



LAKWOOD WATER DISTRICT

Comprehensive Water Plan

February 2020

Comprehensive Water System Plan

Lakewood Water District

February 2020



Murraysmith

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Executive Summary

Authorization

On April 25, 2017, Murray, Smith & Associates, Inc. (MSA) was authorized by the Lakewood Water District (District) to prepare this update to the District's 2013 Comprehensive Water System Plan (CWSP).

Purpose and Compliance

This water system plan is an update to the Lakewood Water District 2013 Comprehensive Water System Plan, which received Washington State Department of Health (DOH) approval in July 2013. The District 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. The purpose of this updated plan is to meet these regulatory requirements and to provide the District with a useful working document to guide the planning, scheduling, and budgeting of water system improvements. This updated plan will also be used by District 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.

Water System Overview

The study area for this plan includes the District's existing retail and wholesale water service areas, which are the same as the District's future service area. The District's retail water service area includes most of the City of Lakewood's city limits, portions of the Town of Steilacoom and portions of unincorporated Pierce County. The District's wholesale water service area includes the retail water service areas of Pierce County Water Cooperative member systems. The District supplies wholesale water to the Town of Steilacoom and Summit Water and Supply Company and has contracts to provide wholesale water to the Rainier View Water Company's Southwood, Spanaway Water Company, and Firgrove Mutual Water Company. The District's existing key water system data is summarized in **Table ES-1**. For additional information about the District's existing water system, refer to **Chapter 2**.

Table ES-1
2018 Water System Data Summary

Description	Data
Population in 2018 (District retail service area)	61,110
Retail Water Service Area	18.5 square miles
Wholesale Water Service Area	1,420 square miles
Total Retail and Wholesale Connections (2018 average)	16,942
Total Retail and Wholesale ERUs Served (2018 average)	34,915
Demand per ERU (2010-2016 average)	255
Demand per Capita (2010-2016 average)	136
Annual Supply (retail and wholesale)	3,641,974,998 gallons
Average Day Demand (retail and wholesale 2018)	6,200 gpm, 8.9 MGD
Maximum Day Demand (retail and wholesale July 3, 2015)	14,937 gpm, 21.5 MGD
Water Loss (2016-2018 average)	8.7%
Maximum Day/Average Day Demand Factor	2.02 (MDD/ADD)
Peak Hour/Maximum Day Demand Factor	1.62 (PHD/MDD)
Number of Pressure Zones (District's System)	6
Number of Wells & Total Capacity (District's System)	30 Active (22,235 gpm)
Number of Pump Stations & Total Capacity (District's System)	12 (21,080 gpm)
Number of Reservoirs & Total Capacity (District's System)	13 (27.0 MG)
Number of Pressure Regulating Stations (District's system)	8
Total Length of Water Main (District's system)	265 miles

Population and Water Demand Projections

Redevelopment and infill within the District's retail water service area is expected to increase the retail population. Within the 20-year planning period of this plan, the District's retail water service area is anticipated to grow by approximately 7,882 people, or 13 percent. This population projection includes the City of Lakewood's Downtown Plan, which projects growth and redevelopment in Lakewood's Colonial, East Commercial, and Town Center districts. For more information on historical and future populations within the District, refer to **Chapter 3**.

Since 2010, the District's total water demand has continued to increase, but the demand per capita was slowly declined. The average demand per capita in the District's retail water service area between 2010 and 2016 was 136 gallons per person per day, which is a two percent reduction

compared to the average per capita demand of 139 gallons per day in the 2013 plan. This trend shows

In 2012 through 2014, the District experienced an increase in distribution system leakage. It quickly took steps to reduce this leakage, such as conducting leak detection audits, calibrating and replacing water source and service meters and replacing aging water mains which are suspected to have leaks. These steps have successfully reduced water system leakage in the last few years.

In addition to the Town of Steilacoom, the District has entered into contracts to provide wholesale water to the Summit Water and Supply Company, Rainier View Water Company and Spanaway Water Company. More information on the District's wholesale customers can be found in **Chapter 2**.

Water System Operation and Maintenance

Operations are performed by 22 field and office personnel employed by the District. Their titles and duties are discussed in detail in **Chapter 7**. The District has established general staffing requirements for many of the higher maintenance facilities for both financial and personnel planning.

The District owns and operates its own equipment to perform routine operations such as small repairs, water quality sampling, cross connection control and service connection taps. There are a number of different measures in place to ensure customer satisfaction and support. Measures include a preventative maintenance schedule, recordkeeping requirements, reporting requirements and procedures for public notification if disruptions are to occur.

To minimize hazard risks the District has developed routine procedures for many different types of operations. These procedures include relative guidelines set forth by the Washington Industrial Safety and Health Act and Occupational Safety and Health Administration. The District also has many of its own requirements in place for the safety of its personnel and customers. Should an emergency arise, the District has procedures, personnel and equipment in place to resolve it.

Water Supply Evaluation

A comprehensive evaluation of District supply facilities was completed that included consideration of a number of approaches, methodologies and solution option development. The supply analysis was completed based on the District's current and future capacity, reliability and redundancy needs.

The District is supplied by 30 active groundwater wells. These wells have sufficient capacity and water rights to meet current and future demands. Many of the District's supply facilities have aging mechanical equipment and aging site piping that needs replacing. These, and other, physical capacity limitations of the District wells necessitate the installation of additional wells and rehabilitation of existing wells to provide reliable operations at projected future supply levels.

Storage Evaluation

A water storage evaluation was completed for the existing and future system-wide water storage requirements. As with the supply system, the storage system meets current and future system needs, but many facilities are aging. The District has made some improvements, but more are still needed. The District plans to replace the Nyanza Hill and the 88th Street and Pine tanks within the next six and twenty years, respectively.

Distribution System Analysis

A computerized hydraulic network analysis was completed to evaluate the performance of the existing distribution system and to aid in the development of proposed system improvements. System performance and adequacy was evaluated to identify deficiencies and develop recommended system improvements for the Capital Improvement Plan (CIP). The distribution system capacity was found to have numerous deficiencies primarily due to the relatively small diameters, age and material of the water mains.

Recommended Improvements

The water system analyses formed the basis for the recommended water system improvements. The majority of the CIP addresses the Annual Water Main Replacement Program. This program's main goal is to replace the District's extensive inventory of asbestos concrete (AC) pipe, as well as increase pipe capacity to accommodate fire-flow requirements. Other recommended improvements include maintenance projects to improve the reliability or performance of existing facilities and proposed new or replacement facilities to address existing age and material concerns. System improvements include recommendations for improvements to reservoirs, pump stations, distribution system water mains and other facilities. Cost estimates are presented for all recommended improvements and annual budgets are presented which support ongoing programs.

Capital Improvement Program

A number of improvements were identified for inclusion in the District's water system CIP. The CIP is recommended for major maintenance and replacement needs of the existing system. **Table ES-2** lists the projects included in the CIP and the estimated costs for the projects. A breakdown of each project is presented in **Chapter 9**. All estimates are in 2018 dollars. Due to the high cost of replacing the District's approximately 160 miles of AC water main, the water main replacement program is presented as being accomplished in 50 years. Other improvements in the CIP are identified to be completed within the 20-year planning period.

The improvements in **Table ES-2** are organized into six categories.

1. Water Main Improvements (WM1-WM3L). Improvements to existing water mains as well as adding new water mains to improve capacity and reliability.
2. Storage Improvements (T1-T6). Improvements include renovating older tanks, replacing tanks due to age and condition, as well as constructing new tanks to facilitate water system operations.
3. Pump Station Improvements (P1 & P2). Improvements focused on updating the District's pump stations to improve reliability, aesthetics, usefulness, safety and serviceability.
4. Well Source Improvements (W1-W4). Improvements focused on updating existing well facilities to improve overall performance and supply.
5. Wholesale Improvements (WS1-WS3). Improvements focused on improving the districts ability to supply adequate water to their wholesale customers.
6. Miscellaneous Improvements (M1-M5). Program-level planned work required to comply with various state and federal water regulations.

Table ES-2
Recommended Capital Improvement Project Summary

CIP Abbreviation	CIP Description	Estimated Cost ¹	Estimated Completion Year
WM	Water Main Improvements	\$228,830,000	2019-39
T	Storage Improvements	26,971,000	2019-39
P	Pump Station Improvements	\$1,105,000	2021-26
W	Well Source Improvements	\$28,050,000	2019-39
WS	Wholesale Improvements	\$18,000,000	2019-20
M	Miscellaneous Improvements	\$1,275,000	2019-39

1. Cost in 2019 dollars

Funding Sources and Water System CIP

The need for improvements to the water system is almost entirely due to infrastructure that has reached the end of its useful service life, is undersized and unable to meet current requirements, or has some other existing deficiency. The improvements identified in this plan have been sized to meet both current needs and future growth within the system.

Improvements identified for the first six years (2019 through 2025) are estimated to cost approximately \$70.7 million, which results in an average expenditure of approximately \$11.78 million per year (in 2019 dollars).

A financing plan has been developed for funding the planned improvements and ongoing operations and maintenance, while providing for debt service payments through 2029. The improvements will be funded from existing reserves, rate revenues, capital facilities charges, and

debt financing, and other anticipated sources (e.g. grants, developer contributions). Most of the future capital project costs will be funded from the proceeds of new revenue bonds. Water rate adjustments are necessary to provide sufficient revenue to support the ongoing operation and maintenance of the water system.

Summary

The water system planning work completed as part of this plan provides an inventory of the District's existing water supply and distribution system, develops and presents criteria for the system analysis, and recommends improvements. The District has continued to operate the water system to provide high quality water in a quantity that will meet future needs. Improvements are recommended to address the age of a number of system components. A summary of all recommended improvements is presented in **Table 9-4**. It is recommended that the District's CIP be funded at approximately \$11.78 million annually over the 20-year planning horizon for recommended storage, supply, and distribution system piping improvements.

Chapter 1

Introduction

1.1 Authorization and Purpose

In April 2017, the Lakewood Water District (District) authorized Murraysmith to prepare a comprehensive water system plan update as required by state law under *WAC 246-290-100*. In accordance with *WAC 246-290-100*, the plan shall be updated and submitted to the DOH every six years. The District's previous comprehensive water system plan was approved in 2013. This updated comprehensive water system plan is intended to:

- Evaluate existing water demand data and project future water demands.
- Analyze the existing water system to determine if it meets minimum requirements mandated by DOH and the District's own policies and design criteria.
- Identify water system improvements that resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.
- Prepare a schedule of improvements that meets the goals of the District's financial program.
- Evaluate past water quality and identify water quality improvements, as necessary.
- Document the District's operations and maintenance program.
- Address supplemental requirements, such as water-wise usage, emergency response, cross connection control, wellhead protection, and water quality monitoring.
- Comply with all other water system plan requirements of DOH.

1.2 Background

The District's existing Comprehensive Water System Plan, dated June 2013, was approved by DOH in July 2013. Several changes in the District's water system and to water system regulations, as they apply to comprehensive water system plans, have occurred since 2013. The District has expanded their wholesale water system in addition to constructing new facilities throughout the District. This Plan addresses these changes and improvements.

1.3 Water System Ownership and Management

The District 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 District's system is shown below in **Table 1-1**.

Table 1-1
Water System Ownership Information Summary

Information Type	Description
System Type	Group A – Community – Public Water System
System Name	Lakewood Water District
County	Pierce
DOH System ID Number	45550 C
Owner Number	003231
Address	11900 Gravelly Lake Drive SW Lakewood, WA 98499
Contact	Randall M. Black, General Manager
Contact Phone Number	253-588-4423

1.4 Water Service Area

The District's Retail Water Service area, which encompasses the Lakewood City Limits, a portion of the City of Lakewood's Urban Growth Area, and a small portion of unincorporated Pierce County, is shown in **Figure 2-3**. The District's Retail Water Service Area comprises an area of approximately 18.5 square miles, with a population of approximately 59,873 in 2016. The wholesale water service area that the District can potentially serve includes the water service areas of members of the Water Cooperative of Pierce County and comprises an area of approximately 155 square miles.

1.5 Overview of Existing System

In 2018, the District provided water service to approximately 16,942 customer connections, or 27,269 equivalent residential units (ERUs). The District also supplies wholesale water through two interties to the Town of Steilacoom, which represents an additional 2,735 ERUs, and through a single intertie to the Summit Water and Supply Company, which represents an additional 4,911 ERUs.

Water supply to the District as of 2018 is provided by 30 active groundwater wells. Five of the District's six water treatment plants remove iron and manganese from some of these wells, while

the sixth water treatment plant removes detergent byproducts from two of the wells. Water storage for the District is provided by thirteen reservoirs that have a total capacity of 27.0 million gallons (MG). The District's water system also has six pressure zones with eight pressure reducing stations, twelve booster pump stations, and more than 265 miles of water main. A summary of 2018 water system data for the District's system is shown below in **Table 1-2**.

Table 1-2
2018 Water System Data Summary

Description	Data
Population (District retail service area)	61,110
Retail Water Service Area	18.5 square miles
Wholesale Water Service Area	1,420 square miles
Total Retail and Wholesale Connections	16,942
Total Retail and Wholesale ERUs Served	34,915
Demand per ERU (2010-2016 average)	255
Demand per Capita (2010-2016 average)	136
Annual Supply (retail and wholesale)	3,641,974,998 gallons
Average Day Demand (retail and wholesale 2018)	6,200 gpm, 8.9 MGD
Maximum Day Supply (retail and wholesale July 3, 2015)	14,937 gpm, 21.5 MGD
Water Loss (2016-2018 average)	8.7%
Maximum Day/Average Day Demand Factor	2.02 (MDD/ADD)
Peak Hour/Maximum Day Demand Factor	1.62 (PHD/MDD)
Number of Pressure Zones (District's System)	6
Number of Wells & Total Capacity (District's System)	30 Active (22,235 gpm)
Number of Pump Stations & Total Capacity (District's System)	12 (13,210 gpm)
Number of Reservoirs & Total Capacity (District's System)	13 (27.0 MG)
Number of Pressure Regulating Stations (District's system)	8
Total Length of Water Main (District's system)	265 miles

1.6 Summary of Plan Contents

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

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

1.7 Definition of Terms

The following terms are used throughout this plan. Definition of these terms is provided as follows.

Consumption: The volume of water used by the water system's customers, based on customer meter records. The volume is measured at each customer's connection to the distribution system.

Connection Charge: A one-time fee paid by a property owner when connecting to the District's water system. This fee pays for the new customer's equitable share of the cost of the existing system. This fee offsets the costs of providing water to new customers and recognizes that the existing water system was largely built and paid for by the existing customers. Meter charges, or hookup fees, are additional in order to recover the cost of meter and service line installation.

Cross-Connection: A physical arrangement that connects a drinking water system with anything other than another drinking water system with the potential for pollution or contamination of the drinking water.

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 sufficient fire fighting capabilities, 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. Peak hour demand usually occurs during the same day as the peak day demand.

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

Fire Flow: The rate of flow of water required during fire fighting, which is usually expressed in terms of gallons per minute (gpm) at a residual pressure of 20-psi.

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

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

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

Maximum Contaminant Level (MCL): The maximum permissible level of contaminant in the water that the purveyor delivers to any public water system user, measured at the locations identified under WAC 246-290-310.

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, 404 Zone refers to the District's lower pressure zone that has tanks with an overflow elevation of 404 feet above mean sea level.

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

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

Storage: Water that is "stored" in a reservoir, or tank, to supplement the supply facilities of a system and provide water supply for emergency conditions. Storage is broken down into the following five components that are defined and discussed in more detail in **Chapter 8** which presents a discussion of operational storage, equalizing storage, standby storage, fire flow storage, and dead storage.

Water Loss: Water that is measured going into the distribution system, but not metered going out of the system.

1.8 List of 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	MG	Million Gallons
ADD	Average Day Demand	mg/L	milligrams per liter
AWWA	American Water Works Association	MGD	Million Gallons per Day
CCR	Consumer Confidence Report	OSHA	Occupational Safety & Health Administration
CIP	Capital Improvement Program	PHD	Peak Hour Demand
DBP	Disinfection By-Product	psi	pounds per square inch
DOH	Department of Health	RCW	Revised Code of Washington
EPA	Environmental Protection Agency	SDWA	Safe Drinking Water Act
ERU	Equivalent Residential Unit	SOC	Synthetic Organic Chemical
fps	feet per second	SWR	Surface Water Treatment Rule
GMA	Growth Management Act	THM	Trihalomethane
gpm	gallons per minute	UGA	Urban Growth Area
GWR	Ground Water Rule	USGS	United States Geological Survey
IOC	Inorganic Compounds	VOC	Volatile Organic Chemical
MCL	Maximum Contaminant Level	WAC	Washington Administrative Code
MCLG	Maximum Contaminant Level Goal	WISHA	Washington Industrial Safety & Health Act
MDD	Maximum Day Demand		

Chapter 2

Water System Description

2.1 General

This chapter describes Lakewood Water District's (District) 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 Background

The Lakewood Water District was formed in 1943. The District originally leased its water supply and distribution facilities from the Federal Works Agency, from whom it later purchased the facilities. At that time, the facilities consisted of four wells, three storage tanks, and approximately 41 miles of water main serving approximately 270 connections. The District began its first groundwater drilling efforts in 1943. The District has grown steadily ever since residential and commercial development occurred within its service area. Facilities now include 13 storage tanks and 34 groundwater wells, of which 30 are active. In 2018 the District served approximately 16,942 service connections and had approximately 265 miles of water main.

Approximately 30 miles of the original 41 miles of water main and appurtenances are still believed to be in service and many mains likely date back to the 1930s. Between 1978 and 1985 Pierce County installed new sewer mains throughout Lakewood, many of the sewer mains were installed in the older neighborhoods which have the original water mains. This construction overwhelmed the District resulting in the sewer contractors repairing hundreds of water main breaks without the guidance of the District. Within the few years after sewer construction, leakage from the water mains increased substantially, resulting in a leak detection and system repair program. During these repairs the District has observed substantial corrosion in the galvanized water services and fittings that were installed during the sewer construction, which has led to premature failure and leaks. The District has also observed leaks caused by settling that resulted from the sewer construction. **Chapter 9** identifies improvements to the water system to address the impact these non-standard materials and sewer construction have had on the water system.

The District began providing water to wholesale customers starting with the Town of Steilacoom in April 1997 and Summit Water and Supply Company in 2003. More recently, April 2019 the District has signed wholesale amendments supply contracts with the Rainier View Water Company, Summit Water, and the Spanaway Water Company water system and the newest Wholesale customer Firgrove Mutual Water Company.

2.3 Retail Water Service Area

The District's Retail Water Service Area is in western Pierce County, Washington, south of Tacoma and east of Puget Sound and largely consists of the City of Lakewood. In addition, a portion of the Town of Steilacoom (Steilacoom) and a small area of unincorporated Pierce County between the City of Lakewood and the Town of Steilacoom is directly served by the District. Customers in this area are billed for consumption directly by the District rather than from the Town of Steilacoom.

The District is responsible for providing public water service and water system development within its Retail Water Service Area. A copy of the legal description for the District's Retail Water Service Area boundary is included in **Appendix A** as an attachment to the District's water service area agreement. The District's retail water service boundary encompasses an area of approximately 18.5 square miles, as shown in **Figure 2-1**. The existing water system generally extends south to Berkeley Street SW, north to the intersection of Bridgeport Way and Flannagan Road, east to Interstate 5, and west to the intersection of 116th Avenue and 107th Street. Based on current conditions the District's retail service area is unlikely to change in the foreseeable future.

2.3.1 Franchise Agreements

The District operates in both the City of Lakewood and unincorporated Pierce County. Therefore, the District has franchise agreements with the City of Lakewood and Pierce County. These franchise agreements allow the District to construct, maintain, operate, replace, and repair water systems in the public right-of-way of these governing agency. Copies of these franchise agreements are included in **Appendix A**.

2.3.2 Geology

The District is located primarily on glacial and interglacial deposits, which extend from the land surface to depths of up to 300 feet below the ground surface (BGS). These sediments are underlain by bedrock of Tertiary age.

The effects of the advance and retreat of the Vashon ice sheet from 18,000 to 14,000 years before present dominate the surficial geology. The Retail Water Service Area's geology is typical of glacial drift in the Puget Lowland, which is Vashon lodgment till (Qvt) overlying older glacial drift which likely includes Qva, compact Vashon advance outwash sands, and interglacial sediments. The glacial till in this region is very dense and typically so is the underlying glacial drift, which was compacted by the weight of more than 3,000 feet of ice when the Vashon ice sheet overrode the area.

Tectonically, the Lakewood area lies between an oblique convergent plate boundary and the rising and volcanically active Cascade Mountain Range. An active subduction zone lies deep below Lakewood and the continental crust is being compressed and pushed northward. This tectonic setting results in significant seismic activity.

2.3.3 Topography

The topography of the District's Retail Water Service Area varies in elevation from approximately 120 feet to 405 feet above mean sea level (MSL). The lowest areas within the service area are in the northern portion of the service area, near Leach Creek. Elevations as high as 405 feet occur in the western portion of the service area, along Hemlock Street. Generally, the District's service area is relatively flat, with some limited areas of higher elevation. Given this topography, the District's largest pressure zone, referred to as the 404 Zone, constitutes of most of the system.

2.3.4 Satellite System Management

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by the DOH to own or operate more than one public water system without the necessity for a physical connection between such systems.

The District is currently not an SSMA but may consider providing SSMA services to small neighboring water systems and evaluate becoming an SSMA on a case-by-case basis. Upon agreement between the two systems to have the District provide SSMA services, the District will pursue the necessary steps to become an approved SSMA. These steps include submitting a notice of intent to the DOH, participating in a pre-submittal meeting with the DOH, submitting a SSMA plan to DOH that meets the plan requirements, and obtaining approval of the plan from DOH.

2.4 Regional Water Cooperative of Pierce County

The District, as a member of the Regional Water Cooperative of Pierce County ("Cooperative"), desires to assist other Cooperative members in meeting the water demands of the rapidly growing communities in Pierce County. The District currently supplies water within the Cooperative's combined service area boundary and through its wholesale transmission main system. The Department of Ecology approved changes to the place of use of the District's water rights to incorporate the combined service areas for distribution of water among Cooperative members.

Cooperative members surrounding the District have found that the costs associated with developing new water supplies exceed the costs of purchasing water from the District and other Cooperative members. Adoption of a Cooperative-Wide service area is consistent with the Pierce County Coordinated Water System Plan (PCCWSP). Page IX-12 of the PCCWSP provides:

It is recommended that the individual systems (Cooperative members) continue to develop groundwater resources in their service areas to extent that the groundwater aquifer will sustain the use and it is feasible to secure a water right. There may be opportunities for joint development of wells and/or storage by adjacent systems. ... As a further step in regional cooperation, it is recommended that the area to be served by the water right include the entire service area of the Cooperative. ... Further, it is suggested that filings for new water rights also identify the entire are. ... Direct interties will be handled per WAC 246-290-100 and 246-290-132.

Since the adoption of the PCCWSP, Chapter 90.03 RCW was revised by the Municipal Water Law, Second Engrossed Second Substitute House Bill (2E2SHB) 1338, which became effective on September 9, 2003. This law recently survived several facial constitutional challenges in the Supreme Court's ruling in Lummi Indian Nation v. State of Washington, 241 P.3d 1220 (2010). Section 5(2) of 2E2SHB 1338, codified at 90.03.386, provides that the place of use of a municipal water supplier's water rights includes any portion of the approved service area in a planning or engineering document approved by the Department of Health that was not previously with the place of use for that supplier's water rights, if the supplier is in compliance with the terms of its water system plan and the alteration of the place of use is not consistent, regarding an areas added to the place of use, with any comprehensive plan or development regulations adopted under chapter 90.82 RCW, or a comprehensive watershed plan adopted under RCW 90.54.040(1) after September 9, 2003, if such a watershed plan has been approved for the area. Approval of the service area for the District's water rights to include the water service areas of other Cooperative members is consistent with the above-described plans and would promote sound and efficient management of water resources throughout the Cooperative's combined service area.

Based on the Pierce County Coordinated Water System Plan, the Municipal Water Law, and the consistent actions of other Cooperative members, the District adopts a service area that includes the service areas of all Cooperative members that are in compliance with the terms of the water system plan or small water system management program, including those regarding water use efficiency, at this time. A map of the Cooperative members is shown in **Figure 2-2**, and a signed copy of the District's water service area agreement is included in **Appendix A**.

2.4.1 Wholesale Water Service Agreements

Per the "Regional Wholesale Water Supply System Report," dated November 2009, the District's wholesale water service area is the service areas of the members of the Cooperative. If additional water systems join the Regional Water Cooperative of Pierce County, the wholesale service area would expand to include those members. **Figure 2-2** shows the District's wholesale water service area.

The District currently provides wholesale water supply to the Town of Steilacoom and the Summit Water and Supply Company. The District also has wholesale contracts with Spanaway Water Company, Rainier View Water Company's Southwood, and Firgrove Mutual Water water systems. The terms of these wholesale water agreements are summarized below. The District would consider adding additional wholesale partners if the requesting water utility is within the District's wholesale area, and the District has sufficient water capacity to meet the request.

2.4.1.1 Town of Steilacoom Wholesale Water Agreement

The District has an agreement with the Town of Steilacoom to supply the Town with potable water. The agreement, which was signed on July 17, 2019, states that the District will supply the Town of Steilacoom with wholesale water for a period of at least 20 years. The District agrees to convey water to the Town of Steilacoom through interties monitored by two master meters. The District

is contracted to supply a maximum of 2.0 million gallons per day. A copy of the agreement is included in **Appendix B**.

2.4.1.2 Summit Water and Supply Company Wholesale Water Supply Agreement

Summit entered into an agreement with the District on August 5, 2004 to purchase wholesale water for a period of at least 20 years. The agreement indicates that the District will supply wholesale water to Summit, based on a schedule that provides up to 0.75 million gallons per day (mgd) through December 31, 2007, up to 1.2 mgd from January 1, 2008 through December 31, 2017, and up to 2.0 mgd after December 31, 2017. Lakewood Water and Summit Water have amended these contracts to provide for more water copies of these amendments are attached in **Appendix B**.

2.4.1.3 Spanaway Water Componay Wholesale Water Supply Agreement

The District and Spanaway Water Company entered into an agreement on March 2, 2009 to supply wholesale water for at least 20 years. The agreement outlines that the District will supply up to 0.43 mgd to Spanaway from July 1, 2012 through June 30, 2015, up to 0.72 mgd from July 1, 2015 through June 30, 2018 and up to 1.0 mgd after July 1, 2018. A copy of this agreement is included in **Appendix B**.

2.4.1.4 Rainier View Water Company Wholesale Water Agreement

Rainier View entered into an agreement with the District on July 29, 2009 to purchase wholesale water for a period of at least 50 years after the intertie with Tacoma is built. The agreement indicates that the District will supply wholesale water to Rainier View's Southwood water system, based on a schedule that provides up to 0.5 mgd through June 30, 2012, up to 1.0 mgd from July 1, 2012 through June 30, 2015, up to 1.5 mgd from July 1, 2015 through June 30, 2018, and up to 2.0 mgd after July 1, 2018. A copy of this agreement is included in **Appendix B**.

In April of 2019 Rainier View Water Company signed an amendment to their existing wholesale contract amending the amount of water to be taken and share in the costs of the Wholesale Transmission Main extension project. The amendment adds an additional 1.0 mgd to the contracted 2.0 mgd. The amendment to this contract is included in **Appendix B**.

2.4.1.5 Firgrove Mutual Water Wholesale Water Agreement

In April of 2019 Firgrove Mutual Water Company and Lakewood water signed a wholesale supply contract to sell 2 MGD initially to Firgrove. A copy of this agreement is included in **Appendix B**.

2.5 Existing Water Facilities

The following sections present a detailed description of the existing water system and the current operation of the facilities. The District's most recent Water Facilities Inventory Form (WFI) is included in **Appendix D**. The analyses of the existing water facilities are presented in **Chapter 8**.

2.5.1 Pressure Zones

The District currently serves customers within an elevation range of approximately 120 feet above MSL in the northern areas of the District's service area to approximately 405 feet above MSL in the Hemlock Hill area of the system. Most of the service area is relatively flat, but it does contain some small areas with higher elevations. The range of elevations requires that the water pressure be increased or reduced to maintain pressures that are safe and sufficient to meet the service requirements of the system. This is achieved by dividing the water system into six pressure zones, as shown in **Figure 2-3**. Each of these zones will be referred to by their maximum hydraulic elevation in feet above MSL, as summarized in **Table 2-1**.

Table 2-1
Pressure Zone Data Summary

Zone Name	Maximum Hydraulic Elevation (above MSL)	Storage Facilities	Supply Facilities
404	404 ft	Forster (Pumped Storage), American Lake Gardens, Ghilarducci, Washington Boulevard, Hemlock Hill/Dunbar, 104th & Bridgeport Way, Nyanza Hill, Oakbrook, and Philip Tanks	A-3, D-2, D-3, E-2, E-3, F-2, I-4, J-1, J-2, N-1, N-3, O-2, Q-1, O-2, R-1, S-1, S-2, Q-3, O-1, U-1, G-1, G-2, H-1, H-2, I-1, I-3, K-1, K-2, L-2, P-1R and P-2 Wells
455	455 ft	88th & Pine Tank (Pumped Storage)	Steilacoom Boulevard and 88th & Pine Pump Stations, J-1, J-2 and J-3 Wells
460	460 ft	No Storage Facilities	Nyanza Hill Pump Station
470	470 ft	No Storage Facilities	Dean Court PRV Station
490	490 ft	Farwest Drive Tank	Hemlock Hill, 114th & Old Military Road, & Philip Tank Pump Stations
513	513 ft	Hemlock Hill Elevated Tank, Dave Hall Hydropillar	104th & Butte, Hemlock Hill, Philip Tank and Deepwood Pump Stations, L-3 Well

2.5.2 Supply Facilities

Water supply to the District's system is provided by 30 active groundwater wells from a total of 34 wells. Three of the inactive wells, the Hemlock Hill (L-1), Oakbrook (O-1), and Hipkins (I-) Wells, are currently not being used, but can be placed in service if needed. The Deepwood (Q-3) Well is abandoned as it would require treatment for manganese on a very low producing well.

All wells are equipped with a telemetry and control technology called "WellSaver," which continuously monitors aquifer levels and adjusts pumping rates or shuts down wells to avoid excessive water level drawdown in the well. Most of the District's wells are equipped with either an on-site emergency generator set or a receptacle which allows power to be provided by the District's portable emergency generator set.

All of the wells supply the 404 Zone, except for the L-3 Well, which supplies the 513 Zone, and the J-1, J-2, and J-3 Wells which supply the 455 Zone. In addition, the J Wells can serve either the 404 Zone or the 455 Zone through the use of a variable frequency drive and associated valving control in an emergency.

A more detailed description of each well source is provided below, and additional data is outlined in **Table 2-2**. Supplementary well data is in the facility data sheets and is included in **Appendix C**.

2.5.2.1 A-3 Well (Tillicum)

The A-3 Well, also referred to as the Tillicum Well, is located in the Tillicum area, in the southern portion of the water system. The well site is fenced and located in a residential area near the intersection of Grant Avenue and Lake Street. An abandoned 0.15 MG tank is also located on the site. The tank is empty but is maintained as a standby facility for emergency storage. The site may also be used for an additional storage facility in the future. The well is housed separately from the chlorine generation equipment. The secured wood-frame building contains the chlorine injectors, mechanical equipment, and electrical equipment.

The chlorine generation equipment building contains the chlorine generator, sodium hypochlorite solution storage tank, and chlorine generation supplies. A stationary engine generator set, located outside of the buildings, provides backup power supply to the well. Two other wells that were once on the same site, the A-1 Well and the A-2 Well, have been abandoned.

2.5.2.2 D-2 and D-3 Wells (Yard)

The D-2 and D-3 Wells, also referred to as the Yard Wells, are located in a separate building behind the District office on property that is fenced with a locking gate. The wells are housed in a secured building that contains the mechanical, electrical, chlorination and filtration equipment. A stationary engine generator set, located outside of the building, provides backup power supply to the wells and the shop in the event of a power outage.

2.5.2.3 E-2 and E-3 Wells (Washington Boulevard)

The E-2 and E-3 Wells, also referred to as the Washington Boulevard Wells, are located on Washington Boulevard, near Interlaken Drive on property that is fenced with a locking gate. The Washington Boulevard 3.72 MG Tank is also at this site. The wells are housed in a secured wood-frame building that contains the mechanical, electrical, and chlorination equipment. The site has receptacles to connect a portable engine generator set for backup power supply to the wells. The water produced by the wells is chlorinated before entering the distribution system.

2.5.2.4 2.1.1.1 H-1 and H-2 Wells (Ponders)

The H-1 and H-2 Wells, also referred to as the Ponders Wells, are located on the east side of Interstate 5 and relatively close to the Nyanza Hill area on property that is fenced with a locking gate. The site also contains the Ponders GAC System, the Ponders Aeration Towers and the

Ponders Pump Station, which are separate facilities. Each well is in its own secured wood-frame building that houses the well's mechanical and electrical equipment. The site has receptacles to connect a portable engine generator set for backup power supply to the wells.

The stripping towers, clear well, and pump station were installed in 1985 after the water source was contaminated from nearby dry-cleaning waste products. Water that is pumped from the wells into the stripping towers settles in a clear well and is pumped directly into the 404 Zone by the Ponders Pump Station. The water is chlorinated as it enters the clear well.

In 2018 the District closed the Ponders wells due to elevated levels of PFOA and PFOS found at this site. To address these concerns, the District added a GAC system to the Ponders site and replaced the air stripping towers. This facility was returned to service in late 2019.

2.5.2.5 L-2 and L-3 Wells (Hemlock Hill)

The L-2 and L-3 Wells, also referred to as the Hemlock Hill Wells, are located on Hemlock Hill, near the intersection of Crestwood Drive and Hemlock Road. Each well is located in its own secured building that houses the well's mechanical and electrical equipment. The inactive L-1 well is also located on the site. The District has water rights for the L-1 Well and could consider placing it in service in the future. The wells are located at a large fenced lot with the Hemlock Hill Elevated Tank, Hemlock Hill/Dunbar Reservoir, the Dave Hall Hydropillar and the Hemlock Hill Pump Station. Onsite chlorine generation equipment is housed in a separate building on the site, and water produced by the wells is chlorinated before entering the distribution system. A stationary engine generator set is located onsite to provide backup power supply.

2.5.2.6 N-1, N-2 and N-3 Wells (View Road)

The N-1, N-2 and N-3 Wells, also referred to as the View Road Wells, are located northwest of Lake Louise near the intersection of View Road and Rigney Road at the same site as the View Road Treatment Plant on property that is fenced with a locking gate. The wells are the main source of supply to the Steilacoom Boulevard Intertie, which supplies most of the Town of Steilacoom's water system. The Military Road Intertie provides the remaining supply to the Town. All three wells are located outside of the CMU block building that houses the District's laboratory and filter treatment plant. The site has receptacles to connect a portable engine generator set for backup power supply to the wells. Chlorine solution for disinfection is generated onsite and injected into the water produced by the wells before it enters the pressure filter system to remove iron and manganese from the water.

