1,676,352 |
| Revenues less Expenditures | $ (1,460,197) | $ (754,546) | $ 565,150 | $ 576,966 | $ (969,589) | $ 559,438 | $ 601,734 | $ 611,475 | $ (948,876) |
| **Ending Capital Balance** | **$ 1,126,955** | **$ 372,409** | **$ 937,559** | **$ 1,514,524** | **$ 544,935** | **$ 1,104,373** | **$ 1,706,108** | **$ 2,317,583** | **$ 1,368,707** |
| *Target Minimum* | *$ 967,131* | *$ 995,152* | *$ 996,944* | *$ 998,789* | *$ 1,031,849* | *$ 1,034,449* | *$ 1,036,465* | *$ 1,038,542* | *$ 1,072,069* |