Table 2-2
Well Data Summary

Well Name	Date Constructed	Depth (BGS)	Pump Type	Avg. Flow Rate (gpm)	Motor Size (HP)	Aquifer Level	Zone Supplied	Backup Power	Tank(s) Controlling the Well
A-3	1965	481	Submersible	925	100	E	404	Generator	Nyanza Hill
D-2	1959	497	Verticle Turbine	875	150	E	404	Generator	Washington Boulevard
D-3	1959	224	Submersible	875	75	C	404	Generator	Washington Boulevard
E-2	1963	489	Vertical Turbine	868	125	E	404	Receptacle	Washington Boulevard
E-3	1963	275	Vertical Turbine	768	100	C	404	Receptacle	Washington Boulevard
F-2	1965	535	Submersible	983	125	E	404	Generator	Bridgeport Way
G-1	1950	173	Verticle Turbine	1,250	150	A	404	Receptacle	Nyanza Hill
G-2	1960	180	Submersible	875	100	A	404	Receptacle	Nyanza Hill
H-1	1951	110	Verticle Turbine	1,370	150	A	404	Receptacle	Nyanza Hill
H-2	1959	105	Vertical Turbine	1,125	100	A	404	Receptacle	Nyanza Hill
I-1	1960	267	Submersible	620	150	C	404	Receptacle	Oakbrook
I-3	1974	277	Verticle Turbine	750	125	C	404	Receptacle	Philip Tank
I-4		332		INACTIVE					
J-1	1952	157	Verticle Turbine	975	100	A	404	Generator	88 th & Pine
J-2	1961	605	Submersible	720	125	E	455	Generator	88 th & Pine
J-3	2005	180	Submersible	850	100	A	455	Generator	88 th & Pine
K-1	1958	571	Submersible	963	100	E	404	Receptacle	Nyanza Hill
K-2	1958	572	Submersible	1,188	125	E	404	Receptacle	Nyanza Hill
L-1				INACTIVE					
L-2	1961	213	Submersible	785	60	A	404	Generator	Hemlock Hill/Dunbar
L-3	1969	245	Submersible	525	60	A	513	Generator	Hemlock Hill/Dunbar & Dave Hall Hydropillar
N-1	1962	1,064	Submersible	988	250	G	404	Receptacle	Oakbrook
N-2	1962	566	Submersible	913	200	E	404	Receptacle	Oakbrook
N-3	2018	Drilling	Submersible	Pending	250	E	404	Receptacle	/ Oakbrook
O-1		255		INACTIVE					
O-2	1966	314	Submersible	850	125	C	404	Generator	Oakbrook
O-3	1983	201	Submersible	938	125	C	404	Generator	Oakbrook
P-1R	1985	496	Submersible	550	75	E	404	Receptacle	Ghilarducci
P-2	1969	488	Submersible	1,400	200	E	404	Receptacle	Ghilarducci
Q-1	1972	540	Submersible	945	150	A	404	Receptacle	Philip Tank
Q-3		71		ABANDONED					
R-1	1987	565	Verticle Turbine	1,308	150	E	404	Receptacle	Nyanza Hill
S-1	1987	355	Submersible	650	100	C	404	Receptacle	
S-2	1987	546	Submersible	825	125	E	404	Receptacle	
U-1	1994	304	Submersible	813	100	C	404	None	Ghilarducci

2.5.2.7 O-2 and O-3 Wells (Oakbrook)

The O-2 and O-3 Wells, also referred to as the Oakbrook Wells, are located in the Oakbrook residential neighborhood in the northwest corner of the service area, between Onyx Court and 81st Street on property that is fenced with a locking gate. The wells are on the same property as the Oakbrook 0.5 MG Tank. Each well is located in its own secured building that houses the well's mechanical, electrical, and chlorination equipment. A stationary engine generator set is located onsite to provide backup power supply to the wells in the event of a power outage. Chlorine solution is generated onsite and injected into the water produced by the wells before it enters the distribution system. The O-1 Well, which is no longer in service, is located at the Oakbrook Country Club Maintenance Facility. The District has water rights for the O-1 Well and may consider placing it in service in the future.

2.5.2.8 P-1R and P-2 Wells (Steilacoom Boulevard)

The P-1R and P-2 Wells, also referred to as the Steilacoom Boulevard Wells, are located adjacent to Steilacoom Boulevard, northeast of Seeley Lake on property that is fenced with a locking gate. The wells are on the same property as the Ghilarducci 3.52 MG Tank and the Steilacoom Boulevard Booster Pump Station. The site is in close proximity to a West Pierce County Fire District training facility. The P-1R Well is located outside of its building that houses the well's mechanical and electrical equipment. The P-2 Well is located inside its own secured building with the well's mechanical and electrical equipment. Onsite chlorine generation equipment is also installed in the P-2 Well building. The site has receptacles to connect a portable engine generator set for backup power supply to the wells. Chlorine solution is generated onsite and injected into the water produced by the wells before it enters the distribution system.

2.5.2.9 Q-1 Well (Deepwood)

The Q-1 Well, also referred to as the Deepwood Well, is located near the intersection of Deepwood Drive and 112th Street on property that is fenced with a locking gate. The well is in the same secured wood-frame building as the Deepwood Pump Station. The well building contains the mechanical, electrical, and chlorination equipment. The site has a receptacle to connect a portable engine generator set for backup power supply to the well.

Chlorine solution for disinfection is generated onsite and injected into the water produced by the well before it enters the pressure filter system to remove iron and manganese from the water. To aid in silicate removal, permanganate is injected before filtration. The Q-3 Well, which is abandoned and not usable, is also located on site. The District has water rights for the Q-3 Well as part of the Abitibi mitigation and may consider placing it in service in the future.

2.5.2.10 R-1 Well (112th Street)

The R-1 Well, also referred to as the 112th Street Well, is located near the intersection of 112th Street and 60th Avenue on property that is fenced with a locking gate. The well is located outside of a secured wood-frame building, which houses the well's electrical, mechanical, and onsite

chlorine generation equipment, and has a receptacle to connect a portable engine generator set for backup power supply to the well. The water produced by the well is chlorinated by continuous injection of sodium hypochlorite.

2.5.2.11 S-1 and S-2 Wells (Angle Lane)

The S-1 and S-2 Wells, also referred to as the Angle Lane Wells, are located near the intersection of Angle Lane and 100th Street Court on property that is fenced with a locking gate. Chlorine solution for disinfection is generated onsite and injected into the water produced by the well before it enters the pressure filtration system to remove iron and manganese from the water. To aid in silicate removal, permanganate is injected before filtration. The secured wood frame building houses the pressure filtration system and the electrical, mechanical and chlorine generation equipment. The wells are located outside of the building. The building is equipped with roll-up doors for equipment removal. The site has receptacles to connect a portable engine generator set for backup power supply to the wells.

2.5.2.12 U-1 Well (Country Place)

The District's U-1 Well, also referred to as the Country Place Well, is located in a newer housing development in the northern portion of the service area, near the intersection of 77th Street and 51st Avenue on property that is fenced with a locking gate. The secured wood frame building houses a pressure filter system and the well's electrical, mechanical and onsite chlorine generation equipment. The well is located outside of the building. The site does not have a standby engine generator set or receptacle for backup power supply to the well. Chlorine solution for disinfection is generated onsite and injected into the water produced by the well before it enters the pressure filtration system to remove iron and manganese from the water.

2.5.3 Water Treatment

All of the water from the District's wells is chlorinated before it enters the distribution system. Re-chlorination is also used at the District's Philip and American Lake Gardens storage tanks to maintain adequate chlorine residual in the stored water. The District does not fluoridate its water supply.

2.5.3.1 Filtration and Adsorption Treatment

Several of the District's wells have relatively high concentrations of iron and manganese. To remove these minerals from the water, filtration and adsorption techniques are used. The View Road Treatment Plant uses a low rate, multiple layered filtration process consisting of four anthracite/silica sand pressure filter cells. Water from the N-1, N-2, and a new well, N-3 Wells is treated at this site and supplied to the District's 404 Zone and to the Town of Steilacoom. Sodium Hypochlorite (NaOCl) is added to the raw water to oxidize the soluble iron and manganese, as well as oxidizing any hydrogen sulfide or ammonia before the water enters the pressure filter. The sodium hypochlorite solution also provides for desired chlorine residual in the system. The

disinfected water is filtered through the four anthracite/silica sand pressure filter cells to remove or adsorb the iron and manganese. The filter cells are backwashed regularly to remove particulates that clog the media. The backwash water is retained, treated and returned to the system so that minimal water is wasted.

2.5.3.2 Adsorption Treatment

Adsorption is the second iron and manganese removal technology used by the District and is applied through individual pressure filters in parallel. The total number of filters used at a single site depends on the production capacity and raw water concentrations of iron and manganese in the water provided by a well. The District uses this type of filter system at the Q-1, S-1, D-3, and U-1 Wells. Adsorption removal mechanisms adsorb dissolved iron and manganese onto a manganese dioxide medium. This process also includes the injection of NaOCl prior to the filters for oxidation and to provide chlorine residual in the distribution system.

2.5.3.3 Aeration Treatment

The third type of treatment facility used by the District is at the Ponders H-1 and H-2 Well field. Aeration tower technology was added to the well field, because of the contamination of an aquifer in the Ponders Corner vicinity in the 1980's, after it was discovered that a dry cleaning business was dumping waste products to a private dry groundwater well. Over time, these products contaminated the aquifer with a substantial amount of detergent by-products.

The contaminated water from the wells is pumped to the top of two 30-foot high packed towers where the water is evenly distributed over the full surface of the packing media, which in this case are 2-inch diameter perforated plastic balls. The media disperses the water into droplets allowing more surface contact from air that is blown from the bottom and up each tower. The lighter detergent molecules are separated from the heavier water molecules and blown off to the atmosphere. The water droplets drop down through the media and collect at the bottom of the towers where they flow through a manifold into an approximately 25,000 gallon capacity clear well. NaOCl is injected into the manifold prior to the clear well. The District owns and maintains the wells. The clear well, re-lift pumps and the air stripping towers are owned by the Washington State Department of Ecology (DOE) but are maintained by the District. Since 2015 the District has been trying to secure money from the state to upgrade the treatment facilities. The equipment, piping and building has received financing in 2019 from the State for replacement as the existing facilities that has reached its life expectancy. It is anticipated that treatment will need to continue for the foreseeable future.

2.5.3.4 Granular Activated Carbon Treatment

In 2016 Lakewood water was notified by Joint Base Lewis McChord that they had elevated Perfluorinated Compounds present in their drinking water and that the PFOA and PFOS levels had exceeded the Lifetime Health Advisory Level (LHAL) set by the EPA. This notice was provided shortly prior to a press release from JBLM announcing to the local news, Lakewood Water District Staff and Management moved quickly to test our system and found that several sites contained

recordable levels but none at the time approached or exceeded the LHAL. The District started a monitoring program for these sites and no noticeable changes were found until the Joint Base decided to stop using the wells that were testing positive for PFOA or PFOS. It was then that the District noticed an increase in elevations over a shorter period of time thus causing us additional concerns. The District continued to test and levels continued to rise until September of 2018 when the District Commissioners took action to protect our rate payers and the District closed down the Ponders Wells site until the District could design and build a GAC treatment facility. From September to May, (2018) the District designed in conjunction with other facilities upgrades at Ponders a full GAC system capable of treating the current peak demands and expandable to meet the full potential of the site at a later date. The District found in its investigation that GAC was the most effective and lowest cost to maintain for removing the PFOA and PFOS from the District's wells at this time. The District will have this facility up online before the end of 2019. The District continues to worked with the State Department of Health in fast tracking this project and will be monitoring to seeing what action levels the State of Washington sets over the coming public comment period over the next couple of years.

2.5.4 Pump Station Facilities

The District's water system has 12 pump stations. A summary of data regarding each pump station is presented in **Table 2-3**.

Each pump station serves one of three purposes:

1. Pumping water from a reservoir to the system where the elevation of the reservoir is too low to gravity feed into the system.
2. Continuously pumping water into a pressure zone for maintaining adequate pressures where the pressure zone doesn't have a tank for maintaining pressures (i.e. a closed zone).
3. Pumping water from a lower pressure zone to a higher-pressure zone where the higher-pressure zone has one or more tanks to maintain pressures.

A more detailed description of each pump station is provided below. Additional pump station data is in the facility data sheets included in **Appendix C**.

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	Pump Mfg
Forster Reservoir	2	Forster Reservoir	404 Zone	60	2,000	Vertical Turbine	Peerless
Ponders Relift	3	Ponders Clear Well	404 Zone	60	2,700	Vertical Turbine	Byron Jackson
114 th & Old Military	1	404 Zone	490 Zone	75	800	End Suction	Jacuzzi
104 th & Butte	1	404 Zone	Philip Tank/ Dunbar Reservoir	75	950	Split Case	Peerless
Hemlock Hill	3	404 Zone	490 Zone	125	3,600	End Suction	Cornell
Hemlock Hill	1	404 Zone	513 Zone	50	1,000	End Suction	Cornell
Philip Tank	2	Philip Tank	490/ 513 Zone	50	1,800	Centrifugal	Berkeley
Nyanza Hill	3	Nyanza Hill Tank	460 Zone	10 - 25	2,180	End Suction	Peerless
Deepwood	1	404 Zone	513 Zone	40	650	End Suction	Peerless
Steilacoom Boulevard	2	Ghilarducci Tank	455 Zone	60	3,600	End Suction	Cornell
88 th & Pine #1	1	88 th & Pine Tank	455 Zone	25	700	Inline	Paco
88 th & Pine #2	1	88 th & Pine Tank	455 Zone	40	1,100	Centrifugal	Peerless

2.5.4.1 404 Zone Forster Reservoir Pump Station

The above-grade Forster Reservoir Pump Station was constructed in 1990 and is located on the same site as the Forster Reservoir on property that is owned by the District. The site has a receptacle to connect a portable engine generator set for backup power supply to the pumps. The Forster Reservoir Pump Station pumps water from the Forster Reservoir into the 404 Zone.

2.5.4.2 404 Zone Ponders Relift Station

The Ponders Relift Pump Station is located at the same site as the Ponders Stripping Towers and the H-1 and H-2 wells. The above-grade pump station and stripping towers were built in 1985. The wells pump water from the aquifer to the stripping towers where the water is aerated and conveyed into a clear well. The Ponders Relift Pump Station pumps water from the clear well to the 404 Zone. The site has a receptacle to connect a portable engine generator set for backup power supply to the pumps.

2.5.4.3 490 Zone 114th Street and Old Military Road Pump Station

The 114th Street and Old Military Road Pump Station was constructed in the 1960s. The above-grade pump station is in a small secured CMU block building located on the corner of 114th Street and Old Military Road. The pump station has a receptacle to connect a portable engine generator set for backup power supply to the pump. This pump station is currently used as an emergency backup for the Hemlock Hill Pump Station.

2.5.4.4 513 Zone 104th Street and Butte Drive Pump Station

The 104th Street and Butte Drive Pump Station was constructed in 1994. The pump station is a below-grade concrete vault located on the corner of 104th Street and Butte Drive. The pump station has a receptacle to connect a portable engine generator set for backup power supply to the pump. This pump station fills the Hemlock Hill/Dunbar Reservoir.

2.5.4.5 490 and 513 Zone Hemlock Hill Pump Station

The Hemlock Hill Pump Station was constructed in 2005. The pump station is located inside of the 0.5 MG Dave Hall Hydropillar structure on the same site as the Hemlock Hill storage tank and the L-2 and L-3 Wells. This pump station has four centrifugal pumps. Three pumps, each with a design flow rate of approximately 1,800 gpm and a 125 HP motor, pump water from the 404 Zone to the 490 Zone. Up to two pumps operate in parallel to provide water to the 490 Zone. The fourth pump, with a design flow rate of approximately 1,000 gpm and a 50 HP motor, pumps water from the 404 Zone to fill the Dave Hall Hydropillar.

2.5.4.6 490 and 513 Zone Philip Tank Pump Station

The Philip Tank Pump Station was constructed in 1998 with the Philip Tank. The above-grade pump station is in a secured CMU block building located on the same site as the Philip 8.0 MG Tank. The

District must manually open and close valves in the system to direct water from the pump station to either the 490 Zone or the 513 Zone, and typically provides water to the 513 Zone. A stationary engine generator set is located onsite to provide backup power supply to the pump station.

2.5.4.7 455 Zone 88th and Pine Pump Stations

The 88th and Pine Pump Stations are two separate below-grade vaults on the same site as the 88th and Pine Tank and J Wells. A stationary engine generator set is located onsite to provide backup power supply to the pump stations. Both pump stations pump water to the 455 Zone. Pump Station No. 1 was constructed in 1960 and consists of one centrifugal pump. Pump Station No. 2, constructed in 1997, also contains one pump. Both pump stations are used to pump water from the 88th and Pine Tank to the 455 Zone. Any water in excess of 455 Zone demands is re-circulated back to the 404 Zone through a backpressure-sustaining control valve located in a below-grade vault on Montgrove Avenue near Pacific Highway South. Several control valves will also allow reverse flow from the 404 Zone to the 455 Zone during short-term emergencies, when the hydraulic grade in the 455 Zone drops below the grade of the 404 Zone.

2.5.4.8 460 Zone Nyanza Hill Pump Station

The Nyanza Hill Pump Station was constructed in 1998 and will be upgrade in 2020 as part of the Nyanza Hill Tank and Pump Station project. The above-grade pump station and adjacent Nyanza Hill Tank are located on property that is owned by the District. A stationary engine generator set is located onsite to provide backup power supply to the pump station. An earthquake sensor is also installed inside the pump station. The pump station serves as the only supply to the 460 Zone, which requires at least one continuously running pump. Water pumped from this station more than 460 Zone demands is re-circulated back to the 404 Zone through a pressure relief control valve located in a below-grade vault on Nyanza Park Drive.

2.5.4.9 513 Zone Deepwood Pump Station

The Deepwood Pump Station was constructed in 2002. The above-grade pump station is housed in the same building as the Q-1 Well. The pump station uses one 40 HP pump to pump water from the 404 Zone to the 513 Zone. In addition, the pump station has a receptacle to connect a portable engine generator set for backup power supply to the pump.

2.5.4.10 455 Zone Steilacoom Boulevard Pump Station

The Steilacoom Pump Station was constructed in 2009. The above-grade pump station is housed in its own secured wood framed building. There are two 60 HP end suction centrifugal pumps and one 20 HP end suction jockey pump that pump water from the Ghilarducci Tank to the 455 Zone. The pump station has room for up to two additional pumps in the future, and there is no backup power supply to the pump station.

2.5.5 Storage Facilities

The District's water system has 13 active storage facilities. Eleven of these are tanks that float off of the pressure zone that they serve and provide flow into the system by gravity. The Forster Reservoir has an overflow elevation of 239 feet, too low to gravity feed the 404 Zone, so booster pumps are required to use storage from this facility. The 88th and Pine Tank contains water that is pumped to serve the 455 Zone. This tank previously provided water to the 404 Zone but was converted to a pumped storage tank in 2009 during the creation of the 455 Zone. The Washington Boulevard 1.0 MG Tank, which also required pumping, was abandoned by the District several years ago. The Tillicum Elevated Tank has also been abandoned for several years but remains standing for the sole purpose of supporting cell phone antennas. A more detailed description of each storage facility is provided below. Additional storage facility data is summarized in **Table 2-4** and included in the facility data sheets included in **Appendix C**.

Table 2-4
Tank Data Summary

Facility Name	Overflow Elevation (ft)	Zone Served	Water Storage Height ¹ (ft)	Diameter (ft)	Total Volume (MG)	Volume/ft (gallons)	Material	Year Constructed
American Lake Gardens Tank	404	404	74.0	90	3.54	47,586	Steel	1987
Ghilarducci Tank	404	404	141.0	65	3.50	24,821	Steel	1986
Washington Boulevard Tank	404	404	78.0	90	3.72	47,586	Steel	1986
Hemlock Hill/Dunbar Reservoir	404	404	27.0	90	1.30	47,586	Concrete	1981
Hemlock Hill Elevated Tank	513	513	30.0	24	0.10	3,384	Steel	1956
Dave Hall Hydropillar	513	513	26.0	57	0.50	19,087	Steel	2006
104 th & Bridgeport Way Hydropillar	404	404	21.0	64	0.50	24,063	Steel	1972

Table 2-4 (continued)
Tank Data Summary

Facility Name	Overflow Elevation (ft)	Zone Served	Water Storage Height (ft)	Diameter (ft)	Total Volume (MG)	Volume/ft (gallons)	Material	Year Constructed
Farwest Drive Tank	490	490	34.0	30	0.50	14,687	Steel	1969
Oakbrook Elevated Tank	404	404	34.0	30	0.50	14,687	Steel	1968
88th & Pine Tank	490	455	95.0	30	0.50	5,287	Steel	1953
Nyanza Hill Tank	404	404	83.0	30	0.44	5,287	Steel	1952
Forster Reservoir	239	404	30.0	140	3.50	115,146	Concrete	1990
Philip Tank	411	404	65.0	145	8.00	123,517	Concrete	1998
1 –Water Storage Height is the total height of water stored in the tank/reservoir, which differs from the total tank height for elevated tanks.								

2.5.5.1 American Lake Gardens 404 Zone 3.54 MG Tank

The American Lake Gardens Tank is located in a forested area in the south end of the system. A single 16-inch diameter water main serves as the tank's common inlet/outlet pipe. The tank is anchored for seismic events according to current seismic standards. The fenced site is accessed by a long gravel access road off 150th Street and contains a secured adjacent building which houses the tank's telemetry equipment, cathodic protection equipment, and altitude valve.

Water quality improvements completed in 2002 included the installation of separate inlet and outlet piping within the tank, installation of recirculation pumps to force turnover in the tank, and installation of chlorination equipment to increase the chlorine residual within the tank. The interior was stripped and recoated in 2016. The tank's exterior was last repainted in 2017.

2.5.5.2 Ghilarducci 404 Zone 3.52 MG Tank

The Ghilarducci Tank is located on the same site as the P-1R and P-2 Wells and the Steilacoom Boulevard Booster Pump Station. A 12-inch diameter water main serves as the tank's inlet pipe, and a 16-inch diameter pipe serves as the outlet pipe providing water to the Steilacoom Boulevard

booster pump station and the 404 Zone. The tank is anchored for seismic events according to 1986 seismic standards. The tank's telemetry equipment is located, along with its altitude valve, in a separate secured building on the site.

The tank's exterior was repainted in 2011. Improvements were also completed in 2002 to improve water quality in the tank which included the installation of separate inlet and outlet piping within the tank, installation of recirculation pumps to force turnover in the tank, and installation of chlorination equipment to boost the chlorine residual within the tank. A real time chlorine analyzer and sampling lines were also added so that the chlorine residual could be measured at different heights in the tank. The analyzer is connected to the District's telemetry system, enabling chlorine levels to be monitored remotely at the District office. Check valves inside the tank were recently removed as part of the construction of the Steilacoom Boulevard Pump Station, which draws water from the Ghilarducci Tank to serve the 455 Zone. Since the construction of the pump station water quality has improved and the re-chlorination equipment is no longer used. The water level in the Ghilarducci Tank controls the operation of the Forster Pump Station, P-1R, P-2, and U-1 Wells. The exterior was painted in 2004 and was last inspected in 2009.

2.5.5.3 Washington Boulevard 404 Zone 3.72 MG Tank

The Washington Boulevard Tank is located on a fenced site off of Washington Boulevard. At the top of a hill, the tank is located at the same site as an abandoned pump station and the E-2 and E-3 Wells. A single 10-inch diameter water main serves as the tank's common inlet/outlet pipe. The tank is anchored for seismic events in accordance with 1986 seismic standards. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment and chlorine analyzers are located at the site.

The Washington Boulevard Tank underwent water quality improvements in 2002 that included separation of the inlet and outlet piping within the tank. Telemetry and electrical equipment were also added as part of these improvements. A real-time chlorine analyzer and sampling lines were added to measure the chlorine residual at different heights in the tank. The analyzer is connected to the District's telemetry system, enabling chlorine levels to be monitored remotely at the District office. The tank's interior coating was last inspected in 2002 and was found to be in good shape. The tank's exterior coating was repainted in 2002. The water level in the Washington Boulevard Tank controls the production of the O-2, D-3, E-2, and E-3 Wells.

2.5.5.4 Hemlock Hill/Dunbar 404 Zone 1.3 MG Reservoir

The Hemlock Hill/Dunbar Reservoir is located on a large fenced site on Hemlock Hill, near the intersection of Crestwood Drive and Hemlock Road. The tank shares the site with the Hemlock Hill Elevated Tank, the L-2 and L-3 Wells, the Hemlock Hill Pump Station and the Dave Hall Hydropillar Tank. A single 12-inch diameter water main serves as the reservoir's common inlet/outlet pipe. The reservoir's altitude valve is located in a below-grade concrete vault. Telemetry equipment is located in a separate building at the site. There is no exterior ladder for this reservoir, and the reservoir is not anchored for seismic events. The water level in the Hemlock

Hill/Dunbar Reservoir and the Philip Tank controls the production and operation of the L-2 Well and the 104th and Butte Pump Station.

2.5.5.5 Hemlock Hill 513 Zone 0.1 MG Elevated Tank

The Hemlock Hill Elevated Tank is located on a large fenced site on Hemlock Hill, near the intersection of Crestwood Drive and Hemlock Road. The tank shares the site with the Hemlock Hill/Dunbar Reservoir, the L-2 and L-3 Wells, the Hemlock Pump Station, and the Dave Hall Hydropillar Tank. A single 10-inch diameter water main serves as the tank's common inlet/outlet pipe. Telemetry equipment is located in a separate building on the site. The interior and exterior of the tank was recoated in 2000. The Hemlock Hill Elevated Tank controls the production and operation of the L-3 Well, Philip Tank Pump Station and the Deepwood Pump Station.

2.5.5.6 Hemlock Hill 513 Zone 0.5 MG Dave Hall Hydropillar

The Dave Hall Hydropillar Tank was constructed in 2006 and was renamed after Dave Hall a long-term employee who made many considerable contributions to the welfare of the District. This tank is located on the same site as the Hemlock Hill Elevated Tank, Hemlock Hill/Dunbar Reservoir, the Hemlock Hill Pump Station and the L-2 and L-3 Wells. The Hydropillar has separate inlet and outlet piping and water quality sampling lines. The Hydropillar water level operates together with the Hemlock Hill Elevated Tank water level to control the production and operation of the L-3 Well, Philip Tank Pump Station, Deepwood Pump Station and one pump in the Hemlock Hill Pump Station.

2.5.5.7 104th and Bridgeport Way 404 Zone 0.5 MG Hydropillar

The 104th and Bridgeport Way Tank is located on a fenced site off of a paved road. The Hydropillar shares the site with the F-2 Well. A single 12-inch diameter water main serves as the Hydropillar's common inlet/outlet pipe. The Hydropillar is anchored for seismic events in accordance with existing seismic standards, and the altitude valve is located in a below-grade concrete vault. Telemetry equipment is located at the site in a separate secured building with the F-2 Well. The space below the elevated storage area is used for storing supplies. There is no exterior ladder for this Hydropillar.

The Hydropillar underwent water quality improvements in 2002 that included separation of the inlet and outlet piping within the Hydropillar. Improvements also included installation of a real-time chlorine analyzer and sampling lines for measuring chlorine residual at different heights within the tank. The analyzer is connected to the District's telemetry system, enabling chlorine levels to be monitored remotely at the District office. The tank's interior coating was last repainted in 2018. The tank's exterior coating was repainted in 2009. The water level in the 104th and Bridgeport Way Hydropillar controls the production of the F-2 Well.

2.5.5.8 Farwest Drive 490 Zone 0.5 MG Elevated Tank

The Farwest Drive Tank is located on a fenced site off of Farwest Drive and is the only facility on the site. A single 12-inch diameter water main serves as the tank's common inlet/outlet pipe. The tank's altitude valve is located in a below-grade concrete vault. Telemetry equipment is located at the site in a separate secured building. The water level in the Farwest Drive Tank controls the operation of the 114th Street and Old Military Road Pump Station and the large pumps at the Hemlock Hill Pump Station.

2.5.5.9 Oakbrook 404 Zone 0.5 MG Elevated Tank

The Oakbrook Tank is located in a residential area near the northwest corner of the District's water system. The elevated tank is surrounded by trees on a large fenced site with the O-2 and O-3 Wells. A single 12-inch diameter water main serves as the tank's common inlet/outlet pipe. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment is located at the site in a separate secured building with the O-2 Well and chlorine generation equipment.

The Oakbrook Tank's interior and exterior coatings were inspected in 1999. At that time, the interior coating was found to be in good condition. The exterior coating was also found to be in good condition. Structural damage repairs and seismic improvements were completed in 2002 following the Nisqually Earthquake in 2001. Extensive seismic improvements were done in 2016. The water level in the Oakbrook Tank controls the production and operation of the Forster Pump Station, O-2, O-3, I-1, N-1, and N-2 Wells.

2.5.5.10 88th and Pine 455 Zone 0.5 MG Tank

The 88th and Pine Tank is located on the top of a hill in a residential area near the northeast end of the system. The tank is surrounded by trees on a large fenced site shared with the J-1, J-2, and J-3 Wells, and both 88th and Pine Pump Stations. The wells and one of the pump stations are located on the bottom of the hill at the site. The other pump station is located at the top of the hill near the tank. The tank receives water through a 12-inch diameter elevated inlet pipe and discharges through a 12-inch diameter outlet pipe. The tank is anchored for seismic events. Telemetry equipment is located at the site in a separate secured building with the J-I Well.

The tank underwent water quality improvements in 2002 that included the installation of separate inlet and outlet piping in the tank. Improvements also included installation of a real-time chlorine analyzer and sampling lines for measuring chlorine residual at different heights within the tank. The analyzer is connected to the District's telemetry system, enabling chlorine levels to be monitored remotely at the District office. The recently completed 455 Zone projects has allowed a nearly continuous cycling of water in the tank which has greatly improved water quality.

2.5.5.11 Nyanza Hill 404 Zone 0.44 MG Tank

The Nyanza Hill Tank is located southeast of Gravelly Lake in a residential area and shares the fenced site with the Nyanza Hill Pump Station. A single 8-inch diameter water main serves as the tank's common inlet/outlet pipe. In addition, the tank has a separate outlet pipe for supplying the Nyanza Hill Pump Station. The tank is anchored for seismic events. The tank's altitude valve is located in a below-grade concrete vault. Telemetry equipment is located at the site, in the Nyanza Hill Pump Station building.

The tank's interior and exterior coatings were last inspected in 1999. At that time, the interior coating was in very good condition. The exterior coating was repainted in 2006. The water level in the Nyanza Hill Tank controls the production of the H-1, H-2, A-3, K-1, K-2, R-1, G-1, G-2, and F-2 Wells.

Due to the age of this tank and the damage that it sustained during the Nisqually earthquake and its importance in the operational control of the system. This tank is currently under design. The new Nyanza tank will be placed directly behind the existing keeping it in service while the new facilities are completed. The new tank will increase the volume from the existing .44 million gallons to 2 million gallons. A new Booster will be installed as part of the project as well as a service line going down to Glenwood allowing better utilization of this site. Sitework on this new tank will begin in August of 2019 with a project completion of June 2020.

2.5.5.12 Forster 404 Zone 3.5 MG Reservoir

The Forster Reservoir is located in a residential area within the northern section of the system and shares a large fenced site with the Forster Pump Station. A single 12-inch diameter water main serves as the reservoir's common inlet/outlet pipe. The tank's altitude valve is located in a below-grade concrete vault. Telemetry equipment is located in the Forster Pump Station building. The pump station is activated by the level of the Oakbrook or Philip Tank. The pumps shut off upon reaching a low water level set point in the Forster Tank.

2.5.5.13 Philip Tank 404 Zone 8.0 MG Tank

The Philip Tank is located north of Hemlock Hill and just south of the Western State Hospital property. This tank was renamed in honor of William Philip, a long-term dedicated Commissioner who served the District for over 40 years. The pre-stressed concrete tank shares the site with the Philip Tank Pump Station. The large fenced site is well landscaped and is adjacent to several homes at the top of a hill that slopes down towards the north. A 16-inch diameter water main serves as the tank's common inlet and outlet pipe. The tank's 12-inch diameter altitude valve is located in a below-grade concrete vault. Telemetry equipment is located at the site in the Philip Tank Pump Station building. The water level in Philip Tank controls the production of S-1, S-2, L-2, Q-1, and I-3 Wells.

2.5.6 Distribution and Transmission System

The District's Retail Water Service Area contains approximately 265 miles of water main ranging in size from less than 2-inches to 20-inches in diameter. As shown in **Table 2-5**, much of the water main (approximately 40 percent) within the service area is 8-inch diameter and an additional 20 percent of District's water main is larger than 8-inch diameter.

As shown in **Table 2-6**, approximately 60 percent of the water main in the system is asbestos cement (AC). The District has an ongoing program to replace this older AC water main. All new water main installations are ductile iron water main or Poly Vinyl Chloride (PVC) in accordance with the District's current development and construction standards.

Table 2-5
Water Main Inventory

Diameter (inches)	Length (feet)	% of Total
<2"	480	0.034%
2	6,924	0.5%
3	74	0.0%
4	77,522	5.5%
6	471,380	33.6%
8	557,355	39.8%
10	56,815	4.1%
12	172,395	12.3%
16	33,276	2.4%
20	25,846	1.8%
Totals	1,402,066	100.00%

Table 2-6
Water Main Material Inventory

Water Main Material	Length	Percent of Total
Asbestos Cement	850,305	60.6 %
Ductile Iron	344,540	24.6 %
PVC	168,184	12.0 %
Other	39,037	2.78 %
Totals	1,402,066	100.00%

The average life expectancy of water main in the District’s system is generally estimated at 50 years. This is partly due to the AC pipe material of much of the water system and also due to the numerous water mains that were cut and repaired with couplings and fittings as part of a large sanitary sewer system utility local improvement district (ULID) in the early 1980s. Approximately 47 percent of water main within the system was constructed before the 1960s and is reaching the end of its design life expectancy. Of particular concern is the older AC water mains located throughout the service area. The District has maintained an annual repair and replacement (R&R) program to replace the older water mains in the system.

2.5.7 Pressure Reducing Stations

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

Pressure reducing stations can serve multiple purposes. They can function as an active supply facility by maintaining a continuous supply of water into a lower zone that has no other source of supply or a tank, such as the District’s Dean Court PRV Station. Pressure reducing stations can also function as standby supply facilities that are normally inactive with no water flowing through them. The operation of this type of station is typically triggered by a drop-in water pressure on the downstream side of the station. A typical application of this function is a pressure reducing station that is only needed to supply additional water to a lower zone during an emergency fire flow event. The pressure setting of the control valve within the station allows it to remain closed during normal system operation and open only when the downstream hydraulic grade or pressure falls below

the valve’s set point. This typically occurs during high demand conditions, like fire flow events or peak use periods.

The District's water system has a total of six pressure reducing stations, as shown schematically in **Figure 2-3** and summarized in **Table 2-7**. One pressure reducing station is located at the boundary between the 455 Zone and 404 Zone. This pressure reducing station has a pressure sustaining function that maintains a near steady pressure in the 455 Zone and recirculates excess water from the 455 Zone into the 404 Zone. One pressure reducing station is located at the boundary between the 513 Zone and the 470 Zone, which serves as the 470 Zone's only source of supply. One pressure reducing station is located at the boundary between the 513 Zone and the 490 Zone. There are two pressure reducing stations which were installed in 2001, one on 100th Avenue, and the other on 104th Avenue, that enable the filling of the Philips Tank above the operating grade of the 404 Zone. The tank has an overflow elevation of approximately 411 feet, and without these pressure reducing stations, the District would not be able to fully use the storage in the tank. One pressure reducing station is located at the boundary between the 490 Zone and the 404 Zone to provide supplemental fire flow from the Farwest 490 Zone Tank to the northwest portion of the 404 Zone. A listing of all pressure reducing stations and their size, model, inlet/outlet pressure, ground elevation and up/downstream zones is in the facility data sheets included in **Appendix C**.

Table 2-7
PRV Station Summary

PRV Name	Location	Zones Served		Diameter (inches)
		Upstream	Downstream	
Farwest	Farwest Drive/Steilacoom Boulevard	490	404	8
Philip Tank/Dunbar	104th Avenue & Butte	404	404	8
Philip Tank/Dunbar	Elwood & 101st Avenue	404	404	8
Dean Court	112th Street SW	513	470	6
Nyanza Hill	Hillcrest & Nyanza Road	455	404	6
455 Zone	Montgrove Avenue & Pacific Highway South	455	404	12

2.5.8 Water System Interties

Water system interties are physical connections between two adjacent water systems that are normally separated by a closed isolation valve or control valve. Normal supply interties provide water from one system to another during non-emergency situations, and emergency supply interties provide water from one system to another during emergencies situations only. The following sections describe the District’s interties with other water systems.

2.5.8.1 Town of Steilacoom Wholesale Supply Interties

Through two normally operated supply interties, the Town of Steilacoom purchases all of its water supply from the District. The Steilacoom Boulevard Intertie supplies water from the District's 404 Zone into Steilacoom's 373 Zone. The Military Road Intertie supplies water from the District's 490 Zone into Steilacoom's 440 Zone. More information on the interties and the wholesale water supply agreement that governs the use of the interties can be found in the "Water Service Agreements" section of this chapter and **Appendix B**.

2.5.8.2 112th Street Wholesale Supply (Myrtle) Intertie

The 112th Street Wholesale Supply Intertie connects the District's Retail Water System to its wholesale partners to the east and south of the District's retail service area. This intertie is located on the eastern edge of the District near the Parkland Emergency Intertie.

In 2009 the District completed Phase 1 of a transmission main and booster pump station to supply its wholesale customers from this intertie. This Phase connected the intertie to Summit. The 12 and 20-inch diameter transmission main is approximately 4.9 miles long and was originally designed with a maximum design flow rate of approximately 7.2 mgd.

Phase 2 of this transmission main is currently under construction. The Phase will extend the transmission main another 6.8 miles to the intersection of 176th and 74th street in Fredrickson. This extension is planned to be complete by the end of 2019, and will allow the District to supply Rainier View, Firgrove Mutual, and potentially Spanaway. Phase 2 also increased the maximum design flow rate to approximately 10.0 MGD at the 74th and 176th intertie.

2.5.8.2.1 Rainier View Water Company, Southwood Supply Intertie

As soon as the 112th Street Intertie transmission main is completed, Rainier View will buy wholesale water through its intertie located at the intersection of 74th and 176th in Fredrickson. This intertie, as with all the connections to the wholesale main, will be metered and flow controlled through the District's scada system.

2.5.8.2.2 Firgrove Mutual Water Company 74th and 160th Intertie

As soon as the 112th Street Intertie transmission main is completed, Firgrove Mutual Water Company will purchase two million gallons a day of wholesale water through its intertie. This intertie will be located near Firgrove's well site at 74th and just to the south of 160th in Pierce County. This intertie, as with all the connections to the wholesale main, will be metered and flow controlled through the District's scada system.

2.5.8.2.3 Spanaway Wholesale Supply Intertie

Spanaway Water Company will have the option to connect to the 112th Street Intertie transmission main. The main will have a tee and valve at the intersection of Bingham Ave East and 152nd Street East for this potential future connection as well as the option to connect at A Street. If Spanaway desires to connect to the District's wholesale transmission main, they would construct an approximately mile long section of 16-inch diameter transmission main from the District's transmission main to their system.

2.5.8.3 Parkland Emergency Intertie

The District has one emergency intertie with Parkland. The below-grade intertie facility, located at the intersection of 112th Street South and South Tacoma Way, connects the District's 404 Zone with Parkland's 490 Zone. A single supply pump can provide up to approximately 2,500 gpm of emergency water supply to the Parkland water system. Water can gravity flow into the District's system during an emergency.

2.5.8.4 Western State Hospital Emergency Intertie

The District has one emergency intertie with the Western State Hospital (Hospital) water system, located within the northwest corner of the District's Retail Water Service Area. The intertie is configured so that water can be gravity fed from the District's 404 Zone, near the Oakbrook Tank, into the Western State Hospital water system when the manually operated valve is opened.

The District is currently in negotiations with Western State Hospital to connect their system to the District's. Initially the District would simply use this existing intertie to feed the Hospital's system. As new buildings are added and upgrades are completed on the Hospital's aging water system, the District would slowly phase the Hospital's water system into the District's. Eventually the District will take over the entire Western State Hospital water system as well as its existing water rights.

2.5.8.5 Tacoma Water Emergency Interties

The District and Tacoma currently have two normally closed emergency interties. The first intertie is located next to the District's eastern boundary near the intersection of 96th Street and Interstate 5. Another emergency intertie is located at the District's northern boundary on South Tacoma Way. If opened under normal circumstances, water flows from Tacoma's 478 Zone to the District's 404 Zone. The South Tacoma Way is currently metered. The intertie near 96th Street is currently not metered.

2.5.9 Telemetry and Supervisory Control System

Successful operation of any municipal water system requires monitoring, gathering and using accurate water system information. A telemetry and supervisory control system gather information and can efficiently control a system by automatically controlling and optimizing facility operations. A telemetry and supervisory control system also provide instant alarm notification to

operations personnel in the event of equipment failure, operation problem, flood, fire, or other emergency events or situations.

There are two types of telemetry systems: Distributed Control Systems (DCS) and Supervisory Control and Data Acquisition (SCADA). The District employs the DCS system at all of its facilities. The system consists of remote telemetry units (RTUs) at the District's wells, pump stations, and water tanks. The remote telemetry units send data over secure cell signals and DSL lines to the master telemetry unit (MTU) located at the District office. The MTU system is designed to monitor and control all facilities in the system. The District employs Dell and Siemens brand equipment in the MTU.

The District employs ShakeAlert to receive advance warning of any significant earthquakes that may affect the District. ShakeAlert is an earthquake early warning system that detects significant earthquakes so quickly that it sends out alerts before shaking arrives. It was developed by the U.S. Geological Survey (USGS) along with a coalition of State and university partners and is still being tested and improved. ShakeAlert is designed to give a few seconds of warning, which with the help of the District's DCS control systems, is enough time to modify the operation of the water system to minimize the damages caused by the quake.

2.6 Water System Operation and Control

The District's water system, including supply wells, pump stations and tanks, is operated and controlled differently for each pressure zone. All wells are equipped with telemetry and control technology called "WellSaver," which continuously monitors aquifer levels and adjusts pumping rates or shuts down wells to avoid excessive aquifer level drawdown. A brief discussion of how each zone is supplied and controlled follows.

2.6.1 404 Zone

The 404 Zone is supplied with water from all of the District's wells, except the L-3 Well, which supplies the 513 Zone. The operation of the 404 Zone wells is controlled by water levels in the 404 Zone tanks. These wells are called to operate according to preset tank drawdown levels and are called to turn off upon a preset filling level. This is accomplished automatically through the transfer of tank level data from the tank site's RTU to the well site's RTU. The RTUs also send well and tank data to the MTU at the District office for data collection and alarm notification purposes.

2.6.2 455 Zone

The 455 Zone is typically supplied with water from the 88th and Pine Pump Station No. 1 and the Steilacoom Boulevard Pump Station. The 455 Zone can also be supplied with water from the 88th and Pine Pump Station No. 2, and J-1, J-2 or J-3 Well. Since the 455 Zone is a closed zone, a pump in one of the pump stations or wells must be in a continuous operation mode. The operation of the pump is controlled by the pressure in the 455 Zone. Water pumped from these facilities in excess of 455 Zone demands is recirculated back to the 404 Zone through a backpressure-

sustaining control valve located in a below-grade vault on Montgrove Avenue immediately west of South Tacoma Way. The control valve will also allow reverse flow from the 404 Zone to the 455 Zone during short-term emergencies, if the hydraulic grade in the 455 Zone drops below the grade in the 404 Zone.

2.6.3 460 Zone

The 460 Zone is supplied with water from the Nyanza Hill Pump Station, which pumps water from the 404 Zone. Since the 460 Zone is a closed zone, at least one of the three pumps in the pump station is in continuous operation mode. The operation of the pumps is controlled by the pressure in the 460 Zone. Therefore, pumps are called on to operate as needed to meet the demands of the zone and to maintain adequate pressures. Water pumped from this station in excess of 460 Zone demands is recirculated back to the 404 Zone through a pressure relief control valve located in a below-grade vault in Nyanza Park Drive.

2.6.4 470 Zone

The 470 Zone is a closed zone, supplied by the 513 Zone through a single pressure reducing station. The pressure reducing station maintains a set downstream pressure in the 470 Zone, regardless of system demands, up to the flow capacity of the control valve.

2.6.5 490 Zone

The 490 Zone is supplied with water from the Farwest Drive Tank, Hemlock Hill Pump Station, 114th Street and Old Military Road Pump Station, and Philip Tank Pump Station. The source of water to the 490 Zone is from the 404 Zone through one or combinations of these pump stations. The operation of the pump stations is controlled by the water level in the Farwest Drive 490 Zone Tank, which is the only tank directly serving the 490 Zone.

2.6.6 513 Zone

The 513 Zone is supplied with water from the L-3 Well, Hemlock Hill Pump Station, Philip Tank Pump Station, 104th and Butte Drive Pump Station, and Deepwood Pump Station. The operation of the pump stations and L-3 Well is controlled by the water level in the Hemlock Hill Elevated Tank and the Dave Hall Hydropillar. The water level in these tanks set the water pressures in the 513 Zone.

2.7 Water System Interties

Water system interties are physical pipe and valve connections between two adjacent water systems. Interties are normally separated by a closed isolation valve or a control valve. Emergency supply interties provide water from one system to another during emergency events only. An emergency event may occur when a water system loses its main source of supply or a major transmission main and is unable to provide a sufficient quantity of water to its customers.

Normally operated supply interties provide water from one system to another during non-emergency events and are typically supplying water at all times.

The District currently has both emergency and normally operated supply interties as described below. The District has also planned for potential interties in the future by installing stub-outs at locations near the District's service area boundary at the time of new water main installations. Locations designated for future intertie consideration include the Logistic Center at Joint Base Lewis-McChord (JBLM), Union Avenue in Tillicum, Lakewood Drive near the Meadow Park Golf Course, and Woodbrook Drive near JBLM.

2.8 Adjacent Water Systems

The District is surrounded by municipal water systems and water systems owned and operated by JBLM. Several other water systems are located within the District's wholesale water service area, as shown in **Figure 2-2**. A brief description of the municipal water systems located within or adjacent to the District's Retail Water Service Area is provided below.

2.8.1 Tacoma Water Division

The largest water system adjacent to the District's Retail Water Service Area is Tacoma's water system. Tacoma's water system is mostly located north of the District's service area boundary, but also extends east in areas adjacent to the District's wholesale water service area. Tacoma is a regional water supplier that serves more than 300,000 customers in Pierce and King Counties.

Tacoma's raw water supply originates in the Green River Watershed, which covers approximately 148,884 acres on the west flank of the Cascade Mountains between Chinook and Snoqualmie passes, and supplies up to 167 mgd. Tacoma can supplement its Green River supply with water from seven wells located along the north fork of the Green River. This well field can produce 84 mgd in the winter and spring months. These wells are used only when the water in the river is too turbid to be used as a supply. This usually occurs in the fall and winter when rain and snow melt washes soil sediment into the river. The raw water supply for this system is stored in the Howard Hanson Reservoir which was created after the U.S. Army Corps of Engineers installed the Howard Hanson Dam in 1961. The water from the reservoir is then diverted into Tacoma's pipeline for treatment and distribution.

In 2005 Tacoma finished installing 34 miles of transmission main increasing the water supply to Tacoma and South King County. Due to this increase in supply an expansion of the Howard Hanson Dam was required to increase storage capacity. This 2007 expansion added 6.5 billion gallons of storage capacity to the water system. New water treatment facilities were also constructed in 2005 and 2007 and include ozone disinfection.

In addition to the North Fork Wells, Tacoma has several wells in its service area that can be used to meet peak summer water demands. The South Tacoma Wells have a maximum capacity of approximately 59 mgd.

2.8.2 Parkland Light and Water Company

The Parkland water system is located east of the District's retail service area boundary and east of Joint Base Lewis-McChord. Parkland's water is pumped from aquifers beneath the Clover/Chambers Creek Basin as it flows to Puget Sound. Parkland owns twelve wells which range from 30 to 630 feet BGS. Parkland's tanks can store a total of 5.75 million gallons of water. The District has one emergency intertie with Parkland. There are no plans for additional interties between Parkland's water system and the District's water system at this time.

2.8.3 Town of Steilacoom

The Town of Steilacoom's water system, located west of the District's Retail Water Service Area, serves approximately 6,255 customers. Currently, the Town of Steilacoom purchases all water from the District but maintains ownership of one well. Water is supplied to the Town of Steilacoom through two existing metered interties that connect the District and the Town of Steilacoom. No additional future interties are currently planned.

2.8.4 Western State Hospital

The Western State Hospital water system is a small system located in the northwest corner of the District's Retail Water Service Area. The system serves the Western State Hospital and has two storage tanks and its own wells for water supply. The District currently has one intertie with the Western State Hospital water system, which is used for emergency supply only. The intertie is configured so that water can be gravity fed from the District's 404 Zone, near the Oakbrook Tank, into the Western State Hospital water system. As discussed previously, the District is currently in negotiations to bring this water system into the District.

2.8.5 Abitibi Consolidated Sales Corporation

The Abitibi Consolidated Sales Corporation (Abitibi) water system is a small system located adjacent to the northwest corner of the District's Retail Water Service Area. The water system, which is no longer in use, previously served the West Tacoma Newsprint plant that is now closed. The site is now being redeveloped and is currently planned for future residential use. The District entered into an agreement with Abitibi and purchased 6.0 mgd of water rights associated with the groundwater wells that served Abitibi's water system in 2002. More information on the Abitibi water rights is included in **Chapter 6**.










2.8.6 Canterbrook Village Apartments

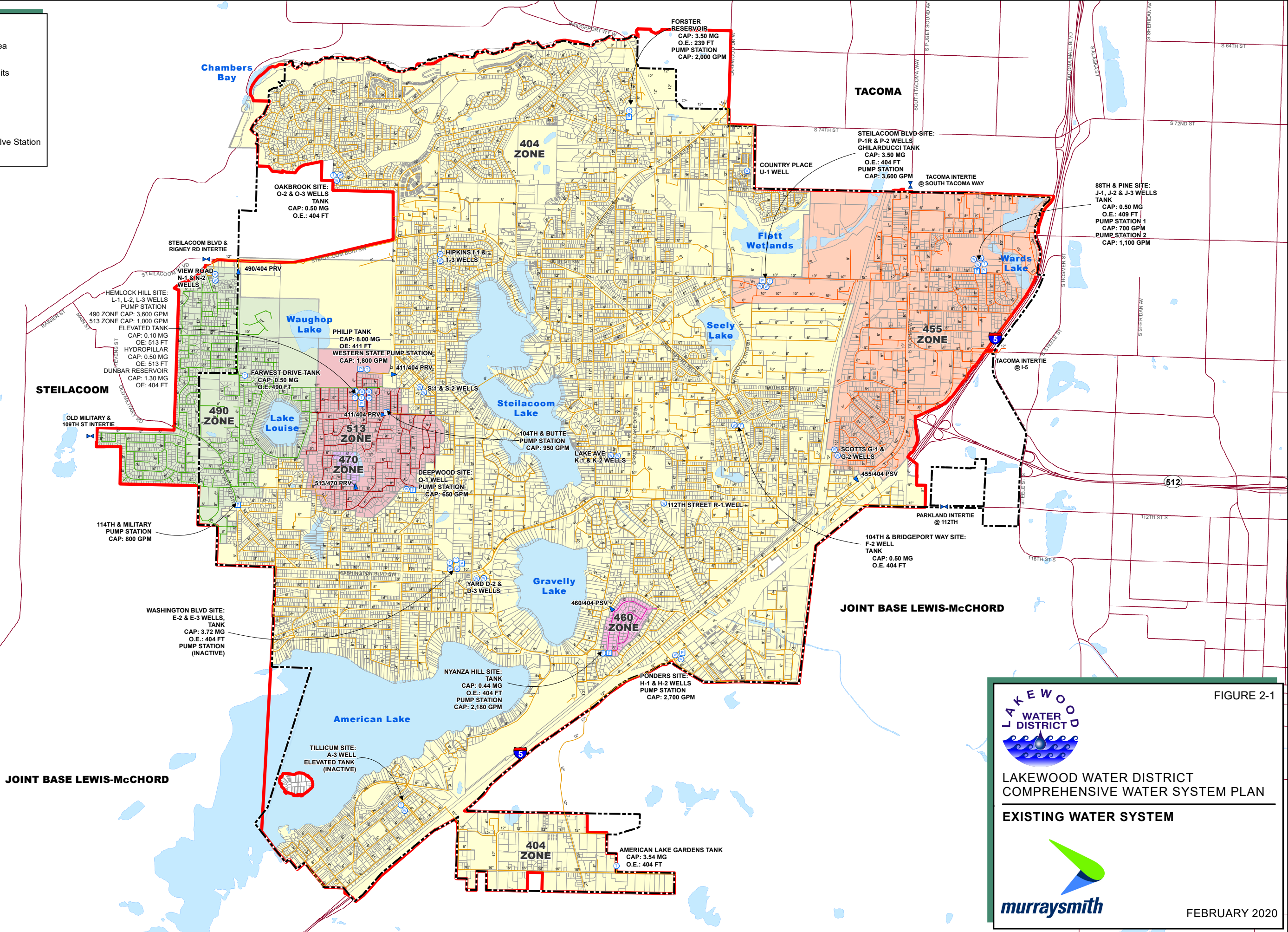
Canterbrook Village Apartments water system is located near the southern border of the District's retail water service area, west of American Lake. This group A water system serves approximately 134 single family residential connections, using one well to produce water. No interties exist between the District and Canterbrook Village Apartments, but there is the potential of adding an intertie and/or providing other services in the future.

2.9 Summary

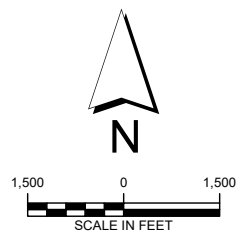
This chapter presents a summary of the District's existing water system including the water sources, storage, transmission and supply system, system interties, and distribution system piping. Also included is a discussion of existing supply and treatment, water rights and pressure zones. The information presented and summarized in this chapter will be used with condition assessments, capacity assessments, vulnerability review and the planning and analysis criteria to guide the development and analysis of improvement needs and alternatives.

LEGEND

-  Retail Water Service Area
-  Lakewood City Limits
-  Town of Steilacoom Limits
-  Groundwater Well
-  Water Tank
-  Pump Station
-  Intertie
-  Pressure Regulating Valve Station
-  Water Bodies



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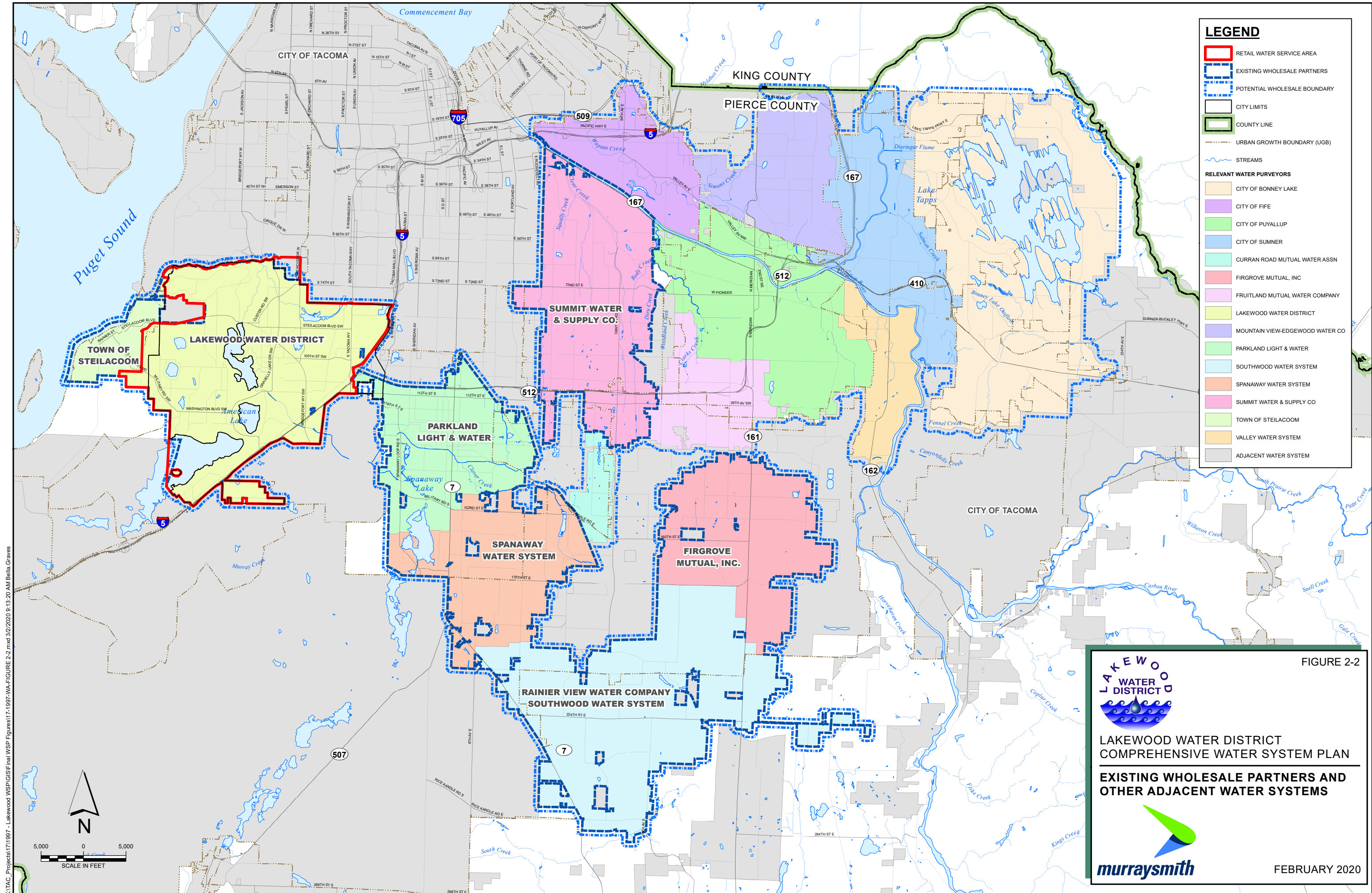


FIGURE 2-1

LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN
EXISTING WATER SYSTEM



FEBRUARY 2020



LEGEND

- RETAIL WATER SERVICE AREA
- EXISTING WHOLESALE PARTNERS
- POTENTIAL WHOLESALE BOUNDARY
- CITY LIMITS
- COUNTY LINE
- URBAN GROWTH BOUNDARY (UGB)
- STREAMS

RELEVANT WATER PURVEYORS

- CITY OF BONNEY LAKE
- CITY OF FIFE
- CITY OF PUYALLUP
- CITY OF SUMNER
- CURRAN ROAD MUTUAL WATER ASSN
- FIRGROVE MUTUAL, INC
- FRUITLAND MUTUAL WATER COMPANY
- LAKEWOOD WATER DISTRICT
- MOUNTAIN VIEW-EDGEWOOD WATER CO
- PARKLAND LIGHT & WATER
- SOUTHWOOD WATER SYSTEM
- SPANAWAY WATER SYSTEM
- SUMMIT WATER & SUPPLY CO
- TOWN OF STEILACOOM
- VALLEY WATER SYSTEM
- ADJACENT WATER SYSTEM

K:\TAC_Projects\171987 - Lakewood_WSP\GIS\Final\WSP_Figures\171987-WA-FIGURE 2-2.mxd 3/2/2020 9:13:20 AM Bella Graves

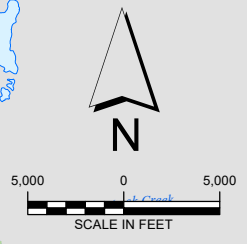




FIGURE 2-2



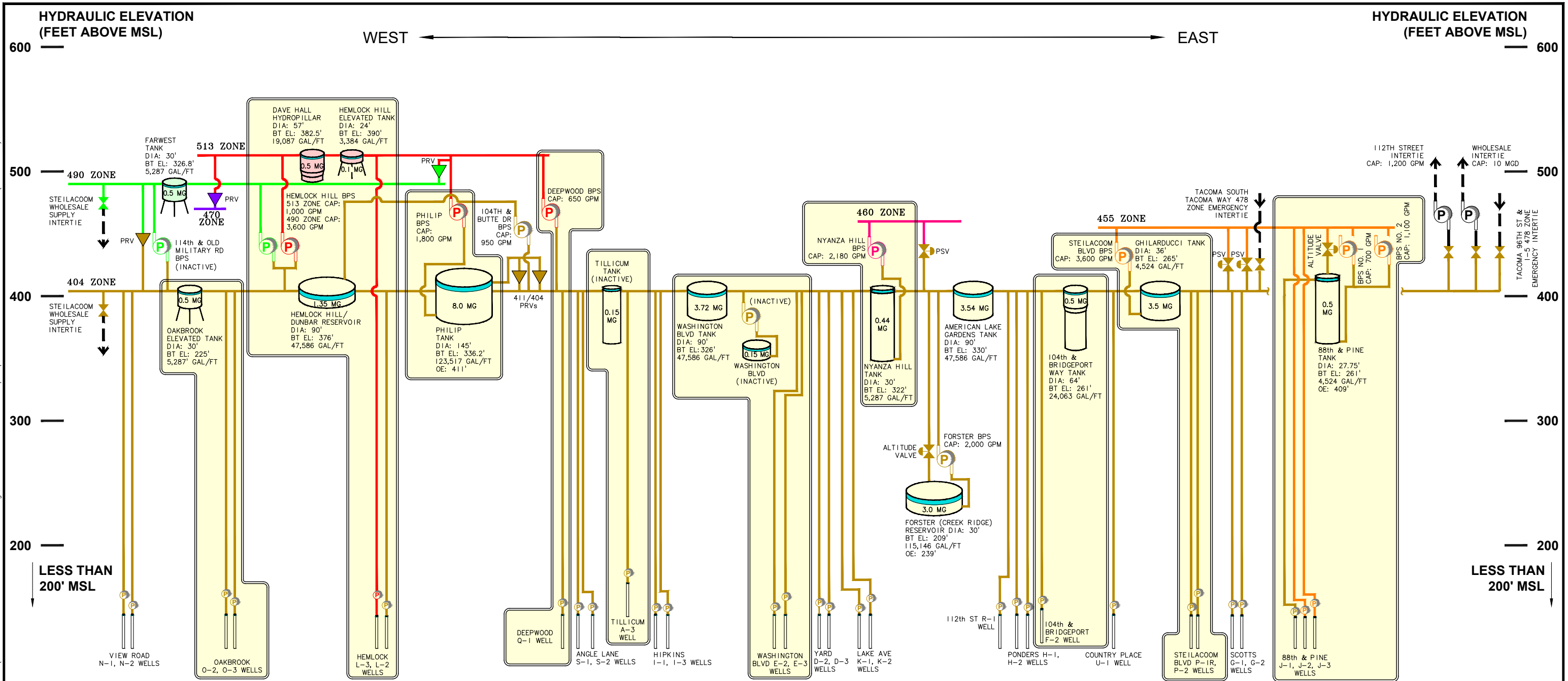
LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN
EXISTING WHOLESALE PARTNERS AND OTHER ADJACENT WATER SYSTEMS



FEBRUARY 2020

K:\TAC_Projects\171987 - Lakewood_WSP\GIS\Final\WSP_Figures\171987-WA-FIGURE 2-2.mxd 3/2/2020 9:13:20 AM Bella Graves

K:\TAC_Projects\17\1997 - Lakewood WSP\410 - Final Plan\Figure Updates\17-1997-407-WA-FIGURE 2-3.dwg HYDRAULIC PROFILE 3/10/2020 9:24 AM BELLA.GRAVES 23.0s (LMS Tech)



LEGEND

- 404 ZONE
- 455 ZONE
- 460 ZONE
- 470 ZONE
- 490 ZONE
- 513 ZONE
- ADJACENT SYSTEM
- FACILITIES AT SAME SITE
- CONTROL VALVE
- INTERTIE
- PRESSURE REDUCING STATION/VALVE
- PUMP STATION

ABBREVIATIONS

- BPS BOOSTER PUMP STATION
- BT BOTTOM
- DIA DIAMETER
- EL ELEVATION
- FT FEET/FOOT
- GAL GALLONS
- MG MILLION GALLONS
- OE OVERFLOW ELEVATION
- PRV PRESSURE REDUCING STATION/VALVE
- PSV PRESSURE SUSTAINING VALVE

FIGURE 2-3

LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN
EXISTING WATER SYSTEM
HYDRAULIC PROFILE

FEBRUARY 2020

Chapter 3

Land Use and Population

3.1 General

The Lakewood Water District (District) lies within Pierce County, Washington. Its Retail Service Area boundary is approximately the same as the City of Lakewood's City limits. The service area also includes an area between the Town of Steilacoom and the City of Lakewood that is unincorporated Pierce County.

The City of Lakewood Comprehensive Plan was completed in July 2000 and last revised in October 2019. The plan was developed to meet the requirements of the State of Washington Growth Management Act (GMA), which requires, among other things, consistency between land use and utility plans and their implementation. The City's comprehensive plan documents the City's adopted land use regulations which cover the majority of the District's retail water service area. In the unincorporated Pierce County portions of the District's service area, the County determines land use regulations. Additionally, a small portion of the District's retail water service area is within the Town of Steilacoom. In those areas, Steilacoom determines the land use regulations.

Pierce County is part of the Puget Sound Regional Council (PSRC) planning area. PSRC is a multi-county planning council that develops policies and coordinates decisions on a regional level. It helps to ensure that comprehensive plans for communities in this region are consistent, and work together to make decisions about transportation, growth management, and economic development.

This chapter demonstrates the compatibility of the District's Comprehensive Water System Plan with the City of Lakewood, Town of Steilacoom, Pierce County Comprehensive Plans, and PSRC planning projections, identifies the designated land uses within the Retail Service Area, and identifies population projections within the District's planning area.

3.2 Compatibility with Other Plans

To ensure that the Comprehensive Water System Plan is consistent with the current land use plan and other related plans, the following planning documents were examined:

- Growth Management Act
- City of Lakewood Comprehensive Plan
- City of Lakewood Downtown Plan
- Pierce County Comprehensive Plan
- Town of Steilacoom Comprehensive Plan

- Puget Sound Regional Council Landuse Baseline and VISION 2040
- Pierce County Coordinated Water System Plan
- The Chambers-Clover Watershed Action Agenda
- Chambers-Clover Creek Basin Groundwater Management Program

3.2.1 Growth Management Act

The Washington State Growth Management Act (GMA), which was passed in 1990 and amended in years to follow, defined four goals relevant to water system planning:

1. Focus growth in urban areas and reduce sprawl
2. 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

As part of the development of its 2000 Comprehensive Plan, the City of Lakewood designated an Urban Growth Area (UGA) that would accommodate the City's projected population growth and provide resource conservation. The City developed its UGA in coordination with Pierce County in accordance with GMA.

3.2.1.2 Consistency

The GMA requires the plans and policies of the Lakewood Water District, City of Lakewood, Town of Steilacoom, Pierce County, and the PSRC to be consistent with each other as directed by the Revised Code of Washington (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 the implementation of the water system plan be consistent with the comprehensive plan as directed by RCW 36.70A.120.

The 2003 Municipal Water Law also requires that water system plans are consistent with local plans and regulations. The signed Consistency Statement Checklists included in **Appendix E** from the City of Lakewood, Town of Steilacoom and Pierce County document the determinations of these agencies that this comprehensive water system plan is consistent with their plans and regulations.

3.2.1.3 Concurrency

The GMA requires concurrency, so that adequate public facilities and services are available when growth occurs to ensure health, safety, and a high quality of life. The GMA requires that growth

be located in areas already served or readily served by public facilities and services, per RCW 36.70A.110.

3.2.1.4 Critical Areas

The GMA requires that critical areas be designated and protected. Critical areas include wetlands, steep slopes, and aquifer recharge areas. **Appendix F** contains a State Environmental Policy Act (SEPA) checklist that was prepared for this Comprehensive Water System Plan.

3.2.2 City of Lakewood Comprehensive Plan

As stated above, most of the District's water service area is within the City of Lakewood. The Land Use Element of the City of Lakewood's Comprehensive Plan, last revised November 2016 describes the City's vision of how growth and development should occur over a 20-year planning horizon. While the Land Use Element goals and policies set forth general standards for planning land uses, the Comprehensive Plan Future Land Use Map in **Figure 3-1** indicates geographically where certain types of uses may be appropriate. This Future Land Use Map is a guide for development of an area, whereas the zoning code is the regulatory means for implementing it.

The City of Lakewood encompasses an area of approximately 12,200 acres or 19.1 square miles. According to the Comprehensive Plan, the majority of the land area within the City limits is developed. Therefore, the City must accommodate the growth mandated by the GMA through infill development of vacant or underutilized areas. The Lakewood UGA extends beyond the City limits, as shown in **Figure 3-1**, and includes approximately 281 acres to the west of the City limits. This area, referred to as Arrowhead-Partridge Glen in the Lakewood Comprehensive plan, was considered for annexation by Lakewood in 2013, but annexation was not performed as it was unclear if the annexation would be sustainable over the long term. The military base to the south of Lakewood is not served by the District and is not anticipated for incorporation into the City of Lakewood.

3.2.2.1 City of Lakewood Downtown Plan

The City of Lakewood published the Final Planned Action Environmental Impact Statement for the Lakewood Downtown Plan in July of 2018. This statement summarizes Lakewood's planned growth in its Colonial, East Commercial, and Town Center districts. Through this proposed action plan, Lakewood expects to significantly increase its population and encourage economic growth in these districts.

3.2.3 Pierce County Comprehensive Plan

The current update to the Pierce County Comprehensive Plan (PCCP), effective June 30, 2016, was prepared in accordance with the GMA and the Puget Sound Regional Council's (PSRC) Vision 2040. The PCCP has several goals with regards to domestic water systems, such as Lakewood Water District. These goals include:

- Ensuring adequate water supplies for future growth.
- Coordinating water resource planning.
- Preserving the high quality and supply of groundwater resources.
- Encouraging metering or measuring of all public water withdrawals or diversions.
- Protecting the quality of groundwater used for domestic water supplies.
- Prior to development, taking into account the availability of potable water.
- Promoting reliable water service.
- Prohibiting new wells on sites that are at high risk for saltwater intrusion, unless it can be demonstrated that additional groundwater withdrawal will not worsen the problem.
- Supporting and educating about water conservation measures and water-wise usage.
- Implementing satellite management programs for new or failing water systems.
- For purveyors interested in regional supply network development to participate in the planning and construction of facilities within their service area which could be jointly used by adjacent purveyors.

3.2.4 Town of Steilacoom Comprehensive Plan

The Town of Steilacoom encompasses an area of approximately 1,283 acres or 2 square miles. The portion of Steilacoom in the District’s retail service area is approximately 41 acres or 0.06 square miles. According to the Comprehensive Plan, the majority of the land area within the Town limits is developed. Lakewood serves approximately 100 of Steilacoom’s 6,115 residents. The Town does not project any growth in the number of residents served by the District.

3.2.5 Puget Sound Regional Council

Puget Sound Regional Council’s (PSRC) develops two growth projection outcomes: Land Use Baseline and Land Use Vision.

Land Use Baseline, last updated May 4, 2016, uses current growth patterns, plans, policies and development regulations to produce a market based growth projection. This projection does not consider any efforts to implement the policies established by the Vision 40 Regional Growth Strategy, and thus represents a conservative growth projection for the region as a whole.

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. The Lakewood, Pierce County, and Steilacoom comprehensive plans were all developed to be

consistent with Vision 2040. Vision 2040 has several goals and policies with regards to domestic water systems, such as Lakewood Water District. 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.

3.2.6 Pierce County Coordinated Water System Plan

The Pierce County Coordinated Water System Plan (PCCWSP), dated April 2001, is the result of a study completed by the Piece County Water Utility Coordinating Committee (WUCC), Pierce County, Pierce County Planning Agency, City of Tacoma, and the Tacoma-Pierce County Health Department. The members of the WUCC represent all public water systems with more than ten service connections that provide service within Pierce County. The PCCWSP was originally adopted in 1995 and is currently in the process of being updated.

The purpose of the PCCWSP is to assist the area’s water utilities in establishing an effective process for the planning and development of public water systems and minimizing the proliferation of small public water systems. The plan accomplishes this by establishing future service area boundaries, minimum design standards, service review procedures, appeals procedures, long-term regional water supply strategies, water conservation program and goals, and the satellite system management program. As outlined in this comprehensive water system plan, Lakewood Water District has established policies, design criteria, and goals that meet or exceed the requirements and goal of the PCCWSP.

3.2.7 The Chambers-Clover Watershed Action Agenda

The Chambers-Clover Creek Watershed Management Plan Project began in 1998. The Planning Unit was formed in 1999 and met through September 2004. Under the guidance of the Planning Unit, a Chambers-Clover Watershed Technical Assessment was prepared, followed by the Chambers-Clover Creek Management Plan. At the September 2004 meeting, the governmental entities on the Planning Unit were unable to reach consensus on the draft Watershed

Management Plan and the planning process halted. The Chambers-Clover Creek Watershed Council (CCWC) has continued to work together and promotes the protection and enhancement of the Chambers-Clover Creek Watershed. The council has prepared the 2012-2017 Chambers-Clover Creek Watershed Action Agenda. The action agenda identifies watershed goals that the CCWC is committed to achieving. It identifies challenges and strategies to address those challenges in addition to the action's council members will implement to accomplish the strategies. The outcomes describe indicators that measure the success in implementing the strategies.

The CCWC provides an opportunity for local agencies and citizen groups to coordinate their efforts to benefit the watershed. The council is committed to improving the health of the watershed by working to improve fish habitat, water quality, and foster a sense of stewardship among watershed residents.

3.2.8 Chambers-Clover Creek Basin Groundwater Management Program

In 1991, the Clover-Chambers Creek Basin Groundwater Management Program was developed and completed as a result of the Washington State Department of Ecology (Ecology) declaring the Clover-Chambers Creek Basin a Ground Water Management Area under authority of Washington Administrative Code (WAC 173-11). The program was prepared for the Clover Chambers Creek Basin Ground Water Advisory Committee with the Tacoma-Pierce County Health Department (TPCHD) serving as the lead agency. The ruling was made because of the concern over the increasing water quality deterioration of the Clover-Chambers Creek aquifer, which serves as the drinking water supply for large portions of Pierce County. Members of the Ground Water Advisory Committee were selected to represent a broad spectrum of interests within the basin. Existing systems of protecting and managing the Clover-Chambers Creek Basin groundwater resources were analyzed to identify any deficiencies. Alternatives for rectifying each deficiency were developed, and, ultimately, a recommended set of alternatives was combined to form the program. The intent of the program is to prevent potential groundwater quality and quantity problems by investing in prevention measures, rather than cleaning up later. The plan contained the following three goals:

- Protect the Clover-Chambers Creek Basin aquifer from the impacts of all significant sources of contamination.
- Ensure safe and sustained supplies of drinking water for the residents of the Chambers-Clover Creek Basin.
- Increase the public recognition of the importance and vulnerability of the Chambers-Clover Creek Basin aquifer.

3.3 Land Use

The retail water service area of the District encompasses approximately 11,826 acres and is nearly the same as the Lakewood City limits but includes the 319-acre Unincorporated Pierce County area to the west of the current City limits as well as a 41-acre portion of the Town of Steilacoom, as shown in **Figure 3-1**. **Table 3-1** summarizes the distribution of acreage in the district service area.

Table 3-1
Service Area Distribution Summary

Jurisdiction	Area (acres)
City of Lakewood	11,468
Town of Steilacoom	41
Unincorporated Pierce County	317
Total	11,826

Most of the District’s service area is comprised of residential use land within the City of Lakewood. **Table 3-2** summarizes the distribution of zoning by percent of area in the County and Town of Steilacoom lands. **Table 3-3** tabulates the zoning distribution for the City.

Table 3-2
County and Steilacoom Land Use Designation Distribution Summary

Land Use Designation/Municipality	Percent of Land Use Designation by Area
Mixed Use District	0.7%
Moderate Density Single Family	85.0%
Neighborhood Center	3.0%
Pierce County Subtotal	88.7%
R 9.6	10.6%
Commercial, General	0.4%
Public / Quasi-Public	0.3%
Town of Steilacoom Subtotal	11.3%
Total	100.0%

Table 3-3
City of Lakewood Land Use Designation Distribution Summary

Land Use Designation	Percent of Land Use Designation by Area
Single Family ¹	48%
Multi-Family ²	7%
Mixed Residential ³	3%
Residential Subtotal	58%
Commercial Use ⁴	16%
Industrial Use ⁵	5%
Open Space/Government/Education Use ⁶	21%
Total	100%

1. 1-Includes areas labeled Residential 1, 2, 3, and 4 in **Figure 3-1**.
2. 2-Includes areas labeled Multifamily 1, 2, and 3 in **Figure 3-1**.
3. 3-Includes areas labeled Mixed Residential 1 and 2 in **Figure 3-1**.
4. 4-Includes areas labeled Air Corridor 1 and 2, Arterial Residential / Commercial, Central Business District, Commercial 1, 2, and 3, Transit Oriented Commercial, and Neighborhood Commercial 1 and 2 in **Figure 3-1**.
5. 5-Includes areas labeled Industrial 1 and 2, and Industrial Business Park in **Figure 3-1**.
6. 6-Includes areas labeled Military Lands, Open Space/Recreation 1 and 2, and Public Institutional in **Figure 3-1**.

3.4 Population

3.4.1 Household Trends

About 60 percent of the District’s retail service area is residential, and is comprised of nearly an equal split, in terms of housing units, of single family and multi-family residences. In 2010 the District’s service area contained approximately 26,016 housing units, approximately 13,202 of these units, or approximately 51 percent, were single family residential and approximately 12,814 units, or approximately 49 percent, were multi-family residential. The number of multi-family housing units served by the District increased from 2000 to 2010, and it is expected that the number of multi-family housing units served will continue to rise through the year 2030. In 2010, Pierce County had a total of approximately 325,375 housing units. Of this total, approximately 67 percent were single-family residential, and approximately 33 percent were multi-family residential.

According to the U.S. Census Bureau, the average household size in the City of Lakewood was 2.36 persons per household in 2010, which was lower than the Pierce County average household size of 2.59 persons per household. The lower average household size in the City of Lakewood reflects the lower occupancy rate of the City of Lakewood compared to Pierce County. The City also has a lower home ownership rate than Pierce County. The City of Lakewood’s ownership rate in 2010 was approximately 46.5 percent, while Pierce County’s was approximately 63.0 percent.

3.4.2 Historical Population

Pierce County has experienced rapid population growth since 1990, increasing more than 20 percent in terms of population from 1990 to 2010. Lakewood was incorporated as a City in 1996, so the first census data available for the City was in 2000. In contrast to the County as a whole, the City’s population shrank by approximately 0.1 percent between 2000 and 2010.

Table 3-4 illustrates this decline, both within the City and within the District’s RSA. As shown in **Table 3-4** between 2000 and 2010 the population of the District dropped from 59,379 to 59,098. Since 2010, the District has experienced limited growth; the population in 2016 is estimated at 59,873.

Table 3-4
Historical Population Summary

Year	City Population	Retail Water Service Area Population
2000	58,293	59,379
2001	58,108	59,351
2002	58,451	59,322
2003	58,715	59,294
2004	58,577	59,266
2005	58,293	59,238
2006	58,623	59,210
2007	58,506	59,182
2008	58,270	59,154
2009	58,218	59,126
2010	58,163	59,098
2011	58,190	59,252
2012	58,260	59,323
2013	58,310	59,374
2014	58,360	59,425
2015	58,400	59,466
2016	58,800	59,873
2017	59,280	60,488
2018	59,350	61,110

1. The City Population data represents the population within the existing city limits. The Water District Population data represents the population within the existing city limits, Steilacoom, and the UGA area that is located west of Lake Louise. The projected population estimates do not include growth in the military bases.

3.4.3 Future Population Projections

Five different population projections for the District's RSA were reviewed and compared. These population projections were from the Pierce County Comprehensive Plan, the City of Lakewood Comprehensive Plan, the PSRC VISION 2040, the PSRC Land Use Baseline, and the Lakewood Downtown Plan.

Pierce County states a target population of 72,000 people in the City of Lakewood and approximately 73,200 people in the District's RSA by 2030. This represents an annual growth rate of approximately 1.6 percent.

The PSRC VISION 2040 projections closely match Pierce County's target population. It estimates population of approximately 74,100 people in the District's RSA by 2030, which reflects growth rates between 1.45 and 1.65 percent between 2017 and 2030.

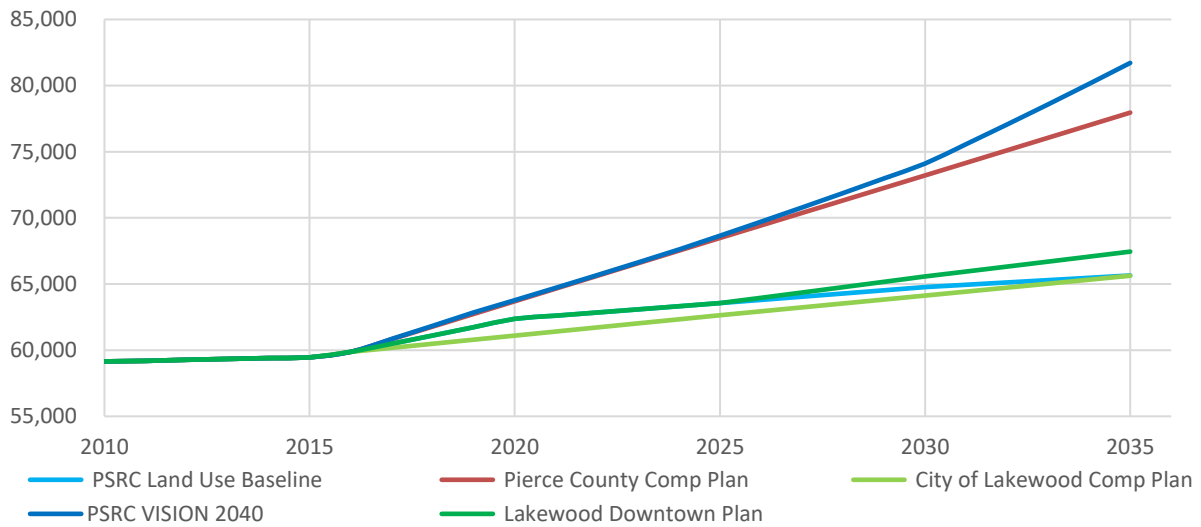
The City of Lakewood's Comprehensive Plan projects a population of 62,916 within the City limits by 2030, which results in about 64,150 in the District's RSA. This projection represents a 0.5 percent population growth rate over the next 11 years. The City explains that it is mostly built-out; future growth will have to be in-fill projects, such as large properties being sub-developed into smaller properties and an increase of multi-family developments.

PSRC's Land Use Baseline (LUB) resembles the City of Lakewood's population projections. The LUB estimates that approximately 64,750 people will live in the District's RSA by 2030. This estimate projects a growth rate of 1.03% between 2017 and 2020, 0.38% between 2020-2030, and 0.27% from 2030-2040. However, the PSRC LUD, last updated in 2016, does not include the population increases caused by the Downtown Lakewood Plan.

The City of Lakewood published the Final Planned Action Environmental Impact Statement for the Lakewood Downtown Plan in July of 2018, which summarizes Lakewood's planned growth in its Colonial, East Commercial, and Town Center districts. Through this proposed action plan, Lakewood expects to add between 1,576 and 2,257 households. To create a population projection from this information, additional households were added to PSRC's LUB, assuming that the Downtown Plan starts adding population to the City in 2025 and is complete around 2045. PSRC's LUB was selected because it closely matches the population projection presented in the City of Lakewood's Comprehensive Plan.

Figure 3-2 compares the population projections for the District's RSA until 2035.

Figure 3-2 Population Projections Comparison



After reviewing the population projects shown above, the District elected to use the Lakewood Downtown Plan population projection because it is the most consistent with City’s current plans for the future.

Table 3-5 shows the projected population within the District’s Retail Service Area. These projections are consistent with the regional planning estimates from PSRC and will be used for the basis for this Plan.

**Table 3-5
Population Projection Summary**

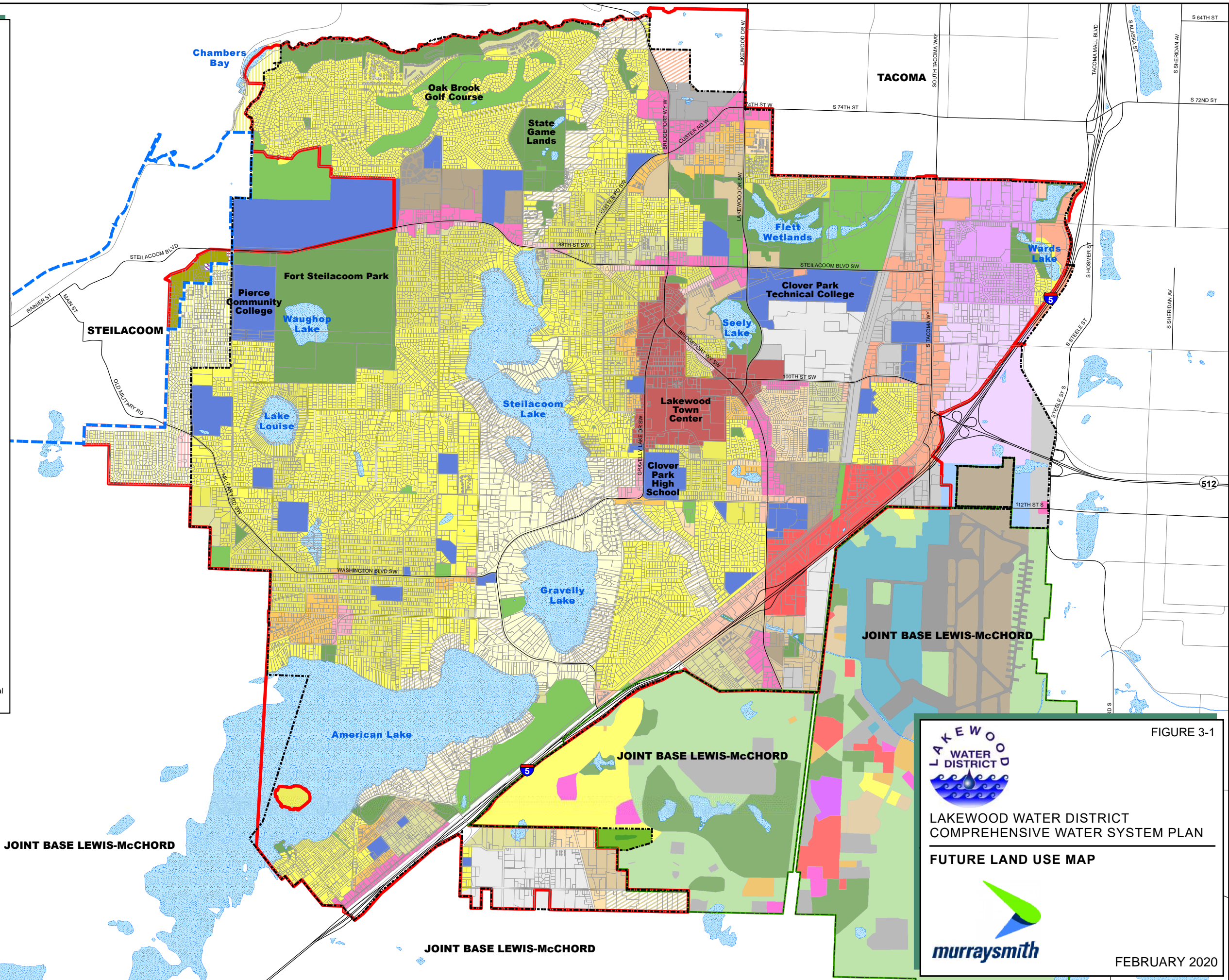
	Year	RSA Population
Historical	2016	59,872
	2017	60,488
	2018	61,110
10-yr Projection	2019	61,739
	2020	62,374
	2021	62,610
	2022	62,846
	2023	63,084
	2024	63,322
	2025	63,561
	2026	63,959
	2027	64,359
	2028	64,762
	2029	65,167
20-yr (2039)	68,992	

3.5 Summary

Lakewood Water District's RSA includes all areas inside City of Lakewood limits, small areas of Unincorporated Pierce County, and a small section of the Town of Steilacoom. This area is largely built-out, so most of the growth within the District's RSA will be subdividing properties and increasing multi-family housing. After reviewing the City of Lakewood's plans for the future, the District developed a population projection that is consistent with the City's plans. This population projection shows a small but steady population growth over the twenty-year planning period.

LEGEND

- Lakewood City Limits
 - Town of Steilacoom Limits
 - Retail Water Service Area
 - Parcel Boundaries
 - Military Installation Boundary
 - Water Bodies
- City of Lakewood Zoning:**
- Air Corridor 1 - Aircraft Noise and Risk Compatible
 - Air Corridor 2 - Aircraft Noise and Risk Compatible
 - Arterial Residential/Commercial - 15 Dwelling Units Per Acre
 - Central Business District - Primary Retail and Office District
 - Clear Zone - Aircraft Noise and Risk Compatible
 - Commercial 1 - Light Commercial
 - Commercial 2 - Med Commercial
 - Commercial 3 - Heavy and Large Commercial Facilities
 - Industrial 1 - Light Industrial
 - Industrial 2 - Heavy and High-impact Industrial
 - Industrial Business Park - General industrial
 - Military Lands - Military-Owned Lands
 - Mixed Residential 1 - 8.7 Dwelling Units per Acre
 - Mixed Residential 2 - 14.6 Dwelling Units per Acre
 - Multifamily 1 - 22 Dwelling Units per Acre
 - Multifamily 2 - 35 Dwelling Units per Acre
 - Multifamily 3 - 54 Dwelling Units per Acre
 - Neighborhood Commercial 1 - 22 Dwelling Units per Acre
 - Neighborhood Commercial 2 - 35 Dwelling Units per Acre
 - Open Space / Recreation 1 - Recreational Use Only
 - Open Space / Recreation 2 - Recreation and Civic Facility Use
 - Public Institutional - Civic Use
 - Residential 1 - 1.45 Dwelling Units per Acre
 - Residential 2 - 2.2 Dwelling Units per Acre
 - Residential 3 - 4.8 Dwelling Units per Acre
 - Residential 4 - 6.4 Dwelling Units per Acre
 - Transit Oriented Commercial
- Pierce County Zoning:**
- Mixed Use District - 25 Dwelling Units per Acre
 - Moderate Density Single Family - 6 Dwelling Units per Acre
 - Neighborhood Center - Mixed Use to Serve Nearby Community
- Joint Base Lewis-McChord Zoning:**
- Administrative
 - Aircraft Operations and Maintenance
 - Aircraft Pavements
 - Airfield
 - Community (Commercial)
 - Community (Service)
 - Highway Right-of-Way
 - Housing (Accompanied)
 - Housing (Unaccompanied)
 - Industrial
 - Medical
 - Open Space
 - Outdoor Recreation
- Town of Steilacoom Zoning**
- Commercial, General - Mixed Use Commercial
 - Public/Quasi-Public - Public Facilities and Approved Commercial
 - R-9.6 - 9.6 Dwelling Units per Acre



K:\TAC_Projects\171987 - Lakewood WSP\GIS\Final\WSP_Figures\17-1987-WA-FIGURE 3-1.mxd 7/31/2019 8:40:01 AM stephanie.ard

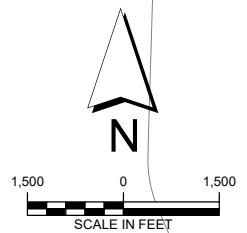


FIGURE 3-1

LAKWOOD WATER DISTRICT

LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN

FUTURE LAND USE MAP

murraysmith

FEBRUARY 2020

Chapter 4

Water Demands

4.1 General

The planning efforts of the District rely on a thorough analysis of water system demands. This analysis reviewed the historical water supply and demand data from 2010 to 2016. Using this data, the District’s demand per equivalent residential units (ERU), the average day demand (ADD), and the maximum day demand (MDD) were calculated for each year. The analysis then looked at the general trends of these values over the ten-year period 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 demands needs for the system for the next six-, ten-, and twenty-year planning periods. The future water supply and demands needs 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**.

4.1.1 Current Population and Service Connections

4.1.1.1 Retail Population Served

The District's retail water service area is primarily residential, comprised largely of single-family residents, as described in **Chapter 3**. In 2016, the District provided retail water service to an average of 16,886 customer accounts, of which approximately 13,984 accounts, or 83 percent were single family residential customers; approximately 1,266 accounts, or 7 percent, were multi-family residential customers; and approximately 1,636 accounts, or 10 percent, were all other customer types. The District’s retail population has held relatively steady for the past six years, and the population forecasts presented in **Chapter 3** estimates only a minor annual population growth rate.

4.1.1.2 Wholesale Population Served

The District is a member of the Regional Water Cooperative of Pierce County and sells wholesale water to other members. The District has supplied wholesale water to Summit Water and Supply Company and the Town of Steilacoom (Town) for more than ten years. In 2019 the District signed agreements to supply wholesale water to Firgrove Mutual Water Company and updated its agreement to supply Rainer View Water Company’s Southwood water system. The District also has a contract to supply wholesale water to Spanaway Water Company’s water system but is not currently providing water to this system under normal operating conditions. Between 2017 and

2026 the District is looking to continue to provide more wholesale water to its existing customers as well as add new wholesale customers. More information on the District’s wholesale customers can be found in **Chapter 2**.

4.2 Historical Water Consumption

Water consumption is the amount of water used by all customers of the system, as measured by the customers' meters. The District separates customers into ten different customer classes for billing purposes. These classes include commercial, multi-unit residential, residential, schools, school swimming pools, parks, regular compound meters, fire meter/miscellaneous, Town of Steilacoom, and Summit Water & Supply Company.

For planning purposes, the water customers have been combined into the six user groups shown in **Table 4-1**. The consumption analysis that follows will summarize the water use patterns of the six user groups that the District tracks, in the following columns listed in **Table 4-1**:

- Single Family Residential, includes data for “residential” customer class.
- Multi-Family Residential, includes data for “multi-unit residential” customer classes.
- Commercial/Other, includes data for “commercial” and “fire meter/miscellaneous” customer classes.
- Government Education, includes data for “schools,” “parks,” and “school swimming pools” customer classes.
- Steilacoom includes data for “Town of Steilacoom” customer class.
- Summit includes data for “Summit Water & Supply Company” customer class.

Table 4-1 shows the average number of connections, average annual consumption, and average daily consumption per connection for six customer groups that include data from ten customer classes tracked by the District between 2010 and 2016.

Table 4-1
Average Annual Metered Consumption Summary

Year	Customer Group						Totals
	Single Family Residential	Multi-Family Residential	Commercial/ Other	Government/ Education	Steilacoom Wholesale	Summit Wholesale	
Average Number of Connections							
2010	13,815	1,202	1,466	102	2	1	16,588
2011	13,844	1,225	1,471	104	2	1	16,647
2012	13,863	1,240	1,474	101	2	1	16,681
2013	13,882	1,231	1,483	108	2	1	16,707
2014	13,900	1,249	1,521	105	2	1	16,778
2015	13,932	1,267	1,510	104	2	1	16,816
2016	13,984	1,266	1,528	108	2	1	16,889
Average Annual Consumption (1,000 gallons)							
2010	1,272,698	678,365	381,122	78,948	212,885	192,113	2,816,132
2011	1,134,877	604,905	310,511	67,639	195,067	95,622	2,408,620
2012	1,324,268	705,853	359,831	80,720	221,302	124,649	2,816,622
2013	1,268,197	675,966	374,431	88,026	218,045	133,447	2,758,112
2014	1,283,525	684,136	378,141	82,938	230,700	288,754	2,948,193
2015	1,405,860	749,342	393,967	115,655	241,519	332,343	3,238,686
2016	1,366,864	728,557	391,042	126,159	254,980	478,352	3,345,954
Average Daily Consumption per Connection (gal/day/connection)							
2010	252	1,546	712	2,121	-	-	-
2011	225	1,353	578	1,782	-	-	-
2012	261	1,555	667	2,184	-	-	-
2013	250	1,504	692	2,233	-	-	-
2014	253	1,501	681	2,164	-	-	-
2015	276	1,620	715	3,047	-	-	-
2016	267	1,572	699	3,192	-	-	-
Average	255	1,522	678	2,389	-	-	-

As shown in **Table 4-1**, and based on data from 2010 to 2016, single family residential customers use an average of approximately 255 gallons per day per connection, multi-family customers consume an average of approximately 1,522 gallons per day per connection, commercial/other customers consume an average of approximately 678 gallons per day per connection, and government/education customers consume an average of approximately 2,389 gallons per day per connection.

The higher consumption of the multifamily customers is a result of one connection often serving multiple living spaces. The higher use of the commercial/other customer group is a result of the connections serving some of the largest water users in the District. The Town of Steilacoom and Summit Water & Supply Company connections have the largest demand per connection, because both customers supply entire water systems from one or two connections to the District.

4.2.1 Largest Water Users

Table 4-2 shows the District’s top retail water users in 2016. The total water consumption of these retail customers represents almost five percent of the total retail consumption in 2016. The table consists mostly of multi-family complexes, public facilities, and commercial properties.

Table 4-2
2016 Largest Water Users Summary

No.	Name	Address	Annual Consumption (1,000 gallons)
1	Alpine Estates Lakewood	6622 146th St SW	15,380
2	Clover Park School District	4002 Steilacoom Blvd SW	12,492
3	Lakewood Industrial Park	47TH Ave SW 100th St	12,335
4	City of Lakewood	8714 87th Ave	11,765
5	Pierce County Park Department	8200 87th Ave SW	10,128
6	Village Green Partnership	2902 S 84th St	9,483
7	Parkwood Terrace	6503 150th St SW	9,328
8	Clover Park School District	10801 Gravelly Lk Dr SW	8,999
9	Clover Park School District	9101 Lakewood Drive	7,642
10	Pierce Collage	9401 Farwest Dr SW	6,633
11	Melby Management	8300 Phillips Rd SW	6,228
12	Wisteria Walk	3615 112th St SW	2,085
13	Helen Kim	3315 82nd St S	2,053
14	The Harrison	8320 84th Ave SW	2,052
Total			116,602
Percent of Retail Water Consumption			5%

4.2.2 Factors Affecting Water Consumption

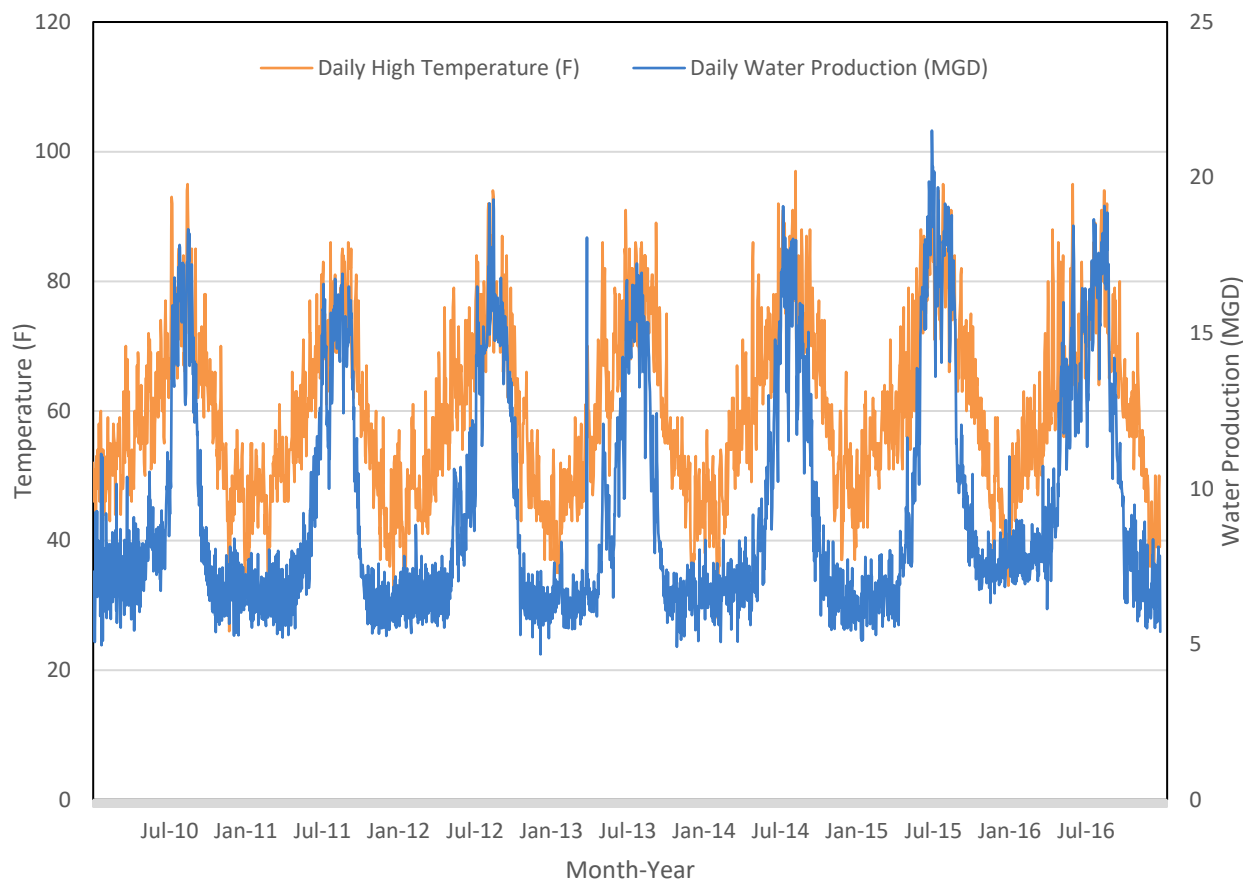
Many factors affect the water demand of a system. Any significant changes to the population, weather, customer classifications, population density, or conservation efforts of a system can substantially change the system’s demand.

4.2.2.1 Seasonal Water Consumption Patterns

Weather has a seasonal impact on water demands, which tend to increase with the outdoor temperature. **Figure 4-1** shows this correlation between temperature and the District’s water production from 2010 through 2016. **Figure 4-1** uses production data rather than consumption data because daily production data was available while daily consumption data was not. Since water production follows the same inter-day pattern as consumption for the District, consumption can be assumed to follow the same inter-day pattern as production.

The District’s retail service area has seen a slight increase in water demand per capita in the last two years (2015 and 2016). This increase is most likely due to weather. As **Figure 4-1** illustrates, 2015 and 2016 were generally warmer than previous years.

Figure 4-1
Annual Lakewood High Temperature vs. Water Production Summary



Water consumption also varies among separate groups of water customers. Single-family residential customers typically use more water than multi-family residential customers, primarily due to the outdoor lawn watering and irrigation practices of single-family residences. Commercial and Industrial tend to have a higher water usage demand per connection than residential connections.

While both residential and commercial customers typically use more water in the summer than the winter, residential consumption tends to increase more than commercial consumption. Residential consumption is typically more affected by outdoor water use during hot weather, while commercial use typically has a larger average daily, or baseline, demand which tends to lower the impact of outdoor water use. As shown in **Table 4-3**, the District’s residential customers typically use 88 percent more water in the summer than in the winter. Commercial customers typically use 64 percent more water in the summer than in the winter.

Table 4-3
Summary of Seasonal Variations in Consumption by Customer Class

Residential Water Use (CF)			
Year	Summer (June, July, August)	Winter (December, January, February)	Percent of Seasonal Increase
2010	78,520,800	52,130,100	51%
2011	80,740,500	33,809,400	139%
2012	83,344,600	52,256,100	59%
2013	88,466,700	49,126,400	80%
2014	88,761,800	47,615,800	86%
2015	109,767,200	49,810,100	120%
2016	92,341,900	50,565,200	83%
2010 – 2016 Average			88%
Commercial Water Use (CF)			
Year	Summer (June, July, August)	Winter (December, January, February)	Percent of Seasonal Increase
2010	14,911,800	10,810,100	38%
2011	13,986,100	6,651,700	110%
2012	14,536,200	9,831,700	48%
2013	16,021,700	13,586,400	18%
2014	16,222,800	9,678,700	68%
2015	17,590,800	9,496,000	85%
2016	16,993,600	9,552,300	78%
2010 – 2016 Average			64%

4.2.3 Equivalent Residential Units (ERUs)

The demand of each customer class can be expressed in terms of equivalent residential units (ERUs) for demand forecasting and planning purposes. One ERU is equivalent to the amount of water used by a single-family residence. The number of ERUs represented by the demand of the other customer groups is found from the total demand of the customer group divided by the demand per ERU calculated from the single family residential demand data.

Table 4-4 uses the annual demand for and number of single-family residential connection to calculate the system’s ERU value from 2010 through 2016.

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

Year	Number of Single-Family Connections	Average Annual Demand (gallons per day)	ERU Demand (gpd/ERU)
2010	13,815	3,486,845	252
2011	13,844	3,109,252	225
2012	13,863	3,618,219	261
2013	13,882	3,474,512	250
2014	13,900	3,516,506	253
2015	13,932	3,851,671	276
2016	13,984	3,734,601	267
2010 – 2016 Average			255

As shown in **Table 4-4**, the average demand per ERU for the years 2010 to 2016 was approximately 255 gpd. This is close to the average single-family demand for the Pierce County area which is approximately 244 gpd according to the 2009 Puget Sound Water Supply Forum’s Supply Outlook.

Table 4-5 uses shows the number of ERUs per customer class, which is calculated by dividing the average water demand per connection, shown in **Table 4-1**, by the system’s demand per ERU, shown in **Table 4-4**.

Table 4-5
Number of Equivalent Residential Unit (ERUs) per Customer Class

Year	Demand/ERU	Single Family Residential	Multi-Family Residential	Commercial/Other	Government/Education	Total Retail Customers	Wholesale	Total System ERUs
2010	252	13,815	7,289	4,095	848	26,048	4,352	30,400
2011	225	13,844	6,500	3,337	727	24,407	3,124	27,531
2012	261	13,863	7,564	3,856	865	26,148	3,707	29,855
2013	250	13,882	7,263	4,023	946	26,115	3,777	29,892
2014	253	13,900	7,351	4,063	891	26,206	5,582	31,787
2015	276	13,932	8,052	4,233	1,243	27,460	6,166	33,626
2016	267	13,984	7,807	4,190	1,352	27,333	7,858	35,192
2010 – 2016 Average								31,183

4.2.4 Average Day Demand

Average Day Demand (ADD) is the total amount of water consumed and used in a year divided by the number of days in the year. The average day demand 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 4-6
Retail Water Service Area Average Day Demands

Year	Retail Demand ¹ (gal/day)	District Retail Water Service Area Population ²	Average Day Demand ³ (gpd/capita)
2010	7,725,373	59,152	131
2011	7,875,314	59,193	133
2012	8,197,659	59,276	138
2013	8,234,433	59,340	139
2014	7,713,042	59,404	130
2015	8,427,856	59,458	142
2016	8,448,706	59,872	141
2010 – 2016 Average			136

Notes:

1. Retail demand is from the District’s records for its water production minus the water sold to wholesale customers. This estimate includes all water used in the District’s Retail Water Service Area and distribution system leakage.
2. District population is discussed in more detail in **Chapter 3**.
3. Average day demand is calculated by dividing the retail demand by the District’s Retail Water Service Area population. This demand is only for the retail water service area.

4.2.5 Maximum Day Demand

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 summer day when lawn watering is occurring. Per WAC 246-290: Distribution Systems, the distribution system shall provide fire flow at a minimum pressure of 20 psi during MDD conditions. Supply facilities (e.g., supply stations, booster pump stations, interties) are typically designed to supply water at a rate that is equal to or greater than the system’s MDD.

Table 4-7
Retail Water Service Area Maximum Day Demands

Year	ADD (gal/day)	MDD (gal/day)	Peaking Factor
2010	7,725,373	16,898,969	2.19
2011	7,875,314	14,773,283	1.88
2012	8,197,659	17,150,989	2.09
2013	8,234,433	17,008,000	2.07
2014	7,713,042	16,719,695	2.17
2015	8,427,856	18,719,387	2.22
2016	8,448,706	16,144,757	1.91
2010 – 2016 Average			2.07

4.2.6 Peak Hour Demand

Peak Hour Demand (PHD) is the most amount of water consumed and used throughout the system, excluding fire flow, during a one-hour period of a given year. Per WAC 246--290-230: Distribution Systems, new public water systems or additions to existing systems shall be designed to offer domestic water at a minimum pressure of 30 psi during peak hour demand conditions. Equalizing storage requirements are typically based on peak hour demand data.

Because hourly system data was not available, the DOH PHD formula included in the DOH Water System Design Manual: December 2009 was used to estimate PHD. The calculated PHD/MDD ratio of 1.62 is within the typical range of 1.3 to 2.0 for other systems in the area.

4.2.7 Wholesale Peaking Factors

Wholesale demand to the Town will likely experience large demands during the same day as the District. This plan references the Town's MDD/ADD peak factor of 2.8 stated in the Town's 2010 Water System Plan (approved by DOH in 2014). The Town's wholesale demand does not create a significant peak hour demand peak on the District's system because the Town's water storage facilities provide equalizing storage for intraday peak demands.

The wholesale demand to the Wholesale Partners (Summit, Rainer View, and Firgrove) are not anticipated to create a significant peaking factor for the District's system because the supply contracts encourage these wholesale partners to draw water at a steady rate from the District.

Both the retail and wholesale peaking factors will be used later in this chapter, in conjunction with projected average day demands, to forecast future MDD and PHD of the system.

4.3 Water Use Efficiency

The District has promoted using water efficiently and minimizing waste for many years. The District first implemented its Water Wise Usage Plan in 1994 to curb water waste and promote water conservation. This plan was updated several times before, and successfully reduced the District's per capita water demand. In 2008 the District created a Water Use Efficiency (WUE) Program, as mandated by the Department of Health (DOH) WUE Rule. The program was updated in June 2013, and the program's goal to reduce water use by 0.25 percent per year was renewed. The WUE Program focuses on reducing distribution system leakage and encourage water conservation. A copy of the District's WUE Plan is included in **Appendix G**.

To reach this goal the District has continued the educational effort to promote responsible use of the resource as it has over the last many years. The District has adjusted rates by increasing the base fee, adjusting consumption rates, and adding a Renewal & Replacement (R & R) fee to its rates. This increase in cost has incentivize the customers to responsibly use this valuable resource. These rate changes in addition to the measures and educational programs in place are helping the District's WUE goals.

4.3.1 Authorized Consumption and Distribution System Leakage

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 are: 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 supply and authorized consumption is the amount of distribution system leakage (DSL) in the system. There are many sources of DSL in a typical water system including water system leaks, inaccurate supply metering, inaccurate customer metering, water service line and main breaks from construction, illegal water system connections or water use, and malfunctioning telemetry and control equipment resulting in an overflow of storage tanks.

The amount of DSL in the District's system varied slightly from 2010 through 2016, as shown in **Table 4-8**.

Table 4-8
Historical DSL Summary

Year	Total Supply (1,000 gal)	Total Retail Demand (1,000 gal)	Total Wholesale Demand (1,000 gal)	Non-Billed Authorized Consumption (1,000 gal)	Total Authorized Consumption	Distribution System Leakage	3-Year Rolling Average
2010	3,225,444	2,411,134	404,998	26,899	2,843,032	11.9%	7.1%
2011	3,192,073	2,117,931	290,689	373,245	2,781,865	12.9%	8.6%
2012	3,332,922	2,470,672	345,951	24,586	2,841,209	14.8%	13.2%
2013	3,179,375	2,406,620	351,492	22,221	2,780,333	12.6%	13.4%
2014	3,334,135	2,428,740	519,454	18,919	2,967,112	11.0%	12.8%
2015	3,651,303	2,664,824	573,862	22,252	3,260,938	10.7%	11.4%
2016	3,826,210	2,612,622	733,332	77,263	3,423,216	10.5%	10.7%
2017 ¹	3,649,006				3,396,733	6.9%	9.4%
2018 ¹	3,641,975				3,325,651	8.7%	8.7%

Note:

1. 2017 and 2018 WUE data from WUE Report submitted to DOH, and therefore, a detailed breakdown of authorized consumption is not provided.

4.4 Future Water Demands

The District's future water demand projections include both retail and wholesale demand. Several items that affect these demand projections are currently in flux and could result in a wide range of future demands during the planning period. These items include:

- Town of Steilacoom Supply – Lakewood Water District and the Town of Steilacoom are in the process of renegotiating their supply agreement.
- City of Lakewood Town Center Redevelopment – This planned redevelopment could add several thousand new homes and increase density in the City. Currently this is anticipated to occur over a 25-year time period starting in 2020.
- Supply to Wholesale Partners – While there is agreement in the general range of supply needed by the District’s Wholesale Partners, the exact amount is currently unknown. For planning purposes, the supply to the Wholesale Partners will be at least 5 MGD and up to 9 MGD, although the specific timing is unknown.
- Supply to Western States Hospital – The hospital has expressed interest in exploring the option of having the District provide water supply to the hospital. Initial discussions have been held and currently the District anticipates that the hospital’s water rights would need to be transferred to the District as a condition of supplying the hospital. Since the water right and supply offset under this scenario, the impact of supply and demand to the hospital is not considered in the supply analysis scenarios.

In general, retail demands were projected using the population growth stated in **Chapter 3**, and the 2010 – 2016 average per capita demand of 136 gpd. Historically, the per capita demand has decreased due to water use efficiency efforts. Therefore, a secondary retail demand was projected assuming that the District meets the goal stated in its WUE Program of reducing the District’s per capita demand by 0.25 percent each year. The future MDD and PHD shown were computed from the projected average day demands and the calculated peaking factors shown in **Table 4-7**. To capture the wide range of potential wholesale demands, two alternative scenarios were prepared. The alternatives are listed below.

- Medium Demand Scenario – Assumes Town of Steilacoom continues being supplied by the District. This alternative also assumes Wholesale supply to the Wholesale Supply Partners stays at 5 MGD through 2029, increases to 7 MGD in 2030 and increases to 9 MGD in 2039. This alternative also assumes the Lakewood Town Center development takes 25 years.
- High Demand Scenario – Assumes Town of Steilacoom continues being supplied by the District. This alternative also assumes Wholesale supply to the Wholesale Supply Partners stays at 5 MGD through 2024, increases to 7 MGD in 2025 and increases to 9 MGD in 2030. This alternative also assumes the Lakewood Town Center development takes 20 years.

The District believes that the Medium Demand Scenario is the most likely, and therefore, it is the scenario that is carried over through the rest the of planning material.

Future demands are summarized in **Table 4-9**, and **Table 4-10** below. The tables present the incremental 10-year and 20-year water demand forecasts for the District’s water system.

Projections are based on the historical water data from 2010 to 2016, as analyzed earlier in this chapter. The actual demand data from 2016, 2017, and 2018 are also shown in the table for comparison purposes and show that demands in 2017 and 2018 were slightly lower than 2016.

4.5 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 4-9
Medium Water Demand Scenario Projection

	Description	Base Year (2016)	Reference Years ¹			10yr Planning Period											20yr Period (2039)
			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029		
Retail Demand	ADD (gpm)	Without WUE	5,883	5,788	5,575	5,960	6,021	6,044	6,066	6,089	6,112	6,135	6,174	6,212	6,251	6,290	6,660
		With WUE	--	--	--	5,915	5,960	5,968	5,975	5,982	5,989	5,996	6,018	6,039	6,061	6,083	6,266
	MDD (gpm)	Without WUE	11,963	--	--	12,336	12,463	12,510	12,557	12,605	12,652	12,700	12,780	12,860	12,940	13,021	13,786
		With WUE	--	--	--	12,243	12,338	12,353	12,368	12,383	12,397	12,412	12,457	12,502	12,547	12,592	12,971
	PHD (gpm)	Without WUE	--	--	--	19,985	20,190	20,267	20,343	20,420	20,497	20,574	20,703	20,833	20,963	21,094	22,333
		With WUE	--	--	--	19,834	19,988	20,012	20,036	20,060	20,083	20,107	20,180	20,253	20,326	20,398	21,012
Annual Demand (MG)		3,092	3,042	2,930	3,132	3,165	3,177	3,189	3,201	3,213	3,225	3,245	3,265	3,286	3,306	3,500	
Wholesale Demand (Med Projection)	Town Wholesale (MGD)	0.70	0.69	0.70	0.70	0.71	0.71	0.71	0.72	0.72	0.72	0.72	0.73	0.73	0.73	0.76	
	Partners Wholesale (MGD)	1.31	0.97	1.25	1.31	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	9.0	
	Total Wholesale (MGD)	2.01	1.66	1.95	2.02	5.71	5.71	5.71	5.72	5.72	5.72	5.72	5.73	5.73	5.73	9.76	
Whole System Demand	ADD (gpm)	Without WUE	7,279	6,942	6,929	7,360	9,985	10,010	10,034	10,059	10,084	10,109	10,149	10,189	10,230	10,271	13,437
		With WUE	--	--	--	7,315	9,925	9,934	9,943	9,952	9,961	9,969	9,993	10,016	10,040	10,064	13,043
	MDD (gpm)	Without WUE	14,229	--	--	14,129	16,821	16,871	16,922	16,973	17,024	17,075	17,157	17,241	17,324	17,409	20,985
		With WUE	--	--	--	14,036	16,696	16,714	16,732	16,750	16,768	16,786	16,834	16,883	16,931	16,979	20,170
	PHD (gpm)	Without WUE	--	--	--	21,777	24,548	24,628	24,708	24,788	24,868	24,949	25,081	25,214	25,347	25,482	29,532
		With WUE	--	--	--	21,627	24,346	24,373	24,401	24,428	24,455	24,481	24,557	24,634	24,710	24,786	28,212
Annual Demand (MG)		3,826	3,649	3,642	3,866	5,246	5,259	5,272	5,285	5,298	5,311	5,332	5,353	5,375	5,396	7,060	

1. Data add for 2017 and 2018 to verify the validity of the projections presented.

Table 4-10
High Water Demand Scenario Projection

Description	Base Year (2016)	Reference Years ¹		10yr Planning Period										20yr Period (2039)			
		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029			
Retail Demand	ADD (gpm)	Without WUE	5,883	5,788	5,575	5,960	6,021	6,044	6,066	6,089	6,112	6,135	6,180	6,225	6,271	6,316	6,752
		With WUE	--	--	--	5,915	5,960	5,968	5,975	5,982	5,989	5,996	6,024	6,052	6,080	6,108	6,353
	MDD (gpm)	Without WUE	11,963	--	--	12,336	12,463	12,510	12,557	12,605	12,652	12,700	12,793	12,886	12,980	13,075	13,977
		With WUE	--	--	--	12,243	12,338	12,353	12,368	12,383	12,397	12,412	12,469	12,527	12,585	12,643	13,151
	PHD (gpm)	Without WUE	--	--	--	19,985	20,190	20,267	20,343	20,420	20,497	20,574	20,724	20,876	21,028	21,181	22,642
		With WUE	--	--	--	19,834	19,988	20,012	20,036	20,060	20,083	20,107	20,200	20,294	20,388	20,482	21,304
Annual Demand (MG)		3,092	3,042	2,930	2,930	3,165	3,177	3,189	3,201	3,213	3,225	3,248	3,272	3,296	3,320	3,549	
Wholesale Demand (High Projection)	Town Wholesale (MGD)	0.70	0.69	0.70	0.70	0.71	0.71	0.71	0.72	0.72	0.72	0.72	0.73	0.73	0.73	0.76	
	Partners Wholesale (MGD)	1.31	0.97	1.25	1.25	5.00	5.00	5.00	5.00	5.00	7.00	7.00	7.00	7.00	7.00	9.00	
	Total Wholesale (MGD)	2.01	1.66	1.95	1.95	5.71	5.71	5.71	5.72	5.72	7.72	7.72	7.73	7.73	7.73	9.76	
Whole System Demand	ADD (gpm)	Without WUE	7,279	6,942	6,929	7,360	9,985	10,010	10,034	10,059	10,084	11,498	11,544	11,591	11,638	11,686	13,529
		With WUE	--	--	--	7,315	9,925	9,934	9,943	9,952	9,961	11,358	11,388	11,418	11,448	11,478	13,130
	MDD (gpm)	Without WUE	14,229	--	--	14,619	17,313	17,365	17,418	17,470	17,523	18,965	19,062	19,161	19,260	19,360	21,703
		With WUE	--	--	--	14,526	17,188	17,208	17,228	17,248	17,268	18,676	18,739	18,802	18,865	18,928	20,877
	PHD (gpm)	Without WUE	--	--	--	22,268	25,040	25,122	25,203	25,285	25,367	26,839	26,994	27,150	27,307	27,466	30,369
		With WUE	--	--	--	22,117	24,838	24,867	24,896	24,925	24,954	26,371	26,470	26,569	26,668	26,767	29,030
Annual Demand (MG)		3,826	3,649	3,642	3,642	5,248	5,261	5,274	5,287	5,300	6,043	6,068	6,092	6,117	6,142	7,111	

1. Data add for 2017 and 2018 to verify the validity of the projections presented.

Chapter 5

Policies and Design Criteria

5.1 Introduction

This chapter presents the policies and design criteria that the Lakewood Water District (District) has adopted. These policies and design criteria have been created to ensure the long-term viability of the District’s water system and fulfill regulatory requirements.

5.2 Regulatory Overview

The Lakewood Water District (District) operates and plans water service for District residents according to the design criteria, laws, and policies that originate from the seven sources as summarized in **Table 5-1**. The listed agencies are in descending order from those with the broadest authority in setting the policies and 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
Pierce County Council	County Regulations
Lakewood Board of Commissioners	Administrative Policies
American Water Works Association	Design Criteria

The laws, design criteria, and policies listed in **Table 5-1** guide the District’s operation and maintenance of the water system on a daily basis and in the long-term planning for growth and improvements. The overall objective is to ensure the District continues to provide high quality water and reliable service at a reasonable cost to its customers. They also set the standards that the District 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 the recommended improvements are identified in **Chapter 9**.

Three of the governmental entities establishing policies and laws, including the U.S. Government, Washington State and Pierce County Council, establish requirements in statutes, regulation, or ordinances. The District's Board of Commissioners and General Manager adopt and set policies that cannot be less stringent or in conflict with those established by governments above them. The District's policies take the form of resolutions, memoranda, written policies, and operation procedures, many of which are summarized in this chapter.

The District's policies associated with the following categories are presented in this chapter:

- Supply
- Customer Service
- Facilities
- Finance
- Organization

5.3 Supply Policies

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

5.3.1 Water Quantity

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

1. The District will use supply from the District's own groundwater wells to supply all customers within the District's service area as well as wholesale customers.
2. The District will plan for at least 20 years into the future, so that potential future water resource limitations can be identified early and handled effectively.
3. The District will ensure that the supply capacity of the system, including supply sources, pump station, and transmission mains, is sufficient to meet the peak day demand of the system.

5.3.2 Water Quality

The District has adopted the following policies to ensure that it delivers high quality, safe water which meets or exceeds all local, state and federal guidelines:

1. The District will pursue steps to meet or exceed all water quality laws and standards.
2. The District will take all reasonable measures to protect its system and customers.

5.3.3 Cross-Connection Control

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

1. The District has a responsibility to protect the public water system from contamination due to cross-connections. Cross-connection which can be eliminated will be eliminated.
2. The District established a cross-connection control program in 1989 for eliminating cross-connection. A copy of the Lakewood Water District Cross-Connection Control Program is contained in **Appendix H**.
3. The District has staff that is certified for backflow prevention.
4. The District will comply with the backflow prevention assembly installation and testing requirements as indicted in WAC 246-290-490 and as published in the most current edition of the manual entitled, Cross Connection Control Manual Accepted Procedure and Practice – Pacific Northwest Section – American Water Works Association (AWWA).

5.3.4 Fire Flow

The District will plan its water system to provide fire flows at the rate and duration shown in **Table 5-2** and based on City of Lakewood land use designations found in **Chapter 3**. Fire flow requirements for individual buildings will be determined through the building permit process. The District will determine the available fire flows based on hydraulic analyses and field testing of fire hydrants in issuing Certificates of Water Availability.

Table 5-2
Fire Flow Requirement Summary

City of Lakewood Land Use Category	Fire Flow Requirement (gpm)	Flow Duration (hours)
Single Family (< 3600 SF)	1,000	2
Air Corridor 2	1,500	2
Residential Estates (>3600 sq. ft.)	1,750	2
Mixed Residential	1,750	2
Multi-Family	2,000	2
High Density Multi-Family	2,500	2

Table 5-2 (Continued)
Fire Flow Requirement Summary

City of Lakewood Land Use Category	Fire Flow Requirement (gpm)	Flow Duration (hours)
Arterial Commercial	3,000	3
Neighborhood Business District	3,000	3
Air Corridor 1	3,500	3
Central Business District	3,500	3
Corridor Commercial	3,500	3
Public & Semi-Public Institutional	3,500	3
Industrial	4,000	4

5.3.5 Regional Participation

The District is a regional provider of water in the Pierce County area and places a high value on participating regionally and has adopted the following policies regarding regional participation:

1. The District will participate in regional supply management and planning activities to protect the environment, reduce cost of service, and improve reliability, water quality and quantity. The District is participating in the following regional activities:
 - a. Water Resource Inventory Areas (WRIA) planning group for WRIA 12
 - b. Pierce County Regional Water Association
 - c. Water Cooperative of Pierce County
 - d. Washington Water Utility Council
 - e. Washington State Water/Wastewater Agency Response Network (WARN)

Participation in these activities include attending meetings, providing information for studies and performing water quality monitoring tasks, as needed.

2. The District will supply all customers within the District’s service area and wholesale customers.

5.4 Customer Service Policies

The District and its employees have created customer service policies to maintain quality water supply for existing and future customers. These policies reference new connections, temporary services, emergency services and planning boundaries.

5.4.1 Water Service and Connection

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

1. The District strives to provide potable water service to all people within the District's retail water service boundary, provided all policies related to service can be met.
2. All proposed developments within the District's retail water service boundary shall connect directly to the District's water system, unless deemed unfeasible by the District at the time of the request.
3. Water system extensions required to provide water service to proposed developments shall conform to the District's adopted design criteria, construction standards and specifications, as shown in the Lakewood Water District Developers Extension Program.
4. Parties outside the existing service area boundary requesting to receive water from Lakewood Water District require written approval from the purveyor originally assigned to provide water service, as well as approvals from the local planning division, Pierce County Water Resources, the Tacoma Pierce County Health Department and the Washington State Department of Health Drinking Water Division.
5. Requests for new water service are received at the District office and provided to the Superintendent. The Superintendent confirms the size of the service requested by the applicant. The request is forwarded to the District's Construction Department Head to determine road crossing and right of way permit costs.
6. Requests for new water service are processed after receipt of payment of all fees and upon determination of sufficient water system capacity. The District periodically evaluates the capacity of all groundwater wells and associated water rights to ensure that the system can provide adequate water service to both existing and future water customers. Storage and distribution/transmission capacity is evaluated every six years during the water system plan update process.
7. Applications for new water services are usually processed within 5 business days.
8. Delays resulting from non-technical conditions that affect the District's ability to provide new water service are the responsibility of the applicant. These conditions include, but are not limited to, environmental assessments and local ordinances.

9. Time extensions in regard to water availability are granted in accordance with the associated permit requirements. When extensions are denied, the disputes are handled through the District's dispute resolution process.
10. Disputes received at the District office are forwarded to the appropriate District Department Head. Disputes not resolved by the Department Head are forwarded to the Superintendent. Disputes not resolved by the Superintendent are forwarded to the District General Manager. Disputes not resolved by the District General Manager are forwarded to the Board of Commissioners. Mediation and then arbitration is the final process that is used to resolve disputes that are not resolved by the Board of Commissioners and others involved in the process. Legal counsel is usually sought when the dispute reaches the District General Manager level and is retained throughout mediation and arbitration.

5.4.2 Temporary Water Services

Temporary service may be provided if available and at all cost to the applicant. When conditions which necessitate the temporary water service are resolved, for example, a new water main is now available on the property, temporary service agreements require connection to the new water main at the regular price of connection, plus the disconnect price of the temporary service. Failure to connect with a permanent water service connection within 90-days of notice constitutes disconnection of service.

5.4.3 Emergency Water Service

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

1. Compliance with standards may be deferred for emergency water service.
2. The Board of Commissioners may waive policy criteria for emergency water service.

5.4.4 Planning Boundaries

Lakewood Water District's retail water service area is entirely bordered by other DOH approved water purveyors. These water purveyors are all part of Pierce County's Coordinated Water System Plan and have agreed to abide by the retail water service boundaries in the document. The District has adopted the following policies regarding planning boundaries in order to be in compliance with associated regulations:

1. The line between these purveyors and the District is definitive and non-controversial.
2. To receive water from Lakewood Water District outside of the existing service area boundary requires written approval from the purveyor originally assigned to provide water service, as well as approvals from the planning division with jurisdiction in that

area, Pierce County Water Resource, the Tacoma Pierce County Health Department and the Washington State Department of Health Drinking Water Division

3. For planning purposes, the District will use retail water service boundaries established by agreement as a result of the Pierce County Coordinated Water System Plan and as approved by the Department of Health through the Comprehensive Water System Plan approval process.
4. For purposes of interties with other public water systems, the District will use the wholesale service area described in **Chapter 2**.

5.5 Facility Policies

This section describes the planning criteria and policies used to establish an acceptable hydraulic performance level and a standard of quality for the water system. Additional criteria are contained in the District's construction standards; a copy is included in **Appendix I** of this plan.

5.5.1 Minimum Water Pressure Standards

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

1. The District will endeavor to maintain a minimum water pressure of 30 pounds per square inch (psi) at the customer meter during all demand conditions, excluding a fire or other emergency situation.
2. The District will endeavor to maintain a maximum pressure of 120 psi in the water mains during normal demand conditions, excluding pressure surges and wholesale transmission mains. Individual residences are responsible for reducing water pressures over 80 psi.
3. During fire flow conditions, the minimum water pressure at customer meters and throughout the remainder of the system will be at least 20 psi.
4. During a failure of any part of the system, the maximum water pressure at customer meters will not exceed 150 psi. Except with regard to wholesale customers and meter sets.

5.5.2 Velocities

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

1. Under normal, non-emergency, demand conditions the velocity of water in a water main should be less than 5 feet per second (fps).

2. During emergency conditions, such as a fire event, the velocity of water in a water main may exceed 5 fps, but may not exceed 8 fps (policy used for prioritizing water main replacement projects though actual velocity of flow could exceed 8 fps).

5.5.3 Storage

The District must plan for multiple types of water storage to maintain reliable service for all customers during all seasons and conditions. In addition, the District must create policies that will maintain sustainable consumption so that quality water service can continue in the future. The following is a list of policies regarding water storage:

1. Storage within the distribution system must be of sufficient capacity to:
 - a. Supplement supply when system demands are greater than the supply capacity (equalizing storage);
 - b. Maintain sufficient storage for proper pump operation (operational storage);
 - c. Maintain sufficient storage for fire suppression (fire flow storage); and
 - d. Maintain sufficient storage for other emergency conditions (standby storage).
2. Standby storage must be stored above the elevation that yields a 20 psi water service pressure to the highest service in the zone.
3. Fire flow storage must be stored above the elevation that yields a 20 psi water service pressure to the highest service in the zone.
4. The District 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 during the emergency condition.
5. The District will provide sufficient storage for a fire condition equal to the system's maximum fire protection water demand and the required duration.
6. The District will have high-water level and low-water level alarms in its storage facilities.
7. Water level indicators are currently installed and shall be required on all new water storage facilities to satisfy the following requirements:
 - a. Minimize fluctuations in system pressure during normal demands;
 - b. Maximize use of the storage facilities during fire flow events and peak demand periods; and
 - c. Improve the reliability of supply to the water system.

5.5.4 Transmission and Distribution

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 will allow for more ease in system maintenance and installation. The following is a list of policies regarding water transmission and distribution:

1. Where practical, transmission and distribution mains will be looped to improve water quality, increase reliability, increase fire flow capacity and decrease head losses.
2. All water mains will comply with the generally recognized design criteria from the AWWA and DOH guidelines that follow:
 - a. All new construction will be in accordance with the District's current construction standards, a copy of the current standards at the time of writing of this plan are included in **Appendix I** of this plan.
 - b. Distribution system design assumes that adequately sized service lines will be used. All residential service lines will be 1-inch in diameter or larger. Service lines will be the same size as the meter or larger.
 - c. The minimum diameter of distribution mains will be 8 inches. Water mains not required to carry fire flow, as determined by the District, may be 6 inches in diameter. All new water mains will be ductile iron pipe.
 - d. All new distribution mains will be sized by a hydraulic analysis method acceptable to the District.
 - e. Water mains will be designed to maintain a 10-foot horizontal and 18-inch vertical separation above non-potable pipelines (sanitary sewers, reclaimed water piping, irrigation lines, and other uses) as much as reasonably possible. If these separations cannot be provided, additional precautions shall be considered in the design consistent with the current version of the DOH Water System Design Manual.
 - f. 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 of 8 fps during maximum day demand conditions. In general, new water mains that will carry fire flow in residential areas shall be a minimum of 8 inches in diameter; in commercial, business park, industrial, and school areas water main shall be a minimum of 12 inches in diameter and looped.
 - g. Valve installations will satisfy the following criteria:

- i. Zone valves will be located at all pressure zone boundaries to allow future pressure zone re-alignment without the need for additional pipe construction;
 - ii. Isolation valves will be installed in the lines to allow individual pipelines to be shut down for repair or installing services. Unless it is impractical to do so, the distance between isolation valves will not exceed 300 feet in commercial areas and 600 feet in all other areas. A minimum of two valves will be provided per cross, and one valve per tee;
 - iii. Air/vacuum release valves will be placed at all high points or “crowns” in all pipelines greater than 16-inch diameter; air/vacuum release valves may also be required on pipelines less than 16-inch diameter depending on the location and alignment of the pipeline;
 - iv. Blow-off assemblies shall be located at the end of dead-end water mains 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 the concrete thrust blocking; and
 - v. Individual pressure reducing or check valves must be installed in all new customer service lines in the District. The Uniform Plumbing Code requires pressure reducing valves on customer service lines if water service 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 distribution system caused by possible cross-connection in the customer’s pipes or fixtures. These valves are installed on the customer side of the water meter and are owned and maintained by the customer.
- h. Fire hydrant installations will satisfy the following criteria:
- i. Fire hydrant placement locations are specified by the West Pierce Fire and Rescue, formally Lakewood Fire District. It is up to the developer’s engineer to determine the most efficient method to provide adequate water to all on-site fire hydrants with water mains 8 inches in diameter or larger.
 - ii. Fire hydrants serving detached single-family dwelling or duplex dwellings on individual lots will be located not more than 700 feet on center such that all single family lots are within 350 feet from a fire hydrant, as measured along the path of vehicular access.

- iii. Fire hydrants shall be served by a minimum 6-inch diameter lateral up to 50 feet long from the water main serving the hydrant. Each hydrant shall be equipped with a dedicated isolation valve at the water main tee.
- iv. West Pierce Fire and Rescue and Lakewood Water District will review all proposed fire hydrant installations to ensure the correct number, location, and spacing of fire hydrants for each project.
- v. Final plans from developers shall have the signature of the Fire Marshal having jurisdiction approving the locations of fire hydrants shown on the plans.

5.5.5 Supply and Pump Stations

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

1. All existing and future supply and booster pump stations will be modified and/or constructed 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. Sites will be fenced to reduce vandalism and District liability where appropriate.
 - d. Each station will be equipped with a flow meter and all necessary instrumentation to assist District operations personnel in operating and troubleshooting the facility.
 - e. Emergency power capability, either through an on-site emergency generator set, or a connection for a portable emergency generator will be provided to at least one booster pump station supplying each pressure zone.
2. Pumps will be operated automatically, using the District's telemetry and supervisory control system, with the ability for District staff to adjust pump start/stop settings.
3. Stations will be operated with the provision for remote and local methods of equipment control to minimize system vulnerability.
4. Manual override of stations will be provided for, and located, at the Operations and Maintenance office using the District's telemetry and supervisory control system as well as at each facility on site local control panel.
5. Stations will be monitored with alarms for the following conditions:

- a. Pump started automatically or manually
 - b. Power failure
 - c. Communication failure
 - d. Low suction pressure
 - e. High discharge pressure
6. Stations will have the following indicators:
- a. Local flow indication and totalizing
 - b. Flow indication and totalizing at the Operations and Maintenance office
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
 - d. Improve water quality by increasing circulation and quantity

5.5.6 Pressure Reducing Stations

The District 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.

5.5.7 Water System Control

The District's SCADA/telemetry 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 District has adopted the following policies to maintain a reliable control system:

1. All facilities will be integrated with the SCADA/telemetry system.
2. The District will regularly look into the current technology available to determine if upgraded SCADA/telemetry equipment should be purchased.
3. The District will regularly maintain SCADA/telemetry equipment per manufacturers' recommendations.

5.5.8 Maintenance

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

1. Facility and equipment breakdown are given the 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 and as funding is available.
3. Proactively, 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 appropriate Department Head.
11. Written records and reports will be maintained on each facility and item of equipment showing operation and maintenance history.

5.6 Financial Policies

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

1. The District will set rates that are based on equity, fairness and efficiency to its customers.
2. Rates and additional charges established for the District are:

- a. Cost-based rates that recover current, historical, and future costs associated with the District's water system.
 - b. Equitable charges to recover costs from customers commensurate with the benefits they receive.
 - c. Adequate and stable source of funds to cover the current and future cash needs of the District.
3. Existing customers of the District will pay the direct and indirect costs of operating and maintaining the facilities through water rates. In addition, the water rates will include debt service incurred to finance the capital assets of the District.
4. New customers seeking to connect to the water system will be required to pay a connection charge (General Facilities Charge – GFC) for an equitable share of the historical cost of the system. Connection charge revenues will be used to fund the CIP in conjunction with rate revenue.
5. New and existing customers will be charged for extra services through separate ancillary charges based on the costs to provide the services. Ancillary charges can increase equitability and increase operating efficiency by discouraging unnecessary demand for services. The charges are reviewed regularly and updated annually based on the costs to provide the service. Revenue from ancillary charges will be used to finance annual operations and maintenance.
6. The District maintains information systems that provide sufficient financial and statistical information to ensure conformance with rate-setting policies and objectives.
7. User charges are 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 is set aside and retained for capital expenditures, which will cover the depreciation of the physical plant. The amount may be transferred from the Maintenance Fund to the Construction Fund for general purposes or for specific purposes.
8. A Working Capital Reserve is maintained to cover unanticipated emergencies and fluctuations in cash flow. The District will maintain a cash reserve for the Maintenance Fund.
9. Fees and charges are calculated for the service area as a whole. Rates will be the same regardless of service location for existing customers. Rates charged in areas located outside of the District's retail service area boundary will be evaluated by the District prior to construction.

5.6.1 Connection Charges

In order to have an equitable method of paying for water system improvements, the District 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. Connection Charge: The connection charge will be assessed against any property that has not participated in the development of the water system. Meter charges, or hookup fees, are additional in order to recover the cost of meter and service line installation.
 - b. Developer Extension Charges: These charges are for the administration, review, and inspection of developer extension projects, in accordance with the District's Developer Extension Program.

General Facilities Charges: are for the recovery of capital costs paid by existing customers for those facilities that benefit future connections and development.

5.7 Organizational Policies

Appropriate organizational policies are key to the continued successful operation of the District. To promote a healthy organization, the District has adopted the following policies regarding the District's structure and staffing:

5.7.1 Organizational and Governance Structure

The District has adopted the following policies regarding the District's organizational and governance structure:

1. The three members of the Board of Commissioners are elected by the registered voters in the Lakewood Water District retail water service area. The Board hires a General Manager who has the day to day responsibilities for operation of the water system. Upon recommendation by the General Manager, the Board also hires other staff. Among them are the District Superintendent, who is responsible for the construction, operation and maintenance activities and the Finance Director who is responsible for the administrative and financial operation of the District. Both report to the General Manager. An organization chart can be found in **Chapter 7**.
2. The District shall be financially self-supporting.

5.7.2 Staffing

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

1. Personnel certification will comply with Washington state standards. The District Manager and District Superintendent shall be certified waterworks operators, as required by state law.
2. The District will promote staff training.

5.8 Water Use Policies

In an effort to promote water use efficiency, a document titled *Conservation Planning Requirements* was prepared by the DOE, DOH, and the Washington Water Utilities Council in 1994. A part of this document addresses water use data collection requirements for public water systems. It identifies the minimum data required to project water demand and to provide a basis for evaluating the effectiveness of conservation programs. At least five years of continuous water use data is required. The District has complied with this requirement collecting and maintaining files with more than five years of data.

The water use data collection requirements will vary and depend on the size of the water system. The water use data for the District is presented in **Chapter 4**. The following section identifies the water use data requirements for the District and the District's policies and status for meeting these requirements.

5.8.1 Source of Supply Meter Readings

Water supply to the District is currently provided by its 30 active wells, all of which are metered and monitored. It is important to the District to maintain this high level of data not only to meet regulatory requirements but also to aid in the efficient operation of the water system. The District has adopted the following policies to this end:

1. Each water source will be metered.
2. Each water source meter will be connected to the District's telemetry system.
3. Flows from sources will be recorded continuously on each telemetry system.

5.8.2 Peak Day/Peak Month

Peak water use drives the design and sizing of many infrastructure projects, in order to adequately size these types of facilities, the District has adopted the following policies to determine peak usage:

1. The District will record maximum day demands annually based on telemetry reports and water usage reports.
2. The District will record maximum month demands annually based on telemetry reports and water usage reports.

5.8.3 Water Use Efficiency

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

1. The District will promote the efficient and responsible use of water through its Water Use Efficiency Program and will conserve water during a water shortage.
2. The Lakewood Water District Water Use Efficiency Program, which is included in **Appendix G**, describes the District's current Water Use Efficiency Program.

5.8.4 Non-Billed Authorized Consumption

Non-billed authorized consumption water is metered water that is used for construction projects, water main flushing, firefighting, and various other purposes and plays an important role in the determination of distribution system leakage. The District has adopted the following policy regarding non-billed authorized consumption:

1. The District will collect and maintain a record of water used for construction projects, and water used for flushing.

5.8.5 Billed Authorized Consumption

Billed authorized consumption is gathered based on meter readings and accounts for the large majority of water produced by the District. To adequately track this data, the District has adopted the following policies:

1. All customer service meters are read at least every other month.
2. All customer service meters are monitored for continuous usage on a weekly basis.
3. The District will record water usage based on customer class as described in **Chapter 4**.

5.8.6 Distribution System Leakage

Distribution System Leakage is the difference between the amount of water supplied and authorized consumption. It is the District's goal to minimize the amount of DSL to the extent practical and has adopted the following policies:

1. DSL is determined from the annual supply and authorized consumption and reported annually.
2. The District will take efforts, as required, to reduce the amount of DSL which may include capital improvements, meter replacements or calibration, leak detection efforts or other systems to track water usage.

5.8.7 Population Served

Knowing the population served by the District is necessary to determine many system regulatory requirements and helps the District operate their system more efficiently. The District has adopted the following policies to track the population served by the District:

1. The District will record the total number of connections in each customer class annually.
2. The District will record population estimates on an annual basis based on the best available data.

5.9 Summary

This chapter summarizes the District's policies on several areas of the District's operations and long-term viability. Other chapters in this plan analyze different aspects of the water system infrastructure, demands, financial and organizational elements against these policies.

Chapter 6

Water Source and Quality

6.1 Introduction

The two main functions of a water system are to provide a sufficient quantity of water to meet customer usage demands and to provide high quality water. This chapter discusses the District's existing water sources, water rights, water quality regulations, and water quality monitoring results. This chapter also uses demand projections from **Chapter 4** to determine if the current water rights meet the existing and projected demands for the District's retail and wholesale customers. **Chapter 8** discusses Lakewood Water District's (District's) ability to supply a sufficient quantity of water in more detail and identifies future source requirements.

6.2 Existing Water Sources

All water supplied to the District is provided by 30 active groundwater wells (the District has 4 inactive wells), which are supplied by four different aquifers referred to as the A, C, E, and Deep aquifers located throughout the District's service area and range in depth from approximately 105 feet to over 1,000 feet below ground surface (BGS). The District first began well drilling in 1943 when the District was formed and drilled its most recent well in 2019. Beginning in 1979, the District has participated in regional studies to better define the groundwater aquifers that provide the District's water resources. This includes a period of extended withdrawal in the District's U-1 well in 1995 to better determine the drawdown effects throughout the aquifer supplying this well. Additional information on each of the District's existing sources is presented in **Chapter 2** and contained in **Appendix C**.

6.2.1 Water Rights

A water right is a legal authorization to use a specified amount of 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 total amount of water use allowed per year and are typically referred to in terms of acre-feet per year (acre-ft). These limits are set to prevent drawdown of the aquifers. Washington State law requires users of public water to receive approval from the Washington State Department of Ecology (DOE) prior to actual use of the water. This approval is granted in the form of a water right permit with a development schedule, and after the water is put to beneficial use, a certificate is issued.

6.2.1.1 Existing Water Rights

The District's water rights in 2019 include those approved by the State for municipal purposes. The District's municipal water rights are summarized in **Table 6-1**. Copies of the municipal water right certificates and permits are included in **Appendix J**.

6.2.1.2 Municipal Water Rights

In 2019, the District possessed municipal water rights totaling 46,843gpm of Q_i , with a Q_a of 20,973 acre-ft of primary rights. In addition, the point of withdrawal for the Town of Steilacoom Well 4 was changed to include the District's N-Wells site. This water right includes a Q_i of 1,500 gpm and a Q_a of 672 acre-ft. Including the Town of Steilacoom Well water rights, the District's total Q_i of 48,343 gpm is equivalent to a peak day demand withdrawal of 69.614 mgd, while the Q_a of 21,645 acre-ft is equivalent to an average day demand withdrawal of 19.323 mgd, as shown in **Table 6-1**.

The District's water rights include 20 supplemental water rights totaling a Q_a of 34,479 acre-ft, as shown in **Table 6-1**. The supplemental water rights can individually be used up to their full Q_i and Q_a limitation, but the total annual quantity of water pumped from all of the District's existing municipal water rights must not exceed the primary water right total of 21,645 acre-ft. Supplemental water rights allow the use of additional wells within the District's service areas up to the maximum water right specified, but do not increase the total annual primary water right amount. Some examples of supplemental rights include those for the District's N-1/N-2 and P-1R/P-2 Wells.

On May 4, 2004, DOE approved the District's applications to expand the use of its municipal water right to include the service areas of other water purveyors in central Pierce County. A copy of one of these applications is included in **Appendix J** with the water right permits and certificates. Decisions identical to this were made with respect to all of the District's municipal water rights except G2-28431P (Well U-1), which already had a place of use that included the service areas of the central Pierce County water purveyors.

6.2.1.3 Abitibi Water Rights Transfer

On November 26, 2002, the District entered into an agreement with Abitibi Consolidated Sales Corporation (Abitibi) to purchase water rights totaling a Q_a of 6,721 acre-ft which are associated with the former West Tacoma Newsprint plant. These water rights are referred to as the Abitibi water rights. The District filed applications with DOE to change the purpose of these water rights to municipal purposes and to change their points of withdrawal to several existing District wells in the E and G aquifers. These applications were approved by DOE on July 19, 2005. An additional water right for 3.5MGD was not allowed at the time and was deemed to be relinquished for non-use of water. The District has since submitted an application for 3.5 MGD of deep aquifer water rights, which is they are still pending with DOE.

Table 6-1
Existing Water Rights

DOH Source No.	Source Name	Permit or Certificate Number	Priority Date	Aquifer	Q _i (gpm)	Q _a			
						Primary		Supplementary	
						(acre-ft)	(gpm)	(acre-ft)	(gpm)
	Abitibi	299-A	1/4/49	E/G	1,187	1,971	2,263	0	0
	Abitibi	4585A	10/16/58	E/G	2,945	4,750	1,904	0	0
	A-1 Tillicum	C-0146-D	4/1/43	C	380	410	254	0	0
	A-2 Tillicum	C-3751-A	2/2/60	C	750	1,200	744	0	0
S01	A-3 Tillicum	C-5573-A	6/8/65	E	1,500	0	0	2,400	1,488
S02	D-2 Interlaken/Yard	C-0601-A	4/2/59	E	2,000	706	438	0	0
S03	D-3 (C) Interlaken/Yard	C-0148-D	1925	C	400	520	322	0	0
S03	D-3 Interlaken/Yard	C-0149-D	1925	C	600	732	454	0	0
S04	E-2 Washington Blvd	C-4485-A	3/18/63	E	1,200	0	0	1,920	1,190
S05	E-3 Washington Blvd ¹	-	-	-	-	-	-	-	-
S06	F-2 104th & Bridgeport	C-5574-A	4/7/65	E	1,000	0	0	1,600	992
S07	G-1/G-2 Scotts	C-0717-A	6/15/50	A	3,000	3,000	1,860	0	0
S08	H-1 Ponders	C-1289-A	3/15/51	A	2,000	32	20	2,468	1,530
S08	H-2 Ponders	C-3831-A	8/24/59	A	800	1,080	670	200	124
S09	I-2 Hipkins	C-1370-A	2/14/52	C	1,500	0	0	1,193	740
S09	I-3 Hipkins	C-7320-A	1/1/70	C	1,200	160	99	0	0
S09	I-4 Hipkins	G2-23869C	6/24/75	C	1,500	0	0	1,200	744
S11	J-1 88th & Pine	C-1305-A	2/25/52	A	1,500	2,000	1,240	0	0
S41	J-3 88th & Pine ²	-	-	-	-	-	-	-	-
S12	J-2 88th & Pine	C-4184-A	10/31/61	E	1,500	0	0	2,400	1,488
S13	K-1/K-2 Lake Ave	C-5541-A	7/25/58	E	2,600	0	0	4,160	2,579
S14	L-1 Hemlock Hill	L-3830-A	2/2/60	A	950	1,520	942	0	0
S14	L-2 Hemlock Hill	C-4183-A	5/15/61	A	1,500	0	0	2,400	1,488
S14	L-3 Hemlock Hill	C-7319-A	12/9/69	A	900	720	446	0	0
S15	N-1/N-2 View Road	C-4447-A	7/19/62	G	3,000	0	0	4,800	2,976
	Steilacoom Well (N Wells)	G2-00890C	1,500	672	0	0	0		
S26	O-1 Oakbrook	C-5194-A	12/10/64	C	800	0	0	1,280	793
S25	O-2 Oakbrook	C-5540-A	5/8/66	C	1,100	0	0	1,760	1,091

Table 6-1 (Continued)
Existing Water Rights

DOH Source No.	Source Name	Permit or Certificate Number	Priority Date	Aquifer	Q _i (gpm)	Q _a			
						Primary		Supplementary	
						(acre-ft)	(gpm)	(acre-ft)	(gpm)
S25	O-3 Oakbrook	G2-26246C	4/11/83	C	1,000	490	304	310	192
S18	P-1R/P-2 Steilacoom Blvd	C-6840-A	4/1/86	E	3,000	0	0	2,400	1,488
S19	Q-1 Deepwood	G2-21391C	1/1/73	E	500	870	539	1,130	701
	Q-3 Deepwood	G2-27280C	2/16/88	A	350	0	0	280	174
S21	R-1 112th St	G2-26833C	10/12/85	E	1,500	812	503	388	241
S22	S-1/S-2 Angle Lane	G2-27158C	2/1/87	C	1,850	0	0	1,480	917
S27	U-1 Country Pl	G2-28431P	2/1/93	C	880	0	0	710	440
Totals (acre-ft & gpm)					48,343	21,645		34,479	
Totals (mgd)					69.61	19.32			

Notes:

1. The E-3 Well is used as an additional point of use for the combined rights of C-1370-A, C-0148-D, C-0149-D, C-7320-A.
2. The J-3 Well is used as an additional point of withdrawal for the combined rights of C-1305-a and C-4184-A.

The water rights acquired from Abitibi are being used to meet both the future and existing needs of customers within the District’s current retail water service area and for wholesale members of the Regional Water Cooperative of Pierce County (Cooperative). Cooperative members include multiple water systems in Northwest Pierce County. These water systems are shown in **Figure 2-2** in **Chapter 2**, and a list of all voting members as of May 2018 is included in **Appendix A**. The authorized place of use of the Abitibi water rights includes the service areas of Cooperative member systems.

6.2.1.4 Water Rights Place of Use and Wholesale Water Service Area

The District, as a founding member of the Cooperative, seeks to assist other Cooperative members in meeting the water demands of a rapidly growing population in central Pierce County by supplying wholesale water through one or more interties within the District’s wholesale service area boundary. Several Cooperative member systems are experiencing the need for new water system connections that either exceed their current water rights capacity or will do so in a matter of years. These systems are finding that the costs associated with developing new water supplies exceed the costs of purchasing water from the District. These costs, coupled with the time and financial resources involved in obtaining new water supplies, results in the purchase of wholesale water as the best alternative for these systems.

Prior to the adoption of the *Municipal Water Supply – Efficiency Requirements Act*, the District obtained water right change approvals for most of its water rights to change the place of use to include Cooperative members. After the Municipal Water Law was adopted, the place of use for municipal water rights automatically changes through the water system planning process. In July 2004 the Department of Health (DOH) approved the District’s wholesale service area, which defines the place of use for its water rights, through its approval of the District’s submittal of a report titled *Wholesale Service Area Interties Planning Report*, dated June 2004. DOH’s approval of the District’s wholesale service area was pursuant to *WAC 246-290-132 Interties*.

6.2.1.5 Water Rights Evaluation

An evaluation of the District’s existing water rights was performed to determine the sufficiency of the water rights to meet both existing and future water demands. **Table 6-2** compares the District’s total maximum 2018 Q_i with the maximum day demand of the system and the total primary 2018 Q_a with the average day demand of the system. The demand data shown in **Table 6-2** includes demands from the District’s retail service area and the wholesale water demands. The 2018 wholesale demand values are based on the actual amount of water the District’s current wholesale customers consumed through interties with the Town of Steilacoom, Summit Water and Supply Company, Spanaway Water, Rainier View Water, and Firgrove Mutual. As shown in the table, the District has enough Q_i and Q_a water rights to meet the demands of existing and future customers until approximately 2039.

Table 6-2
Existing Water Rights Evaluation

Description	Q_i / Maximum Day Demand		Q_a / Average Day Demand		
	(gpm)	(mgd)	(acre-ft)	(mgd)	(gpm)
Total Water Rights (2018)	48,343	69.61	21,645	19.32	13,419
Existing (2018) Water Demand ¹	13,827	19.91	11,603	10.36	7,193
Surplus (or Deficient) Rights	34,516	49.70	10,042	8.96	6,226

Note:

1. Includes supply through interties to the Town of Steilacoom and Summit Water & Supply Company

6.3 Water Rights Planning

Table 6-3 summarizes the results of the future water rights evaluation, which compares the water rights of the existing water sources including the Abitibi water rights with the future 10-year and 20-year demand projections of the system. The analysis is based on future demand projections with and without additional water use reductions from planned conservation efforts, as shown in the table. The demand data shown in the table includes projected demands from the District’s system and for the Town of Steilacoom and maximum contractual supply amounts of other wholesale customers currently under contract with the District. These wholesale customers include Rainier View Water Company, Spanaway Water Company, and Summit Water and Supply

Company. The results of the future water rights evaluation indicate the District has sufficient water rights to meet the projected average day and maximum day demands through at least 2036.

Table 6-3
Future Water Rights Evaluation

Description	Q _i / Maximum Day Demand		Q _a / Average Day Demand		
	(gpm)	(mgd)	(acre-ft)	(mgd)	(gpm)
Total 2018 Water Rights	46,843	67.45	20,973	18.72	13,002
Steilacoom Well 4 Water Rights	1,500	2.16	672	0.60	416.58
Total Water Rights	48,343	69.61	21,646	19.32	13,419
Year 2029 Without Conservation					
Total Water Rights	48,343	69.61	21,646	19.32	13,419
Projected (2029) District Water Demands	13,021	18.75	10,147	9.06	6,290
Projected (2029) Wholesale Water Demands	4,388	6.32	6,422	5.73	3,981
Surplus (or Deficient) Rights	30,934	45	5,077	4.53	3,148
Year 2039 Without Conservation					
Total Water Rights	48,343	69.61	21,646	19.32	13,419
Projected (2039) District Water Demands	13,786	19.85	10,743	9.59	6,660
Projected (2039) Wholesale Water Demands	7,199	10.37	10,932	9.76	6,777
Surplus (or Deficient) Rights	26,429	38	-22	-0.02	-13
Year 2029 With Conservation					
Total Water Rights	48,343	69.61	21,646	19.32	13,419
Projected (2029) District Water Demands	12,592	18.13	9,813	8.76	6,083
Projected (2029) Wholesale Water Demands	4,388	6.32	6,422	5.73	3,981
Surplus (or Deficient) Rights	30,434	44	7,159	4.83	3,355
Year 2039 With Conservation					
Total Water Rights	48,343	69.61	21,646	19.32	13,419
Projected (2039) District Water Demands	12,971	18.68	10,108	9.02	6,266
Projected (2039) Wholesale Water Demands	7,199	10.37	10,932	9.76	6,777
Surplus (or Deficient) Rights	27,244	39	2,354	0.54	376

As shown in **Table 6-3**, the District has water rights in excess of its projected requirements until 2039. Some of the District’s well facilities currently do not have the capability to provide supply to the system at their Q_i. An analysis of the District’s physical supply capacity is presented in detail in **Chapter 8**. Recognizing that water is a resource, the District will strive to use its existing water sources efficiently by continuing the current water use efficiency measures and implementing proposed measures, as outlined in the District’s Water Use Efficiency Program, which is included in **Appendix G**.

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. Through the SDWA, EPA regulated approximately 20 contaminants between 1974 and 1986 when the SDWA was amended to include the regulation of a total of 83 contaminants, which EPA was required to regulate by 1989.

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.

6.4.1.1 Phase I Rule

The Phase I Rule, which was EPA's first response to the 1986 Amendments, was published in the Federal Register on July 8, 1987, and became effective on January 9, 1989. This rule provided limits for eight volatile organic chemicals (VOCs) that may be present in drinking water. VOCs are liquid chemicals that evaporate easily into the air and are used by industries in the manufacture of rubber, pesticides, deodorants, solvents, plastics, and other chemicals. VOCs are found in

everyday items such as gasoline, paints, thinners, lighter fluid, mothballs, and glue, and are typically encountered at dry cleaners, automotive service stations, and elsewhere in industrial processes.

6.4.1.2 Phase II & IIb Rules

The Phase II & IIb Rules were published in the Federal Register on January 30, 1991 and July 1, 1991, and became effective on July 20, 1992 and January 1, 1993, respectively. These rules established new regulations for 27 contaminants and updated regulation of 11 additional contaminants. Organic, animal or plant produced substances containing carbon and other elements such as hydrogen and oxygen, and inorganic chemicals of mineral origin that are naturally occurring elements were included. Some of the contaminants are frequently applied agricultural chemicals, such as nitrate, while others are more obscure industrial chemicals.

6.4.1.3 Phase V Rule

The Phase V Rule was published in the Federal Register on July 17, 1992 and became effective on January 17, 1994. This rule set standards for 23 additional contaminants, of which 18 are organic chemicals which are mostly pesticides and herbicides and 5 are inorganic chemicals, such as cyanide.

6.4.2 Primary and Secondary Drinking Water Regulations

There are currently 92 contaminants included in the *National Primary Drinking Water Regulations*. Of these 92 contaminants, 83 have established MCLs and MCLGs, while the remaining nine have treatment technique requirements. Monitoring of these contaminants within Washington State is addressed under WAC 246-290-300, WAC 246-290-310 and WAC 246-290-320.

EPA has also established secondary standards for 15 contaminants, which generally address aesthetic quality of drinking water. These federal standards are generally used as a guideline since they primarily address taste and odor issues rather than health concerns. Monitoring of these secondary contaminants within Washington State is addressed under WAC 246-290-300, WAC 246-290-310. Per WAC 246-290-320, secondary contaminant MCL exceedances require treatment for new community water systems, while other public water systems are required to take follow-up action as determined by DOH.

6.4.3 Source Water Quality Regulations

The District has a total of 34 groundwater wells, of which 30 are active. These groundwater wells are the only source of water supply in the District. The District does not have any surface water sources or groundwater sources considered under the influence of surface water (GWI). Since the District does not have any surface water or GWI sources, several surface water supply regulations are not discussed in this Chapter. These regulations include: the Surface Water Treatment Rule;

the Interim, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules; and the Filter Backwash Recycling Rule.

6.4.3.1 Radionuclides Rule

EPA established the final Radionuclides rule on December 7, 2000 and it became effective on December 8, 2003. The rule established an MCLG of zero for the four regulated contaminants and MCLs of 5 picocuries per liter (pCi/L) for combined radium-226 and radium-228, 15 pCi/L for gross alpha, excluding radon and uranium, 4 millirems per year (mrem/yr) for beta particle and photon radioactivity, and 30 micrograms per liter ($\mu\text{g/L}$) for uranium. All community water systems were required to complete initial monitoring and integrate all monitoring requirements of the rule between December 8, 2003 and December 30, 2007. The rule requires utilities to undergo four consecutive quarters of monitoring for gross alpha, combined radium-225/228, and uranium. Additionally, systems considered vulnerable were required to monitor for gross beta, tritium and strontium-90. Initial monitoring is used by the enforcing agency to determine if a water system is vulnerable and whether a system has to perform reduced or increased monitoring in the future. Based on the initial monitoring, the District is required to test for radionuclides every four years.

The District last tested for radionuclides in 2016 with no violations. The District will test for radionuclides again in 2020.

6.4.3.2 Arsenic

Arsenic is highly toxic, affects the skin and nervous system, and may cause cancer. The EPA promulgated the Arsenic rule on January 22, 2001 and it became effective on January 23, 2006. The rule sets the MCLG of arsenic at zero and sets the MCL at 0.01 milligrams per liter (mg/L) which is equivalent to 10 parts per billion (ppb). Community water systems with arsenic levels greater than 10 ppb must include the arsenic sampling results, along with a statement on health risks, in the annual Consumer Confidence Report. Water systems that have arsenic levels of 5 to 10 ppb must include an educational statement about arsenic in their Consumer Confidence Reports.

The District last tested for Arsenic in 2018 with no violations. The testing schedule for arsenic is different for each source and is determined by the State who communicates that information to the District via a yearly Water Quality Monitoring Schedule.

6.4.3.3 Ground Water Rule

In accordance with the 1986 SDWA Amendments, EPA developed a Ground Water Rule (GWR) that specifies the use of disinfectants for groundwater systems, as necessary. The proposed rule was published May 10, 2000 in the Federal Register and the final rule was enacted on January 8, 2007. The rule is aimed at increasing the protection of groundwater sources against microbial pathogens in public water systems that use untreated groundwater. The GWR applies to any system which uses groundwater or a mixture of surface and groundwater if the groundwater is supplied to the customers without treatment.

The basic requirements of the GWR, adopted by DOH on October 1, 2010 include source water monitoring, compliance monitoring, sanitary surveys, corrective actions, and public notification. The rule builds upon the Total Coliform Rule (TCR) by addressing the health risks of fecal contamination in groundwater sources used by public water system. Elements of the GWR include the following

- *Assessment Source Water Monitoring* may be required by DOH on a case-by-case basis to evaluate sources that may be at risk for fecal contamination.
- *Triggered Source Water Monitoring* is required when a system's routine distribution samples collected under the TCR is total coliform positive. Within 24 hours of notification of the total coliform positive result, a water system must collect samples at each source that was in operation at the time the routine sample was collected. These samples must be taken prior to treatment. Systems with more than one groundwater source, like the District, can submit a triggered source water monitoring plan for approval by DOH. This plan may allow a reduction in the number of source samples required. A copy of the District's 2012 Triggered Source Water Monitoring Plan is included in **Appendix L**.

Because the District is a wholesale water provider, the District may be required to conduct Triggered Source Water Monitoring if a wholesale customer, referred to as a "Consecutive System," has a routine distribution system sample test positively for coliform.

- *Compliance Monitoring* confirms the effectiveness and reliability of a water system's treatment systems and requires daily monitoring of chemical disinfection residual before the first customer during peak flow for smaller systems and continuous monitoring of disinfection residual for systems serving more than 3,300 people. If a system provides 4-log treatment of viruses and performs compliance monitoring, it does not have to meet the triggered source water monitoring requirements.

The GWR also changes the required frequency of sanitary surveys for community water systems from once every 5 years to once every 3 years. A community water system may be allowed to stay on a 5-year schedule if it meets one of the following criteria:

1. Provides 4-log treatment of viruses for all groundwater sources, or
2. Has no total coliform MCL violations, has no more than one total coliform monitoring violation since the last survey, and has no unresolved significant deficiencies in the current survey.

The GWR requires a water system to take corrective action when it has a significant deficiency or when a source water sample is *E. coli* positive. DOH defines a significant deficiency as "a defect in the design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the department determines to be causing, or have the potential for causing, the introduction of contamination into the water delivered to consumers."

Corrective actions can involve one or more of the following as directed by DOH:

- Correct all significant deficiencies.
- Provide an alternative source of water.
- Eliminate the source of contamination.
- Provide 4-log treatment.

There are several situations and violations in the GWR that require public notification (PN) either within the system's Consumer Confidence Report (CCR) or otherwise. **Table 6-4** summarizes these violations and the type of notification required. The varying tiers of PN required are defined in *40 CFR Section 141, Subpart Q*. Each tier has different notification methods and requirements of timing associated. Tier 1 PN must be provided within 24 hours after the violation is discovered, Tier 2 PN must be provided within 30 days after the violation is discovered, and Tier 3 PN must be provided within 1 year after the violation is discovered.

6.4.4 Future PFOA and PFOS Regulations

The EPA issued health advisories for PFOA and PFOS in the spring of 2016. PFOA, PFOS, and other PFASs are a family of chemicals used since the 1950s to manufacture stain-resistant, water-resistant, and non-stick products. Certain types of firefighting foam contain PFAS. These firefighting foams were historically used by the U.S. military, local fire departments, and airports.

Overtime PFASs leached into groundwater and has contaminated drinking water. Exposure to PFAS over certain levels may result in adverse health effects. The current EPA health advisory level is at 70 parts per trillion.

The Washington State Board of Health began rulemaking for PFAS in drinking water in late 2017. The process is expected take about two years to complete.

PFAS have been found in several of the District's wells. The District is adjacent to Joint Base Lewis-McChord, which has a history of using firefighting foams containing PFAS. The District is closely monitoring the progress of this regulation and has treatment for PFASs included in the Capital Improvement Program, described in more detail in **Chapter 9**.

6.4.5 Distribution System Water Quality

In addition to source water quality monitoring, the District regularly monitors the water quality throughout the distribution system for several contaminants which are described below.

6.4.5.1 Revised Total Coliform Rule

The Total Coliform Rule was published in the Federal Register on June 29, 1989 and became effective on December 31, 1990. The rule set both MCLGs and MCLs for total coliform levels in drinking water, and the type and frequency of testing that is required for water systems. The rule was revised in April of 2016.

The Revised Total Coliform Rule (RTCR), as with the Total Coliform Rule, requires every public water system is required to develop a coliform monitoring plan, subject to approval by DOH. The RTCR adds a “find and fix” approach to any microbial contamination through the use of assessment reports. The RCTR also adds violations to any water system that fails to complete the required tasks. A copy of the District’s Coliform Monitoring Plan is a part of the Water Quality Monitoring Plan, included in **Appendix L**.

Table 6-4
Ground Water Rule Notification Requirements Summary

Situation	Notification Required
<i>E. coli</i> positive groundwater source sample ¹	Tier 1 PN, CCR, Special Notification
Failure to take corrective action within 120 days of notification	Tier 2 PN, CCR, Special Notification
Failure to maintain at least 4-log treatment of viruses	Tier 2 PN, CCR
Failure to meet monitoring requirements	Tier 3 PN, CCR
Uncorrected significant deficiency ²	Special Notice in CCR
Unaddressed <i>E. coli</i> positive groundwater source sample ³	Special Notice in CCR

Notes:

1. Consecutive systems served by the groundwater source must also notify the public.
2. Systems must continue to notify the public annually until they correct the significant deficiency.
3. Community systems must put a notice in the CCR annually until the positive source water sample has been addressed.

Coliforms are a group of bacteria that live in the digestive tract of humans and many animals and are excreted in large numbers with feces. Coliforms can be found in sewage, soils, surface waters, and vegetation. The presence of any coliforms in drinking water indicates a health risk and potential waterborne disease outbreak, which may include gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and other infectious diseases.

The rule established the MCLG for total coliforms at zero. To comply with the MCL, systems must not find coliforms in more than five percent of the samples taken each month. The District takes 70 samples per month, so four samples that contain coliforms would exceed the MCL and trigger the follow-up sampling requirements.

6.4.5.2 Lead and Copper Rule

The Lead and Copper Rule was published in the Federal Register on June 7, 1991 and became effective on December 7, 1992. On January 12, 2000, the EPA published some minor revisions to the rule in the Federal Register, intended to improve the implementation of the rule. In December 2007, additional revisions to the Lead and Copper Rule became effective, intended to enhance implementation of the rule in the areas of monitoring, treatment, customer awareness and lead service line replacement. The rule identifies “action levels” for both lead and copper. An action level is different from a MCL in that a MCL is a legal limit for a contaminant, and an action level is a trigger for additional prevention or removal steps. The action level for lead is 0.015 mg/L. The action level for copper is 1.3 mg/L. If the 90th percentile concentration of either lead or copper

from the group of samples exceeds these action levels, a corrosion control study must be undertaken to evaluate strategies and make recommendations for reducing the lead or copper concentration below the action levels. The rule requires systems that exceed the action level for lead to educate the affected public about reducing its lead intake. Systems that continue to exceed the action level for lead after implementing corrosion control and source water treatment may be required to replace piping in the system that contains the source of lead. Corrosion control is typically accomplished by increasing the pH of the water to make it less corrosive, which reduces its ability to corrode water pipes and absorb lead or copper.

The District is required to test for lead and copper every three years. Lead and copper levels were last tested in 2017 and all results met the 90th percentile compliance rule. The next round of testing is scheduled for 2020.

6.4.5.2.1 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.

The District has been actively removing all lead-containing products or materials in the course of its regular and routine operations and maintenance since 2016. Additional treatment is not anticipated based on the neutral pH of the District's water. The District will perform additional sampling and public notices if required.

6.4.5.3 Stage 1 Disinfectants/Disinfection By-products Rule

Disinfection by-products (DBPs) are formed when free chlorine reacts with organic substances called precursors, most of which occur naturally. Formation of DBPs is dependent on factors such as the amount and type of chlorine used, water temperature, concentration of precursors, pH, and chlorine contact time. DBPs have been found to cause cancer in laboratory animals and are suspected to be human carcinogens.

The EPA proposed the Stage I Disinfectants/Disinfection By-products Rule (D/DBPR) on July 29, 1994. The final rule was published in the Federal Register on December 16, 1998 and became effective on February 16, 1999. The rule applies to Lakewood Water District and most other water systems, including systems serving fewer than 10,000 people, which add a chemical disinfectant to the drinking water during any part of the treatment process.

The rule set the MCL for total trihalomethanes, which are a composite measure of four individual trihalomethanes, at 0.08 mg/L. The rule established MCLs and requires monitoring of three additional categories of disinfectant byproducts as follows:

- Five haloacetic acids (HAA5), 0.06 mg/L
- Bromate, 0.01 mg/L

- Chlorite, 1.0 mg/L

The rule also established maximum residual disinfectant levels (MRDLs) as follows:

- Chlorine, 4.0 mg/L
- Chloramines, 4.0 mg/L
- Chlorine dioxide, 0.8 mg/L

6.4.5.4 Stage 2 Disinfectants/Disinfection By-products Rule

Stage 2 of the Disinfectants/Disinfection By-products Rule (D/DBPR) was promulgated by EPA on January 4, 2006. This rule is the second part of the D/DBPR, of which the Stage 1 D/DBPR became effective in February 1999. The Stage 2 D/DBPR focuses on monitoring and reducing concentrations of two classes of DBPs: total trihalomethanes (TTHM) and HAA5 and applies to water systems that add chemical disinfectants. The key requirements of the Stage 2 D/DBPR include:

1. An Initial Distribution System Evaluation (IDSE) to identify distribution system locations with high DBP concentrations.
2. Site specific locational running annual averages instead of system-wide running annual averages to calculate compliance data.

The MCLs for TTHM and HAA5 are 0.080 mg/L and 0.060 mg/L, respectively, which are calculated as locational running annual averages.

Per Washington State DOH, the District tests for DBPs once a year at two locations within its distribution system.

6.5 Water Quality Programs

6.5.1 Consumer Confidence Report

The final rule requiring that water purveyors prepare a Consumer Confidence Report (CCR) was published in the Federal Register on August 19, 1998 and became effective on September 18, 1998. Minor revisions were posted in the Federal Register on May 4, 2000. The CCR is the centerpiece of the right-to-know provisions of the 1996 Amendments to the Safe Drinking Water Act. All community water systems, like the District, were required to issue the first report to customers by October 19, 1999. The CCR is a report on the quality of water delivered to the system during the previous calendar year. The reports must contain certain specific elements; but may also contain other information. The annual report must be updated and re-issued to all customers by July 1 of each year thereafter. A copy of the District's 2018 CCR is included in **Appendix K**.

6.5.2 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. The PN tiers are described below.

- Tier 1 PN is required to be issued as soon as practical, but no later than 24 hours after the water system learns of the violation or situation.
- Tier 2 PN is required to be issued as soon as practical or within 30 days. Repeat notice every 3 months until violation or situation is resolved.
- Tier 3 PN is required to be issued within 12 months and repeated annually for unresolved violations.

6.5.3 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 Protection*, which became effective in July 1994. In Washington State, DOH is the lead agency for the development and administration of the State's wellhead protection program (WHPP).

A WHPP 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 WHPP. All required elements of a local WHPP must be documented and included either in the Comprehensive Water System Plan, which is applicable to the District, or in a Small Water System Management Program document which is not applicable to the District.

The District's WHPP, was prepared in 1997, and was recently updated in December 2015. The WHPP was approved by the DOH and is available as a separate document. As part of the 2013 update to the District's Comprehensive Water System Plan, the hazard inventory and assessment portions of the WHPP were updated. A summary of the WHPP is included as **Appendix M** of this Comprehensive Water System Plan.

In 2019 the District will publish fliers describing the District's wellhead protection program and distribute them in one or more of the billing cycles to alert homes within the 1-year time of travel zones of all of the District's wells. These flyers will be modeled after the sample notification letter included in DOH's 2010 Wellhead Protection Program Guidance Document. Over this same time period, the District will identify and send similar notifications to businesses on Joint Base Lewis

McChord within the 10-year time of travel zones of the District's wells. These fliers will also be available in the District's lobby and will be published in the 2019 annual report.

6.6 Water Quality Monitoring Results

This section presents the current water quality standards for groundwater sources and the results of the District's recent source water quality monitoring efforts. A discussion of the water quality requirements and monitoring results for the District's distribution system is presented in the section that follows.

6.6.1 Source Monitoring Requirements and Waivers

The District is required to perform water quality monitoring at each of the active sources for inorganic chemical and physical substances, organic chemicals, and radionuclides. The monitoring requirements that the District must comply with are specified in *WAC 246-290-300*. A description of the source water quality monitoring requirements and procedures for each group of substances is contained in the District's *Water Quality Monitoring Schedule*, which is included in **Appendix L**.

In 1994, DOH developed the Susceptibility Assessment Survey Form for water purveyors to use in determining a drinking water source's potential for contamination. The results of the susceptibility assessment may provide for monitoring waivers that allow reduced source water quality monitoring. DOH assigned a high susceptibility rating to the District's H-1 and H-2 Ponders Well Field and a moderate susceptibility rating for the G-1 and G-2 Scott Well Field, 88th and Pine J-1 Well; L-1, L-2, L-3 Hemlock Well Field, and the S-2 Well on Angle Lane. The remaining wells and well fields were assigned a low susceptibility rating. These assignments were based on the results of the susceptibility assessment survey for each source. All but eight of the sources were granted a susceptibility waiver that allowed the District to avoid monitoring of VOCs through 2008. All but three of the sources were also granted a synthetic organic chemical (SOC) waiver through 2008. In 2010, DOH suspended issuing waivers for testing for SOCs.

6.6.2 Source Monitoring Results

The water quality of the District's sources meets or exceeds all drinking water standards, except for slightly higher than allowable levels of manganese in the D-3, Q-1, J-2, and S-1 Wells. Filtration treatment is used at the D-3, Q-1, U-1 and S-1 Wells to remove iron and manganese and bring the concentration of manganese in water from these wells within standards. The remaining J-2 Well is only used during emergencies, or during short periods on high usage days. Filtration treatment for manganese is also employed at the View Road N-1 and N-2 Wells. The District monitored all of its sources for inorganic chemicals (IOCs) once during each of the five past compliance periods. Nitrate monitoring has been performed once per year. The monitoring results for IOCs, including nitrate, VOCs and SOCs from 2011 to 2018 are summarized in **Appendix L**. DOH requires certain counties in Washington State to monitor for ethylene dibromide (EDB) and dibromochloropropane (DBCP). Although the District is located in Pierce County and is currently not required to monitor

for EDB or DBCP, these chemicals are part of the Volatile Organic Chemical Panel we routinely test for and our results – as recently as 2018 – have always been non-detect.

6.6.3 Distribution System Monitoring Requirements and Results

The District is required to perform water quality monitoring within the distribution system for coliform bacteria, disinfectant or chlorine residual concentration, lead and copper, and asbestos in accordance with *WAC 246-290*. The District has been in compliance with all monitoring requirements for the past several years. A summary of the results of distribution system water quality monitoring within the District's system is presented below.

6.6.4 Coliform Monitoring

The District is required to collect a minimum of seventy (70) coliform samples per month from different locations throughout the system, based on a population served of 61,110 in 2019. The District has not collected a positive sample since October 2004. All repeat samples taken within 24 hours had no detectable coliforms. Since the number of positive samples did not constitute at least five percent of the total samples taken, no violation of the legal limit occurred.

6.6.5 Disinfectant Residual Concentration Monitoring

Disinfection requirements for groundwater sources are contained in *WAC 246-290-451*, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system. The District has set a chlorination target to maintain a residual disinfectant concentration of at least 0.2 mg/L. The water samples collected by the District for coliform analysis are also tested for residual disinfectant concentration. The results of residual disinfectant concentration tests in 2018 indicate a range of 0.12 mg/L to 1.28 mg/L, with the average being 0.66 mg/L.

6.6.6 Disinfectant By-Products

The District is required to perform water quality monitoring in the distribution system for disinfection by-products in accordance with *WAC 246-290-310*. The MCLs for trihalomethanes and HAA5 are 80 µg/L and 60 µg/L respectively. Water samples collected by the District in 2018 were tested for disinfectant by-product concentration. The results of these disinfectant by-product tests in 2018 resulted in non-detection of Haloacetic acids and a range of 1.68 to 6.58 µg/L of total trihalomethanes.

6.6.7 Lead and Copper Monitoring

The Lead and Copper Rule identifies the action level for lead as being greater than 0.015 mg/L and the action level for copper as being greater than 1.3 mg/L. The results of the tests from the most recent monitoring period during 2017, which included 30 sample sites, indicate a range of <0.001 mg/L to 0.008 mg/L for lead and a range of 0.05 mg/L to 0.35 mg/L for copper. These results

indicate the 90th percentile concentration of lead and copper from each group of samples has never exceeded the action level. Monitoring currently must be completed every three years.

6.6.8 Asbestos Monitoring

Asbestos monitoring is required if the sources are vulnerable to asbestos contamination or if the distribution system contains more than ten percent of asbestos cement (AC) pipe. Although none of the District's sources are susceptible to asbestos contamination, AC pipe composes more than ten percent of the District's distribution system. Therefore, the District must monitor for asbestos in the distribution system. The current MCL for asbestos is seven million fibers per liter and greater than ten microns in length. The water sample must be taken at a tap that is served by an asbestos cement pipe under conditions where asbestos contamination is most likely to occur. Currently, the District is required to test for asbestos once every nine years. The District's most recent sample in 2011 contained zero asbestos fibers in all tests. The District plans on performing asbestos monitoring again in 2020.

6.7 Water Treatment

All of the water produced from the District's wells is chlorinated before it enters the distribution system. The District does not fluoridate its water supply. In addition, the District uses adsorption, filtration and adsorption and aeration treatment techniques at a limited number of its sources. A detailed description of each technique and where it is implemented is included in **Chapter 2** of this Plan.

6.8 Summary

The District is currently in compliance with all applicable water quality regulations and is performing the necessary regulated water quality testing. The District's existing water rights are anticipated to exceed water system demands, including wholesale customer water contracts, for at least 20 years. **Chapter 8** will further analyze the physical source capacity of the system.

Chapter 7

Operations and Maintenance

7.1 Introduction

This chapter summarizes the operations and maintenance activities and requirements of the Lakewood Water District (District), including a brief description of personnel and their duties for operating and maintaining the water system.

7.2 Water System Management and Personnel

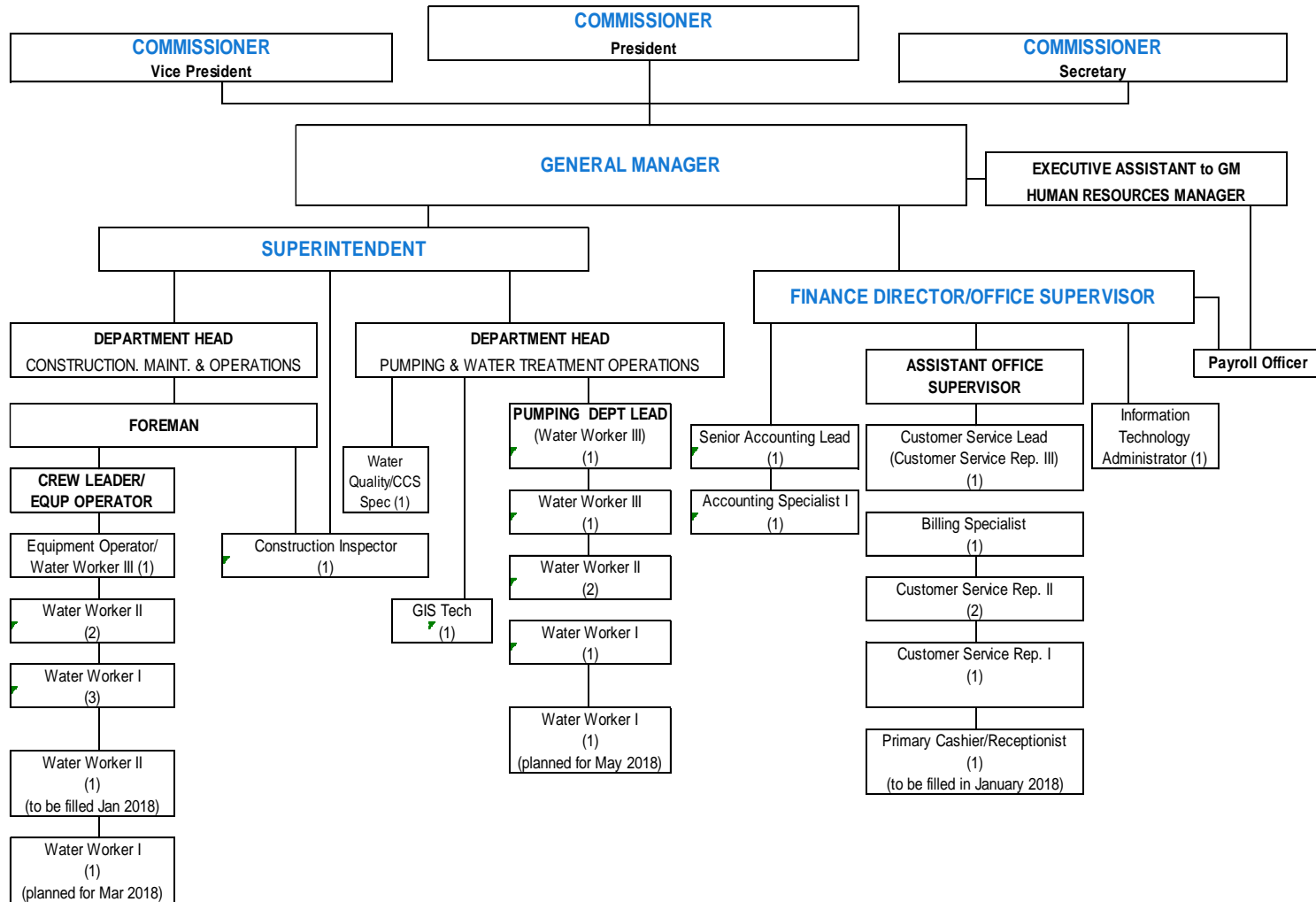
7.2.1 Management Structure

The District functions under the direction of the District General Manager, Mr. Randall Black. The current operations and maintenance staff consist of several maintenance personnel that function under the District General Manager, as shown in **Figure 7-1**. The water system tasks that are performed by the operations and maintenance staff include inspection, testing, installation and repair of system facilities, routine operation and preventive maintenance, record keeping, administrative tasks, general clerical work, and repairs or maintenance required in response to emergencies.

Washington State Law, *WAC 246-292*, requires the District's system to be operated by one or more certified operators. In addition, specialty certification is required for backflow assembly testing. **Table 7-3** shows the current certifications of the District's operations and maintenance staff.

It is District policy to maintain a well-qualified, technically trained staff. The District annually allocates funds for personnel training, certification, and membership in professional organizations, such as the American Water Works Association (AWWA). The District believes the benefits greatly outweigh the time and costs of training, certification, and professional organizations, which result in improved safety, skills, and confidence.

Figure 7-1
Lakewood Water District 2018 Organizational Chart



7.2.2 Personnel Responsibilities

The key responsibilities of the water operations and maintenance management staff positions are summarized in **Table 7-1**. Outside of management there are positions necessary for operation and maintenance of the District which are listed in **Table 7-2**. The organization of the District staff is presented visually in **Figure 7-1**. Some of the District's staff positions require certifications to operate and maintain the District's water system facilities; **Table 7-3** presents all District staff's certifications.

Table 7-1
District Operations and Maintenance Management Staff Position Summary

Position	Description
District General Manager	Manages the District, acts as a contact for emergency response, supervises the implementation of improvement programs, oversees the budgeting process for system improvements and acts as the highest-ranking spokesperson for public contact.
District Superintendent	Has responsible charge of all District staff and directly supervises all District department heads, water operators, and technicians, and is responsible for the day-to-day operation of the water system. The District Superintendent is 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. In the absence of the General Manager, the Superintendent assumes all duties of the General Manager.
Finance Director / Office Supervisor	Manages customer service and financial office staff and has direct responsibility for the District's financial and computer systems.
Pumping & Water Treatment Operations Department Head	Plans and directs the construction, maintenance and operations activity of the District's pumping system.
Construction Maintenance & Operations Department Head	Plans and directs the construction, maintenance and operations activity of the District's transmission and distribution piping systems.
Construction Maintenance & Operations Foreman	Directly supervises and manages work crews for construction maintenance and operations activities.
IT Manager	Manages the District's information technology staff and is responsible for the informational technology and computer systems the District uses.
Water Quality and Treatment Lead	Plans and directs the construction, maintenance and operations activity of the District's water quality and treatment.
Crew Leader	Supervises District construction work crews.

Table 7-2
District Operations and Maintenance Non-Management Staff Position Summary

Position	Description
GIS Mapping Tech	Responsible for the District's GIS/CAD mapping systems.
Equipment Operator	Operates construction equipment.
Water Worker	Maintains and repairs water system related equipment
Meter Reader	Reads and maintains all customer related meters in the system
Construction Inspector	Inspects all new main construction

Table 7-3
District Personnel Certification

Name	Position	Certification Type	Certification No.
Black, Randall M.	District General Manager	WTPO-1; CCS; WDM-4	4877
Black, Ian	Superintendent	WDM-4, WTPO-1	13445
Gaskin, Robert L.	Construction Maintenance & Operations Dept. Head	WDM-2; WDS	5184
Stanley, Don	Pumping & Water Treatment Dept. Head	WDM-1, WDS, CCS	9629
Rae, Alexander T.	Construction Maintenance & Operations Foreman/ Safety Officer	WDS, CCS	9616
Bullard, Chris	Crew Lead	WDM-1	14079
Schwind, Eric	Operator	WDM-3,Asbestos Supervisor	9624
Bosma, Sam	Inspector	WDM-1	13544
Jorgenson, Shaun	Water Worker	WDM-3,WTPO-1,CCS	9922
Skipworth, Seth	Water Worker	WDM-1	13301
Smith, Zachary O.	Water Worker	WDM-3, CCS	7971
Lea, Jacob	Water Worker	WDD IT	13200

Table 7-3 (Continued)
District Personnel Certification

Name	Position	Certification Type	Certification No.
Brooks, Robert	Water Worker	WDM-1	13298
Alvis, Ryan	Water Worker	Pending	
Daulbaugh, Jordan	Water Worker	Pending	
Davidson, Brent	Water Worker	Pending	
Pulk, Clark	Water Worker	Pending	
Rounds, Kegan	Water Worker	Pending	
Lawson, Kyle	Water Worker	Pending	
Bowen, Rod	Water Worker	Pending	
Chris Ryan			
Certification Definitions			
		BTO – Basic Treatment Operator	
WDM – Water Distribution Manager		CCS – Cross-connection Control Specialist	
WDS – Water Distribution Specialist			
QSS - Qualified Sanitary Surveyor			

7.3 Normal Operations

Routine operations involve the analysis, formulation, and implementation of procedures to ensure that the facilities are functioning efficiently and providing reliable, high-quality water to all customers at all times. The District’s maintenance procedures require repairs to be made promptly; assuring customers receive a high-quality water service and limited interruptions.

7.3.1 Available Equipment

The District has several types of equipment available for daily routine operation and maintenance of the water system. The equipment is stored at the District’s Operations and Maintenance Facility at the same site as the District office. If additional equipment is required for specific projects, the District will rent or contract with a local contractor for the services needed. An inventory of supplies in sufficient quantities for normal system operation and maintenance and short-term emergencies is stored at the Operations and Maintenance Facility. A list of equipment and supplies used in the normal operation of the water system is shown in **Table 7-4**.

The District uses several different types of communications equipment to ensure a reliable and redundant means of communication within the staff. All vehicles and equipment are equipped with mobile two-way radios that are capable of communicating with similar base radios at the District’s Operations and Maintenance Facility. Specific radios are also provided allowing personnel to communicate, as necessary, with other local cities and Pierce County. In addition, the District provides cell phones to key personnel or positions for enhanced communication.

Table 7-4
Equipment and Materials Summary

Quantity	Major Equipment
1	10 CY Dump Truck
1	Flatbed Truck
1	Fueling Station
1	60 Sized Excavator
1	410 Sized Backhoe
Quantity	Minor Equipment
2	Dump Truck
15	PU Trucks
1	Valve Turner Machine
2	SUV’s
2	Grumman Meter Reading Vans
3	Equipment Trailers

Table 7-4 (Continued)
Equipment and Materials Summary

Quantity	Communications Equipment
32	Radios Truck Mounted and Hand Held
18	I Pad Tablets
7	Cell Phones
1	Pierce County Water Co-Op Emergency Radio.

Table 7-5 lists the vendors that typically provide materials, supplies, chemicals equipment, and service for the District’s major water system components.

Table 7-5
Water System Equipment and Supply Vendor Summary

Equipment	Vendor(s)
Pumps	Pump Tech, Inc.; Hokkaido Drilling, Inc.; Center Electric, Inc.; PACO pumps
Pipe	Core & Main; Ferguson Waterworks; H.D.Fowler, Consolidated Supply
Hydrants Valves & Meters	Core & Main; Ferguson Waterworks; H.D.Fowler, Consolidated Supply
Isolation Valves	Core & Main; Ferguson Waterworks; H.D.Fowler; Consolidated Supply
Control Valves	GC Systems, Inc.
NaOCl Generator	Severn Trent, ClorTec, Wallace and Tiernan, MicroClor
Filtration Systems	ATEC Systems Associates; Rescue Engineers, Inc.
Generators	Pacific Power Generation
Plumbing and HVAC Supplies	Lakewood Hardware; Core & Main; Ferguson Waterworks; H.D.Fowler; Consolidated Supply
Salt for NaOCl Generators	Cargill, Inc. Salt Division

7.3.2 Routine Water Quality Sampling

The Washington State Department of Health (DOH) has adopted federal regulations that specify minimum 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 minimum monthly routine coliform sampling requirements are summarized in Table 2 (page 69) of the April 1999 “Drinking Water Regulations”. District staff currently performs all routine coliform sampling in the distribution system; collecting a minimum of 70 samples from the District’s water system every month. A further discussion of the water quality monitoring program is contained in **Chapter 6** and in the District’s *Water Quality Monitoring Plan*, included in **Appendix L**.

7.3.3 Cross Connection Control

The District has adopted a Cross-Connection Control Program to comply with *WAC 246-290-490* pertaining to pollution and contamination of potable water due to cross-connections. Backflow prevention assemblies are required at service connections where a potential for contamination or pollution exists. **Appendix H** includes a copy of the District’s Cross-Connection Control Program. As shown in **Table 7-3**, the District employs more than one certified Cross-Connection Control Specialist.

7.3.4 Customer Complaint Response Program

The District maintains a log of complaints received from water customers. Depending on the nature of the complaint, a District employee may be contacted by radio, mobile phone, email, or text message in order to respond immediately if a public health issue is apparent. If the complaint is not of immediate urgency, a work order will be completed, and staff will respond as soon as feasible.

7.3.5 Continuity of Service

As a Special Purpose District, the Lakewood Water District has the structure, stability, authority, and responsibility to assure that water service will be continuous. For example, changes on the Board of Commissioners or staff turnover would not have a pronounced effect on the District’s customers or quality of service.

7.4 Preventive Maintenance

Maintenance schedules that meet or exceed manufacturer’s recommendations have been established for all critical components in the water system. The following schedule in **Tables 7-6** and **7-7** is used as a minimum for preventive maintenance:

**Table 7-6
Storage and Distribution System Preventive Maintenance Schedule Summary**

Tanks/Reservoirs	
Daily	Visual and audio inspection.
Weekly	Check security and inspect facilities for proper operation.
Semiannually	Thoroughly inspect and repair if necessary. Check vents, hatches, etc.
Annually	Check interior condition.
As Needed	Clean, repaint and repair interior and exterior as needed.
Water Mains	
Semiannually	Leak Survey, use "Permalog" leak detectors.
Annually	Flush.
Wells	
Daily	Log and record volume delivered and current supply rate.
Weekly	Check security.
Annually	Check all valves and screens; check control valve settings.
As Needed	Maintain electrical/mechanical equipment; paint structures/piping.
Booster Pump Stations	
Weekly	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.
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.

Table 7-6 (Continued)
Storage and Distribution System Preventive Maintenance Schedule Summary

Engine Generator Sets	
Quarterly	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	
Quarterly	Check insect screen at all air gaps for blockage; manually exercise each valve to ensure proper operation.
Semiannually	Check vault for adequate drainage, clean drain if necessary. Check grout at pipe penetrations for leaks; check ladders, lid and hatch for proper operation and condition; check piping and valves for leaks.
As Needed	Inspect all parts for damage, or evidence of cross-threading. Check diaphragm and disk retainer assembly for tears, abrasion, or other damage. Check all metal parts for damage, corrosion, or excessive wear.
Isolation Valves	
Triennially	Operate full open/closed; uncover where buried; clean out valve boxes and repair as necessary.
Hydrants	
Biennially	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. <u>Leave in open position</u> ; Inspect drain system to ensure proper drainage and protection from freezing weather. West Pierce Fire & Rescue checks many hydrants annually and LWD completes any repairs as necessary.
Meters	
Biennially	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. Locate, inspect and check for leaks, Meters all report through AMI if alarms or problems appear. Service orders will be written at that time for checks and/or repairs.
Air and Vacuum Release Valve Assemblies	
Triennially	Locate and Inspect

Table 7-6 (Continued)
Storage and Distribution System Preventive Maintenance Schedule Summary

Blow off Assemblies	
Annually	Flush and inspect.
Backflow Prevention Devices	
Annually	Inspect, test, and record status.
Telemetry and Control System	
Monthly	Visually inspect cabinets and panels for damage, dust, and debris.
Semiannually	Inspect inside of cabinets and panels for damage, dust, and debris.
	Vacuum clean all modules.
	Test alarm indicator units.
	Clean and flush all pressure sensitive devices.
	Visually inspect all meters to coordinate remote stations.
Annually	Check master and RTU's for proper operation; repair as necessary.

Table 7-7
Tools and Equipment Preventive Maintenance Schedule Summary

Rolling Stock	
Daily	Check all fluid levels and brakes.
As Needed	Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on type of use).
Tools	
As Needed	Clean after each use

7.5 Recordkeeping and Reporting

Regulations for water system operations, water quality testing, recordkeeping, and reporting are found in *WAC 246-290-480*. These regulations are described below.

7.5.1 Recordkeeping Requirements

Records must be kept for chlorine residual and other information as specified by DOH. DOH requires retention of critical records dealing with facilities and water quality issues as summarized in **Table 7-8**.

The District's recordkeeping procedures exist to ensure all records are reviewed and stored properly. First, the field technicians provide information to the foreman, who must review the information prior to it being filed. Then, the information is given to the secretary for their input before it is filed at the District office.

Table 7-8
District Recordkeeping Requirement Summary

Record Type	Length Record Must Be Retained
Bacteriological Analysis	5 years
Chemical Analysis	Life of water system
Daily Source Meter Reading	10 years
Other DOH required records of operation	3 years
Documentation of actions to correct violations of 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 facility

7.5.2 Public Notification Reporting Requirements

The Federal Safe Drinking Water Act (SDWA) and *WAC 246-290-495* require purveyors to include certain information in an annual Consumer Confidence Report, many of these requirements are discussed in **Chapter 6**. In addition, the SDWA and *WAC 246-290-495* requires purveyors to notify their customers if any of the conditions listed in **Table 7-9** occur.

Table 7-9
Public Notification Condition Summary

Conditions	
Failure to comply with	<ul style="list-style-type: none"> ○ A primary MCL described under <i>WAC 246-290-310</i> ○ A surface water treatment technique ○ Monitoring requirements under <i>WAC 246-290</i> ○ <i>Reporting requirements</i> ○ Testing requirements ○ A DOH order
When DOH issues the water system	<ul style="list-style-type: none"> ○ A category red operating permit ○ An order
If the water system is	<ul style="list-style-type: none"> ○ Identified as a source of waterborne disease outbreak ○ Operating under a variance or exemption

7.5.3 Reporting Requirements

As the drinking water quality requirements enforcing agency, DOH requires that water purveyors submit reports when certain conditions occur in a water system. **Table 7-10** outlines the reporting timelines for DOH monitored water quality conditions and test results.

Table 7-10
DOH Reporting Requirement Summary

Condition	DOH Reporting Timeline Requirement
A failure to comply with the primary standards or treatment technique requirements specified in <i>WAC 246-290</i>	< 48 hours
A failure to comply with the monitoring requirements specified in <i>WAC 246-290</i>	< 48 hours
A violation of a primary MCL	< 48 hours
Daily source meter reading	On request
Monthly applicable reports required by <i>WAC 246-290</i>	10th of the month, unless otherwise specified
Total annual water production records	On request
Water facilities inventory and Report form	< 30 days
Presence of coliform sample	< 10 days after test result notification
Presence of Fecal coliform or E. coli	End of business day after test result notification

Table 7-10 (Continued)
DOH Reporting Requirement Summary

Condition	DOH Reporting Timeline Requirement
MCL violation	<ul style="list-style-type: none"> ○ < 24 hrs. after an E. coli MCL violation ○ By end of next business day if total coliform is determined ○ Follow notification procedures in accordance with WAC 246-290-495.
VOC Monitoring results and public notices	< 30 days of receipt of test results

Specific notice content, distribution channels, and time limit requirements as specified in *WAC 246-290-495* must be in compliance when notification is required. The District complies with these requirements as they become necessary.

7.5.4 Other Reports

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 of these reports are compiled and completed according to their instructions.

7.6 Recordkeeping Procedures and Locations

The District maintains all records pertaining to the water system. To maintain accessibility and proper documentation of all water system records the District follows the standard procedures below for the storage, documentation, regulatory and public notification pertaining to water system records.

7.6.1 Facilities Operations and Maintenance Manuals

Operations and maintenance manuals are available for staff members' reference. The equipment and operational maintenance manuals required for all well supplies and equipment, PRV stations and equipment, booster pump stations and equipment, and reservoirs are maintained and housed in the equipment maintenance file at the District office. The District intends to maintain its policies of requiring complete operation and maintenance manuals for all new equipment. The pumping department maintains a guidance manual for On-Call personnel that contain critical information and copies of the pertinent sections of the operational manuals.

7.6.2 Mapping and As-Built Drawing Records

Maintenance of record drawings is essential to maintenance crews, District planners, developers and anyone else needing to know how the water system is laid throughout the District. The District

maintains a comprehensive mapping and record keeping system of the District’s water system. This mapping is comprised of physical maps, historical data books and computer-generated maps in AutoCAD and GIS electronic mapping format. Mapping of the system is a continuous process of incorporating new data from surveys, sketches and digital pictures. The drawing records are stored at the District office and are maintained by District staff. The as-built records are organized into yearly folders and located in the CAD room of the District office. As-built records are also stored at the District office. Both drawing records and as-built drawings have been retained over the past many decades, providing historical information that still to this day provide much needed information for District staff. Gradually, the District intends to copy and electronically retain the information to help provide assistance in the future. The District recently implemented a Geographic Information System (GIS), which provides electronic access to the Districts’ water system maps. The District is currently involved in creating electronic copies of record drawings which will also be accessible through GIS.

7.6.3 Distribution System Maintenance Records

Records for the District’s valve maintenance program are stored in a file cabinet, which is located at the District office. Information on all distribution and hydrant valves are stored at this location on 3-inch x 5-inch note cards. The District’s flushing book, which describes a sequential daily route to be completed every year between March 1st and July 4th, is also stored in the same file cabinet as the valve maintenance records. All water quality, other regulatory records, and additional record types listed in **Table 7-11** are stored in a file in the CAD room of the District office.

Table 7-11
District Office Records Summary

Record Types	
Water Usage	Bacteriological tests
Backflow assemblies and cross-connection incidents	Water samples from new developments
Chlorination levels	Water used for construction
Hydrant repairs	Precipitation
Hydrant meter forms	Water maintenance
Hydrant databases	Confined spaces
Vandalism forms	Water consumable inventory
Water main notes	Water worksheets
Customer complaints	Vehicle Maintenance

7.6.4 Pumping and Water Supply Records

Supply records for the District’s pumping and storage facilities are collected and stored electronically on the District’s Central Archive Server (CAS). **Table 7-12** summarizes the data that is collected about water pumping, storage and supply. The collected data is available in multiple formats identified in **Table 7-13**.

Table 7-12
Supply Record Data Summary

Collection Source	Data Collected
Booster Pumps	<ul style="list-style-type: none"> Number of on/off cycles in 24-hour period
Wells	<ul style="list-style-type: none"> Static/drawdown water level for <i>Aquifer Management Program</i> Flow rate(s) in 1,000 gallons
Storage Tanks	<ul style="list-style-type: none"> Minimum water elevation Maximum water elevation Average water elevation
Distribution System	<ul style="list-style-type: none"> Pressure differential psi (where applicable) Cl₂ residual and pH levels
Alarms	<ul style="list-style-type: none"> Intrusion Power failure Low battery Programmable Logic Controller (PLC) trouble Communications failure Well/booster pump control valve failure Pump flow control valve failure Low well cutoff Tank/reservoir overflow Tank/reservoir low level Pump start limit Telemetry recognition data bit alarm Cl₂ system failure

Table 7-13
Available Report Data Summary

	Format
Display current values	24-hour report (2-31 days)
Custom daily booster total report	Daily alarm history
Weekly alarm history	Monthly alarm history
Daily event history	Daily event history
Weekly event history	Monthly event history

Once an operator has checked available reports, these reports are submitted to the accounting department for use in tabulating total pumping and sales revenue reports. Other reports are used for maintenance and design activities. Data is archived on the both the SCADA server and the CAS depending on the nature of the data. The data is automatically archived annually.

The master telemetry unit programmable logic controller (MTU PLC) continuously records water elevation changes. Two years of accumulated charts are stored in the telemetry office. These charts provide data for maintenance, operations and system design/upgrade projects.

Pumping maintenance logs are filed for multiple activities which are listed in **Table 7-14**. These logs are stored in the telemetry office for three years. They are used to monitor present system conditions and to develop future maintenance activities and schedules.

Table 7-14
Pumping Maintenance Activity Summary

Activity	
Weekly event history	Filtration plant(s) maintenance/inspection
PRV valve/vault inspection	Altitude valve/vault inspection
Well site maintenance/inspection	Filtration plant(s) maintenance/inspection
View Road Treatment Plant maintenance/inspection	Booster pump/booster vault inspection and maintenance

7.7 Safety Procedures and Equipment

Safety is the concern and responsibility of all water operations and maintenance staff. Safety is highly important to the District Board of Commissioners, who annually look to the budget process to closely see plans new safety equipment and training outlined within the upcoming year to help emphasize the importance of safety as an organization. To maintain the highest level of safety, the District has taken steps toward educating its staff and providing resources to ensure a safe working environment. The District will strive to improve its safety program on an on-going basis. The AWWA publishes a manual titled *Safety Practices for Water Utilities (M3)* which describes safety programs and provides guidelines for safe work practices and techniques for a variety of water utility work situations. This manual is available to all District personnel. All District staff are required to participate in safety training classes in First Aid, cardiopulmonary resuscitation, traffic safety and flagging, air testing, confined space entry and equipment calibration. It is also the policy of the District to provide adequate safety equipment to staff.

7.7.1 Available Safety Equipment

Safety and first aid equipment available to staff to safely carry out operations and maintenance tasks include the items identified in **Table 7-15**.

7.7.2 Safety Procedures and Regulations

The District follows all appropriate OSHA and WIHSA regulations in its day-to-day operations and complies with the following state requirements listed in **Table 7-16**. **Table 7-17** identifies standard procedures to be followed for operations and maintenance tasks that involve the most common potential work place hazards in the water system.

Table 7-15
Safety and First Aid Equipment Summary

Equipment	
Steel toe boots	Safety eyeglasses and goggles
Ear plugs	Reflective vests and pants
Climbing harnesses	Fire extinguishers
Chemical aprons	Gloves
Hard hats	Respirators
Eye wash stations in each facility	Trench shoring equipment
Air tester for confined spaces	Traffic safety equipment
Gas monitoring equipment	Confined space blower
Radio and cell phones	First aid kits in each vehicle, workshop and lab
Automated External Defibrillator (AED) in Office	

Table 7-16
State Safety Requirement Summary

Requirement	Reference Document
Entry into confined spaces regulations	WAC 296-62-145 to 14529 Part M – Entry into confined spaces
Shoring of open ditches regulations	WAC296-155-650 to 66411 Part N – Shoring of open ditches
Lock-out tag for work on energized or de-energized equipment or circuits	WAC 296-155-429
Fall restraint for access to the top of water tanks	WAC 296-155 Part C1
Traffic control for working in the public right-of-way regulations	MUTCD

Table 7-17
Standard Safety Procedure Summary

Working Condition	Standard Safety Procedures
Use of Chlorine or Chlorine Products and on-site chlorination generator equipment	Handle with care, provide adequate ventilation, and wear safety glasses, rubber gloves and properly fitted respirators. Follow all Federal, State and Local requirements as well as manufacturers’ guidelines for use of acid for cleaning chlorine generation cells, loading salt and work around electrical equipment.
In Confined Spaces	Follow state requirements for confined space entry.
In Trenches	Obtain proper training and follow all safety procedures for working in trenches.
Around Heavy Equipment	Obtain proper training and follow all safety procedures.
In Traffic Areas	Wear proper clothing and provide adequate signage and flagging for work area.
Around Water Reservoirs	Follow proper safety harness procedures for working on tall structures.
Around Pump Stations	Obtain proper training and follow all safety procedures for working on pumps and electrical equipment.
Working on Asbestos Cement 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.

7.8 Emergency Operations

The District is well equipped to accommodate short-term system failures and abnormalities. A brief discussion of the capabilities of the water system infrastructure and its operation during emergency events follows.

7.8.1 Multiple Water Sources

The District has 30 active groundwater wells and three inactive groundwater wells. Should the District lose the operation of one water source, water could be supplied from other water sources. Such a failure would likely not adversely affect the District's ability to meet the water demands of its customers.

7.8.2 Multiple Reservoirs

Water storage is provided by 13 active reservoirs that are located at different sites throughout the District's water system. The existence of reservoirs in multiple pressure zones, coupled with the water system's ability to transfer water between zones through a series of pressure reducing stations and booster pump stations, provides sufficient redundancy to prevent service disruption when one of the reservoirs is out of service for cleaning, painting, or repairs.

7.8.3 Distribution System

The District has a policy to loop water mains, wherever possible, to improve 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. Where this is not possible or economically feasible, the District requires the customer to install and maintain automatic flushing stations on dead end mains to maintain high drinking water quality standards.

7.8.4 Emergency Telephone

Key or "on-call" personnel can be reached by the District's internal phone system, Police Department, Fire Department and 911.

7.8.5 On-Call Personnel

The on-call staff member is equipped with an iPad, cell phone, and service vehicle. On-call staff are available to respond to emergency calls within 30 minutes. A list of emergency telephone numbers is provided to each on-call employee. New employees are not placed on-call until they are familiar with the water system and maintenance procedures.

7.8.6 Emergency Equipment

The District is equipped with the necessary tools to deal with common and serious emergencies associated with water main failures. If a more serious emergency should develop the District will hire a local contractor from its Small Works Roster to make repairs to fix the emergency condition.

7.8.7 Material Readiness

Some critical repair parts, tools, and equipment are on-hand and kept in fully operational condition. As repair parts are used, they are re-ordered. Inventory is kept current and is adequate for most common emergencies, which can reasonably be anticipated. The District has access to an inventory of repair parts, including parts required for repair of each type and size of pipe within the service area.

7.8.8 Emergency Response Program

The *Lakewood Water District Emergency Response Plan*, dated January 2010, updated August 2016, and will be updated again in 2019, identifies procedures that would be carried out in the event of a serious emergency or disaster situation. The *Emergency Response Plan* also contains a list of water personnel responsible for making decisions in emergency situations, emergency call-up lists, emergency notification procedures, and several other elements. This plan is on file at the District office.

7.9 Addressing Sanitary Sewer Survey Findings

Primary findings of the 2018 Sanitary Survey resulted in recommendations regarding installing screens on all well discharge lines and tank overflow lines, increasing the distance between the well discharge line and top of the discharge pit at noted sites, and other minor items. All survey recommendations have been addressed by the District.

7.10 Staffing

The current field staff includes supervisory personnel and maintenance workers engaged in operating and maintaining the water system, and there are currently 16 full-time field employees.

7.10.1 Staffing Requirements

The estimated hours of work required to achieve optimum operation and maintenance of the District's water system, excluding time required for clerical tasks, is shown in **Table 7-18**. The time available per person per year was based on the calculations summarized in **Table 7-19**. To achieve the level of operations and maintenance described in this chapter, the District requires approximately 19 full-time staff equivalents.

The District's current staff of 19 full-time water system personnel continues to provide for operation and preventive maintenance of the water system that meets or exceeds regulatory requirements. The District's current operations and maintenance schedule presented in **Table 7-20** shows that all items are maintained on a regular basis, although not at the level the District would desire. Currently, customer water meter replacements are not made as frequently as desired, and the District would prefer to allow more time for groundskeeping and administration. As the District's budget allows additional staff will be added to allow the District to meet the more optimal operation and maintenance for the water system as shown in **Table 7-18**.

Table 7-18
Target Staffing Requirement Summary

Description	Total Units in System	Frequency (times/yr)	Time/Unit (Hours)	Time/Year (Hours)
Preventive Maintenance				
Hydrants	1,962	0.5	0.75	736
Isolation Valves, Hydrant Valves	5,435	0.33	0.25	448
Air and Vacuum Release Valves	6	0.33	1	2
Blowoff Assemblies	86	1	0.5	43
Scheduled Meter Replacement	15,702	0.1	3	4711
Leak Survey of Water Mains (miles)	249	0.5	0.5	62
Flushing Water Mains (miles)	249	1	6	1494
Booster Pump Stations	11	1	85	935
Pressure Reducing Stations	6	1	6	36
Interties	4	1	8	32
Wells	30	1	55	1650
Water Treatment	5	1	630	3150
Reservoirs	13	1	30	390
Telemetry and Control System	1	2	40	80
Operations				
Monitor System	40	260	0.4	4,160
False Alarm Response	1	12	2	24
Meter Reading	15,702	6	0.035	3,297
Groundskeeping	25	12	5	1,500
Inventory	1	1	120	120
Meter Repair/Replace	314	1	6.5	2,041
Main Breaks	1	24	8	192
System Failures	1	4	16	64
Hydrant Repairs	120	1	8	960
Service Repairs	50	1	8	400
New Service Connections	100	1	8	800
Main Connections	5	1	16	80
Water Quality Testing	70	12	0.5	420
Telemetry and Control System	1	260	1	260
Administration	1	260	8	2,080
Total Requirements				
Total Hours Required				30,167
Total Full Time Staff Required (based on 1,588 hours per year per person)				19.00

Table 7-19
Staff Member Availability Summary

Time Available Per Year Per Person	
Beginning Hours Available	2,080
Less average vacation of 3 weeks per year	-120
Less average sick leave of 2 weeks per year	-80
Less holidays of 11 day per year	-88
Less average training of 40 hours per year	-40
Less average small tasks other than above of 0.75 hour per day	-164
Net Total Available Hours Per Year Per Person	1,588

Table 7-20
Current Staffing Requirement Summary

Description	Total Units in System	Frequency (times/yr)	Time/Unit (Hours)	Time/Year (Hours)
Preventive Maintenance				
Hydrants	1,962	0.5	0.75	736
Isolation Valves, Hydrant Valves	5,435	0.33	0.25	448
Air and Vacuum Release Valves	6	0.33	1	2
Blowoff Assemblies	86	1	0.5	43
Scheduled Meter Replacement	15,702	0.1	2.5	3926
Leak Survey of Water Mains (miles)	249	0.5	0.5	62
Flushing Water Mains (miles)	249	1	5	1245
Booster Pump Stations	11	1	85	935
Pressure Reducing Stations	6	1	6	36
Interties	4	1	8	32
Wells	30	1	55	1650
Water Treatment	5	1	625	3125
Reservoirs	13	1	30	390
Telemetry and Control System	1	2	40	80
Operations				
Monitor System	40	260	0.4	4,160
False Alarm Response	1	12	2	24
Meter Reading	15,702	6	0.03	2,826
Groundskeeping	25	12	5	1,500
Inventory	1	1	120	120
Meter Repair/Replace	314	1	6.5	2,041
Main Breaks	1	24	8	192
System Failures	1	4	16	64
Hydrant Repairs	120	1	8	960
Service Repairs	50	1	8	400
New Service Connections	100	1	8	800
Main Connections	5	1	16	80
Water Quality Testing	70	12	0.5	420
Telemetry and Control System	1	260	1	260
Administration	1	260	8	2,080
Total Requirements				
Total Hours Required				28,637
Total Full Time Staff Required (based on 1,588 hours per year per person)				18.03

7.11 Summary

This chapter describes the operations and maintenance associated with system and facilities as well as any deficiencies in operation and maintenance. The District has certified staff safety procedures, an emergency response plan, and record keeping procedures in order to assure that customers receive reliable, high-quality water. Analyses of the physical components of the water system are continued in **Chapter 8**.

Chapter 8

Water System Analysis

8.1 Introduction

This chapter documents the analysis of the Lakewood Water District's (District) water system. This analysis reviews the individual components of the system and determines their ability to meet the policies and design criteria of the District and the State. These water system components were analyzed under existing and future water demand conditions presented in **Chapter 4**. The District's policies and design criteria are presented in **Chapter 5**. Any deficiencies identified will be addressed in the proposed improvements presented in **Chapter 9**.

8.2 Pressure Zone Evaluation

This section evaluates the District's capability to supply water with desirable pressures in all six of the District's pressure zones. Pressure zones are usually determined by ground topography and designated by overflow elevations of water storage facilities or outlet settings of pressure reducing facilities serving the zone. It is desirable to provide a static pressure of 40 to 80 psi to all services in the distribution system. Pressures in the distribution system can commonly be as high as 120 pounds per square inch (psi), and in these cases pressure reducers are installed on individual services to reduce pressures to 80 psi. Whenever feasible, it is ideal to serve the highest service elevation with 40 psi pressure to maximize the use of gravity flow. When it is not reasonable to provide gravity flow from storage facilities in the pressure zone, booster pumps and pressure relief valves are used to provide zones with water from other zones or storage facilities. As described in **Chapter 2**, the District has six pressure zones. **Table 8-1** summarizes the highest and lowest water service meter elevations served by each of the pressure zones, and the resulting static pressures.

Table 8-1
Minimum and Maximum Distribution System Pressures Summary

Pressure Zone	Highest Elevation Served		Lowest Elevation Served	
	Elevation (ft)	Static Pressure (psi)	Elevation (ft)	Static Pressure (psi)
513	387 ft	54.6 psi	247 ft	115.3 psi
490	341 ft	64.6 psi	239 ft	108.8 psi
470	297 ft	75.0 psi	257 ft	92.3 psi
460	339 ft	52.4 psi	305 ft	67.2 psi
455	333 ft	52.9 psi	271 ft	79.7 psi
404	303 ft	43.8 psi	163 ft	104.4 psi

As shown in **Table 8-1**, the existing pressure zone boundaries are adequate to provide the desired 40 psi minimum service pressure throughout the water system. A few locations in the 404, 490, and 513 Zones have service locations with pressures greater than 100 psi.

8.3 Source Capacity Evaluation

This section evaluates the ability of the District’s 30 permanent and seasonal water sources to meet the District’s existing and future demands. Supply facilities must present a reliable, high quality source of water in sufficient quantity to meet the requirements of WAC 246-290-230. DOH recommends that the combined capacity of the sources must provide water at a rate that is equal to or greater than the maximum day demand (MDD) of the system while assuming an 18-hour pumping capacity.

The existing and projected future capacity of each well is listed in **Table 8-2**. The existing pump capacities of each well is based on their average pumping rates and information provided by District operations staff. Future pumping capacity is estimated capacity of proposed new or rehabilitate wells that allows the District to meet their projected MDD with an 18-hour pumping capacity. Source improvement projects are discussed in **Chapter 9**. An analysis of the District’s water rights is contained in **Chapter 6**.

Table 8-2
Water Source Capacity Evaluation Summary

Name	Description	Pressure Zone	Pumping Capacity (gpm)				
			Existing (2019)	Six-Year 2024	10-Year 2029	20-Year 2039	
Permanent & Seasonal	A-1	Tillicum	404	0	0	0	0
	A-2	Tillicum	404	0	0	0	0
	A-3	Tillicum	404	930	880	760	900
	D-2	Interlake/Yard	404	980	980	930	470
	D-3	Interlake/Yard	404	700	700	700	700
	D-3	Interlake/Yard	404				
	E-2	Washington Blvd	404	925	925	925	925
	E-3	Washington Blvd	404	670	640	640	640
	F-2	104th & Bridgeport	404	1,000	1,000	1,000	1,000
	F-3	104 th (Future)	404				400
	G-1	Scotts	404	1,375	1,060	1,080	1,080
	G-2	Scotts	404	875	875	875	875
	G-3	Scotts (Future)	404		800	800	800
	G-4	Scotts (Future)	404			800	800
	H-1 ¹	Ponders	404	1,200	1,040	1,080	1,080
	H-2 ¹	Ponders	404	900	900	900	900
	H-3	Ponders (Future)	404			800	800
I-1	Hipkins	404	450	450	450	450	
I-3	Hipkins	404	800	800	800	800	

1 - Ponders only operates one well, so only the maximum pump is included in the total capacity.

Table 8-2 (Continued)
Water Source Capacity Evaluation Summary

Name	Description	Pressure Zone	Pumping Capacity (gpm)				
			Existing (2019)	Six-Year 2024	10-Year 2029	20-Year 2039	
Permanent & Seasonal Supply	J-1	88th & Pine	404	850	850	850	850
	J-2	88th & Pine	455	0	0	0	0
	J-3	88th & Pine	455	810	810	810	810
	K-1	Lake Avenue	404	0	0	0	0
	K-1R	Lake Avenue (Future)	404				800
	K-2	Lake Avenue	404	1,050	1,050	1,000	500
	L-2	Hemlock Hill	404	750	750	750	750
	L-3	Hemlock Hill	513	400	400	400	400
	N-1	View Road	404	1,050	1,050	1,050	1,050
	N-2	View Road	404	1,000	1,000	1,000	1,000
	O-2	Oakbrook	404	740	740	740	740
	O-3	Oakbrook	404	970	970	970	970
	O-3	Oakbrook (Future)	404				800
	P-1R	Boulevard	404	0	0	0	0
	P-2	Steilacoom Boulevard	404	1,590	1,370	1,060	1,000
	P-3	Steilacoom (Future)	404		400	400	400
	Q-1	Deepwood	404	800	1,200	1,200	1,200
	Q-3	Deepwood	404	0	0	0	850
	R-1	112th Street	404	1,400	1,400	1,400	1,400
	R-2	112 th Street (Future)	404			800	800
	S-1	Angle Lane	404	400	400	400	400
	S-2	Angle Lane	404	700	700	700	700
	U-1	Country Place	404	820	820	820	820
W-1	(Future)	404			800	800	
W-2	(Future)	404				640	
V-1	(Future)	404				800	
SUBTOTAL				22,235	22,660	25,390	27,950
18hr Pumping Capacity	Supply Capacity with 18 hours of pumping (MGD)			25.1	25.6	28.5	31.3
	System MDD (MGD) (Retail + Wholesale)			20.7	24.8	25.4	30.2
	Surplus/Deficiency (MGD)			4.43	0.72	3.12	0.76
Emergency Supply	I-4	Hipkins		0	0	0	0
	L-1	Hemlock Hill		0	0	0	0
	N-2	View Road		0	0	0	0
	O-1	Oakbrook		800	800	800	800
	Q-3	Deepwood		250	250	250	250
	SUBTOTAL				1,050	1,050	1,050
TOTAL District Pumping Capacity				23,285	23,710	26,440	29,000

Figure 8.1. illustrated the combined capability of the District’s active groundwater well sources to meet both existing and future MDD (including wholesale projections). The results of this analysis indicate that the District should increase their source capacity to be able to provide a supply equal to MDD with 18-hours of pumping. Specific improvements are described in **Chapter 9**.

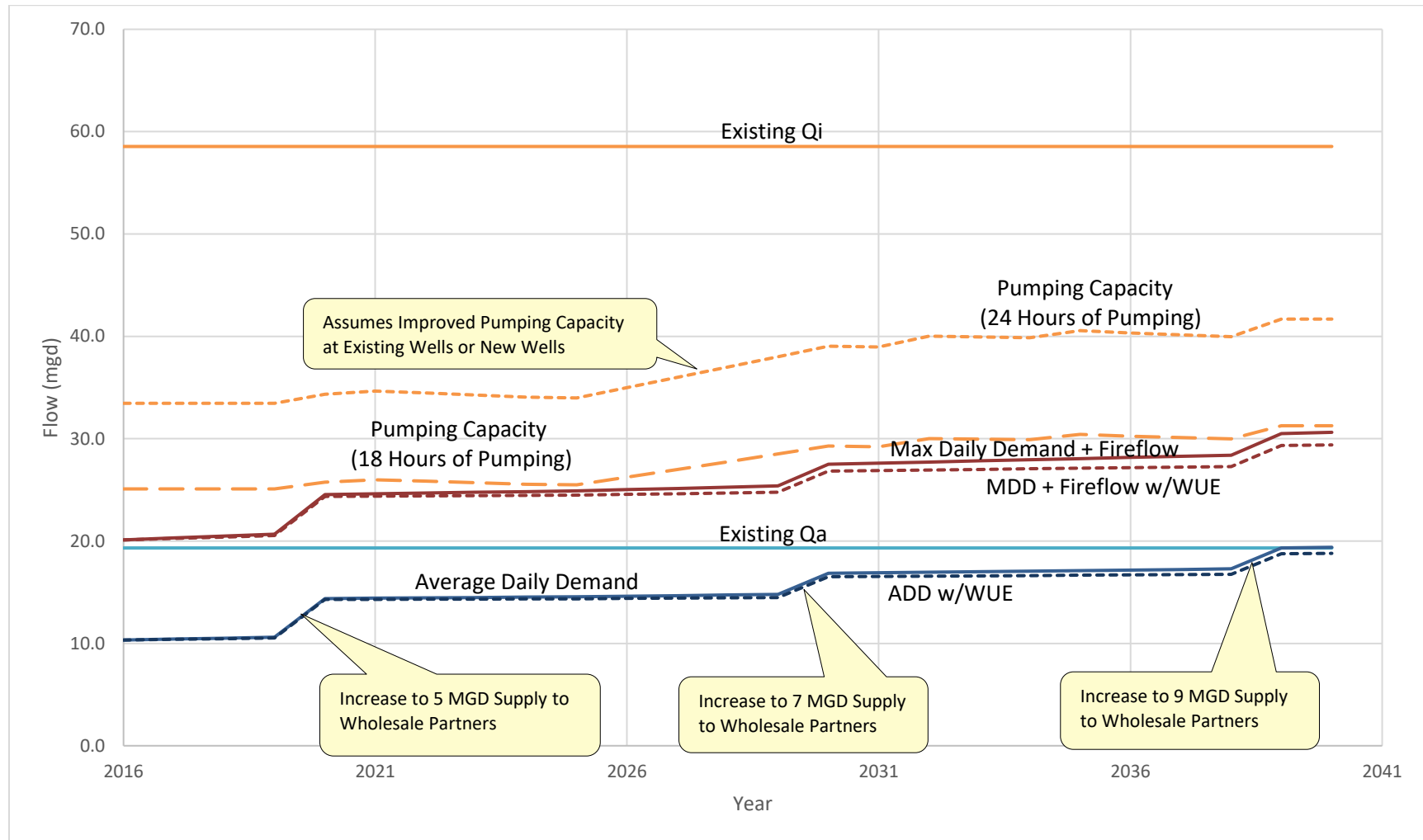


Figure 8.1 Source Supply Analysis

8.4 Water Supply Facilities Evaluation

This section evaluates whether each of the District's six pressure zones have sufficient supply capacity to provide existing and future water demands. As shown in **Table 8-2**, 27 of the District's 30 active and seasonal groundwater wells supply water to the 404 Zone. The remaining pressure zones are supplied by pump stations, PRV stations, and the remaining three wells.

For this evaluation, the retail demand was distributed between the six pressure zones based on the hydraulic model's analysis of the average demand distribution between the pressure zones. To be conservative, the demands used in this evaluation do not reflect water use efficiency efforts.

Supply facilities must provide a sufficient quantity of water at pressures that reliably meet the requirements of WAC 246-290-230. The required quantity depends on whether the pressure zone is an open zone (i.e. has storage) or a closed zone (i.e. does not have storage).

The supply facility(ies) for an open zone must be able to provide water at a rate that is equal to, or greater than, the maximum day demand (MDD) of the zone being served (WAC 246-293-230), while also replenishing depleted fire suppression storage within 72 hours (DOH Water System Design Manual Section 5.7.1).

The supply facility(ies) for a closed zone must be able to provide water at a rate that is equal to, or greater than, the fire suppression requirements (fire flow plus maximum day demand) for the zone when the largest capacity booster pump that is routinely used to meet normal daily, or peak water system demands (WAC 246-293-660(1)). Since a closed zone does not have the reliability that a storage facility provides, closed zones typically require a higher supply quantity than an open zone.

8.4.1 404 Zone Supply Evaluation

The 404 Zone is supplied by 27 of the District's 30 wells. Since almost all of the water in the upper zones is pumped from the 404 Zone via pump stations, the 404 Zone supply facilities must have the capacity to meet the supply requirements of these zones as well.

Table 8-4 summarizes the current and future supply requirements of the 404 Zone, based on the existing and projected water demands for the 404 Zone and five upper zones as well as anticipated wholesale demands.

Table 8-3
404 Zone Supply Evaluation (Open System)

Description	Existing System	Future Projections		
	2019	2024	2029	2039
Required Supply (gpm)				
Fire Supression Storage / 72 hr ¹	222	222	222	222
Maximum Day Retail Demand ²	12,336	12,652	13,021	13,786
Maximum Day Wholesale Demand	2,282	4,869	4,895	7,726
Total Required Supply	14,840	17,744	18,138	21,733
Available Supply (gpm)				
Wells (27 total)³	21,025	21,450⁴	24,180⁴	26,740⁴
Surplus or Deficient Supply (gpm)				
Surplus / (Defecit) of Supply	6,185	3,484	5,820	4,784

1. This is the flow (in gpm) needed to replenish the tanks over a 72-hour period following a 4 hour, 4,000 gpm fire event.
2. Entire retail water service area demands to reflect supply from the 404 Zone being pumped to higher zones.
3. The only wells not in the 404 Zone are J-2 and J-3, which are in the 455 Zone, and the L-3 well, which is in the 513 Zone.
4. See Table 8-2 and Chapter 9 for additional wells planned.

The results of this analysis indicate that the existing and planned configuration and capacities of the District’s wells are sufficient to meet the existing and future demands of the 404 Zone and the upper zones that supplies the 404 Zone.

8.4.1.1 404 Zone Reliability Evaluation

The number, location and configuration of the wells in the 404 Zone provides supply redundancy and increase system reliability in the 404 Zone and throughout the District. Most of the District’s 17 well sites have at least two wells. In addition, all wells except the U-1 Well have a receptacle for a mobile generator or an on-site generator for backup power supply. In order to allow for immediate notification of well facility operations issues, the District has also connected all of the well facilities to the District’s telemetry and control system. This knowledge increases the District’s ability to be responsive to issues and maintain full system functionality.

8.4.2 455 Zone Supply Evaluation

The 455 Zone is supplied by three pump stations and two of the District’s 30 wells. The 88th and Pine Pump Stations No. 1 and No. 2 pump water from the 88th & Pine tank (with an overflow elevation of 409 feet) to the 455 Zone. The Steilacoom Boulevard Pump Station pumps water from the Ghilarducci Tank (in the 404 Zone) to the 455 Zone. The J-2 and J-3 Wells are in the 455 Zone and are primarily used to supply the 455 Zone.

The 455 Zone is a closed zone with pumped storage, so the supply facilities for the 455 Zone must be able to provide the maximum required fire flow plus the maximum day demand for the the zone with the largest pump out of service. **Table 8-5** summarizes the current and future supply requirements of the 455 Zone, based on existing and projected water demands.

Table 8-4
455 Zone Supply Evaluation (Closed System)

Description	Existing System 2019	Future Projections		
		2024	2029	2039
Required Supply (gpm)				
455 Zone Maximum Day Demand (MDD)	1,207	1,238	1,274	1,355
455 Zone Max Fire Flow Requirement	3,500	3,500	3,500	3,500
Total Required Supply	4,707	4,738	4,774	4,855
Available Supply (gpm)				
88th & Pine Pump Station No. 1 ²	800	800	800	Abandon
88th & Pine Pump Station No. 2 ²	1,000	1,000	1,000	Abandon
Future 88th & Pine Pump No. 1	--	--	--	2,000
Future 88th & Pine Pump No. 2	--	--	--	2,000
Future 88th & Pine Pump No. 3	--	--	--	2,000
Steilacoom Boulevard Pump No.1	1,800	1,800	1,800	1,800
Steilacoom Boulevard Pump No.2	1,800	1,800	1,800	1,800
Steilacoom Boulevard Pump No.3	--	--	1,800	1,800
Steilacoom Boulevard Pump (20HP)	500	500	500	500
J-2 Well	0	0	0	0
J-3 Well	810	810	810	810
Total Supply Capacity	6,710	6,710	8,510	12,710
Total Supply Capacity w/Largest Pump out of Service	4,910	4,910	6,710	10,710
Surplus or Deficient Supply (gpm)				
Surplus Pump Station Capacity¹	203	172	1,936	5,855

1. Per WAC 246-293-660(1), the largest pump in the pressure zone is assumed to be out of service for the above evaluations. The largest pump in the 455 Zone in the 2016 and 2022 evaluations is 1,800 gpm at the Steilacoom Boulevard Pump Station and is 2,000 gpm at the 88th & Pine Pump Station No. 1 in the 2036 evaluation.
2. This evaluation assumes the planned improvements take place at both the Steilacoom Boulevard Pump Station and the 88th & Pine Pump Station. See additional information about these planned improvements in Chapter 9.

8.4.2.1 455 Zone Reliability Evaluation

The reliability of supply to the 455 Zone is achieved with a multiple pump station and well arrangement. The J-1 and J-3 Wells are both in good condition. The J-3 Well was built in 2008 and the mechanical equipment for the J-2 Well was replaced in 2008. The J-2 Well is not running due to aesthetic water quality issues at the time of this report. The J-1 and J-3 Wells are supplied from the same aquifer and can only be run simultaneously during emergency conditions. The 88th & Pine Pump Station 2 is less than 20 years old and is in good condition. The 88th & Pine Pump Station 1 is nearly 50 years old and should be considered for replacement in order to improve

equipment access and reliability when budgeting allows. There is also an on-site generator that can supply backup power to both wells and pump stations. The Steilacoom Boulevard Booster Pump Station was constructed in 2009 and is in good condition. In the event that pressures decrease in the 455 Zone due under emergency conditions, several check valves open and allow the 455 Zone to be supplied by water from the 404 Zone.

8.4.3 460 Zone Supply Evaluation

The 460 Zone is supplied by the Nyanza Hill Pump Station which pumps water from the Nyanza Hill Tank. The 460 Zone is a closed zone and is evaluated accordingly. A replacement facility for the Nyanza Pump Station is currently in design and is scheduled to be in service in 2020. The new facility is being designed to match the capacity of the existing pump station. The evaluation shown in **Table 8-5** indicates that the existing and future replacement pump station has sufficient capacity to meet the existing and future demands and fire flow requirements of the 460 Zone.

Table 8-5
460 Zone Supply Evaluation (Closed System)

Description	Existing System		Future Projections	
	2019	2024	2029	2039
Required Supply (gpm)				
460 Zone Maximum Day Demand (MDD)	67	68	70	78
460 Zone Max Fire Flow Requirement	1,000	1,000	1,000	1,000
Total Required Supply	1,067	1,068	1,070	1,078
Available Supply (gpm)				
Nyanza Hill Fire Flow Pump	1,150	1,150	1,150	1150
Nyanza Hill Pump No. 1	800	800	800	800
Nyanza Hill Pump No. 2	150	150	150	150
Total Supply Capacity	2,100	2,100	2,100	2,100
Total Supply Capacity w/Largest Pump out of Service	1,300	1,300	1,300	1,300
Surplus or Deficient Supply (gpm)				
Surplus Pump Station Capacity¹	233	232	230	222

1. Per WAC 246-293-660(1), the largest pump in the pressure zone is assumed to be out of service for the above evaluations. The largest pump at the Nyanza Hill Pump Station has an 800 gpm capacity.

8.4.3.1 460 Zone Supply Reliability Evaluation

Water supply reliability to the 460 Zone is achieved with a multiple pump arrangement. The Nyanza Hill Pump Station consists of three pumps. One pump is regularly used and two pumps are for seasonal or fire flow demands. To provide backup power supply this pump station has a receptacle for a portable generator. In the event of a power outage this zone would experience decreased pressure until a portable generator arrived. In the event of a power outage, uninterrupted service would still be available through the existing check valves in Hillcrest Drive and near the Nyanza Tank that allow the area to be served by water from the 404 Zone.

8.4.4 490 Zone Supply Evaluation

The 490 Zone is supplied by the Hemlock Hill Station and the Philip Tank Pump Station. The 490 Zone is also served by two tanks, the Farwest Tank and the Dunbar Reservoir, which is a pump reservoir, and is considered an open zone. Supply facilities for the 455 Zone must be able to provide the MDD for the the zone while simulateously replenishing the fire suppression storage over 72 hours and be able to provide ADD for the zone with the largest pump out of service. The evaluation shown in **Table 8-6** indicates that the pump stations have sufficient capacity to meet existing and future demands of the 490 Zone.

Table 8-6
490 Zone Supply Evaluation (Open System)

Description	Existing System 2019	Future Projections		
		2024	2029	2039
Required ADD Supply (gpm)				
490 Zone Average Day Demand (ADD)	220	226	232	246
Required MDD + FSS Supply (gpm)				
Fire Supression Storage / 72 hr ¹	146	146	146	146
490 Zone Maximum Day Demand (MDD)	456	467	481	509
Steilacoom Wholesale, 109 th Rd Intertie	137	140	142	148
Total Required Supply	578	606	617	660
Available Supply (gpm)				
Hemlock Hill Pump Station Pump No. 1	1,800	1,800	1,800	1,800
Hemlock Hill Pump Station Pump No.2	1,800	1,800	1,800	1,800
Hemlock Hill Pump Station Pump No.3	1,800	1,800	1,800	1,800
Philip Tank Pump Station Pump No.1	900	900	900	900
Philip Tank Pump Station Pump No.2	900	900	900	900
Total Supply Capacity	7,200	7,200	7,200	7,200
Total Supply Capacity w/Largest Pump out of Service	5,400	5,400	5,400	5,400
ADD Surplus or Deficient Supply (gpm)				
Surplus / (Defecit) of Supply	5,180	5,174	5,168	5,154
MDD + FSS Surplus or Deficient Supply (gpm)				
Surplus / (Defecit) of Supply	6,607	6,593	6,577	6,543

1. This is the flow (in gpm) needed to replenish the tanks for a 3 hour, 3,500 gpm fire spread over 72 hours.

8.4.4.1 490 Zone Supply Reliability Evaluation

Water supply reliability to the 490 Zone is achieved with two pump stations and multiple pumps. Both pump stations have on-site generators for backup power supply. The Philip Tank Pump Station has two pumps that pump into the 490 Zone. The station can also supply the 513 Zone if necessary. This pump station was built in 1998 and is in good condition. Backup power is supplied by an on-site generator with a manual transfer switch.

The Hemlock Hill Pump Station has three pumps that serve the 490 Zone. These pumps are located in the Dave Hall Hydropillar below the elevated tank. This pump station was built in 2006, is well maintained, and is in good condition. Backup power is supplied by an on-site generator with an automatic transfer switch.

8.4.5 513 and 470 Zones Supply Evaluation

The 513 Zone is supplied by two pump stations and a well. In addition, the Dave Hall Hydropillar and Hemlock Hill Elevated Tank serve this zone, so it is an open zone. The Hemlock Hill Pump Station and the Deepwood Pump Station pump water from the 404 Zone to the 513 Zone. The Philip Tank Pump Station can also pump water to the 513 Zone, but an isolation valve would need to be operated manually to supply water to the 513 Zone rather than the 490 Zone. Therefore, the Western State Pump Station is not considered in the 513 Zone supply evaluation.

The 470 Zone is supplied by a pressure reducing valve station which reduces water pressure from the 513 Zone. Since the 470 Zone is completely dependent on one connection to the 513 Zone, the 470 Zone demands will be considered in the 513 Zone demands for this supply evaluation.

Table 8-7
513/470 Zone Supply Evaluation (Open System)

Description	Existing System		Future Projections	
	2019	2024	2029	2039
Required ADD Supply (gpm)				
513 Zone Average Day Demand (ADD)	204	209	216	223
470 Zone Average Day Demand (ADD)	10	10	11	11
Total Required Supply	214	220	226	234
Required MDD + FSS Supply (gpm)				
Fire Supression Storage / 72 hr ¹	28	28	28	28
513 Zone Maximum Day Demand (MDD)	423	433	446	462
470 Zone Maximum Day Demand (MDD)	21	21	22	22
Total Required Supply	471	482	496	513
Available Supply (gpm)				
Hemlock Hill Pump Station (50 hp Pump)	1,000	1,000	1,000	1,000
Deepwood Pump Station	650	650	650	650
L-3 Well	400	400	400	400
Total Supply Capacity	2,050	2,050	2,050	2,050
Total Supply Capacity w/Largest Pump out of Service	1,050	1,050	1,050	1,050
ADD Surplus or Deficient Supply (gpm)				
Surplus / (Defecit) of Supply	8336	830	824	816
MDD + FSS Surplus or Deficient Supply (gpm)				
Surplus / (Defecit) of Supply	1,579	1,568	1,554	1,537

1. This is the flow (in gpm) needed to replenish the tanks for a 2 hour, 1,000 gpm fire spread over 72 hours.

8.4.5.1 513/470 Zone Supply Reliability Evaluation

Supply reliability to the 513 Zone is achieved with the one well and two pump stations. The Hemlock Hill and Deepwood Pump Stations each have one pump that pumps water to the 513 Zone. The Hemlock Hill Pump Station is in excellent condition. An on-site generator supplies backup power. The Deepwood Pump Station is in good condition and is well maintained. There is a receptacle for a portable generator to supply backup power.

The L-3 Well supplies water to the 513 Zone year-round, but use must be reduced when the aquifer level is drawn down. The well is out service at the time of this writing due to a motor failure, but is anticipated to be back at full capacity by 2022. For backup power supply there is an on-site generator.

8.5 Storage Facilities Evaluation

This section evaluates the District's thirteen active water storage facilities to determine if they have sufficient capacity to meet the existing and future storage requirements of their respective operating areas. The District has three operating areas based on the pressure zones served by storage facilities: the 404 Zone Operating Area serves the 404, 455, and 460 Zones; the 490 Zone Operating Area serves the 490 Zone; and the 513 Zone Operating Area serves the 470 Zone and the 513 Zone.

The Hemlock Hill Elevated Tank and Dave Hall Hydropillar provide storage for the 513 Zone Operating Area. The Farwest Drive Tank and Dunbar Tank provide storage for the 490 Zone Operating Area. The District's nine remaining tanks provide storage for the 404 Zone Operating Area. In addition, the 404 Zone Operating Area can provide storage for the other operating areas through several pump stations. The Dunbar Tank in the 490 Zone and the Forster Tank in the 404 Zone are pumped storage, meaning that their overflow elevation is below the hydraulic elevation of their respective zones.

The retail demand was distributed between the six pressure zones based on the hydraulic model's analysis of the average demand distribution between the pressure zones. To be conservative, the demands used in this evaluation do not reflect water use efficiency efforts.

8.5.1 Storage Components

Water storage is typically made up of the following components: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage. Each storage component serves a different purpose and will vary from system to system. A definition of each storage component and the criteria used to evaluate the capacity of the District's storage facilities is provided below.

Operational Storage: Operational storage is used to supply the water system under normal demand conditions. The operational storage in all the District'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.

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 equation for calculating the required volume of equalization storage is Equation 9-1 in the 2009 DOH Water System Design Manual, and is presented below:

$$ES = (PHD-Q_s) (150 \text{ min.}), \text{ but in no case less than zero.}$$

Where: ES = Equalizing storage component, in gallons.
PHD= Peak hourly demand, in gallons per minute (gpm).
Q_s = Sum of all installed and active source of supply capacities, except emergency sources, in gpm.

Standby Storage: The purpose of standby storage, or emergency storage, is to provide a measure of reliability should sources fail or when unusual conditions impose higher demands than anticipated. The volume recommended for systems served by one source may be different from systems served by multiple sources. For this system Equation 9-3 in the 2009 DOH Water System Design Manual was used to calculate standby storage for a multiple source system and is presented below:

$$SB_{TMS} = (2 \text{ days}) (ADD) - t_m (Q_s - Q_L)$$

Where: SB_{TMS} = Total standby storage component for a multiple source system; in gallons
ADD = Average day demand for the system, in gpd
Q_s = Sum of all active source of supply capacities, except emergency sources of supply, in gpm.
Q_L = The largest capacity source available to the system, in gpm.
t_m = Time that remaining sources are pumped on the day when the largest source is not available, in minutes.
(Unless restricted otherwise, this is generally assumed to be 1,440 minutes)

Fire Flow Storage: The purpose of fire flow storage is to have sufficient storage volume to meet the highest fire flow requirement, and is calculated as product of the fire flow rate and duration of the operational area maximum fire flow requirement. The required volume of fire flow storage is different in each operational area.

Dead Storage: Dead storage is water that cannot be used because it is stored at an elevation that is too low to pump or flow by gravity to provide the system with a pressure of 20 psi. This unusable storage occupies the lower portion of many ground-level standpipe type reservoirs.

8.5.2 Existing Storage Evaluation

The existing storage facilities evaluation is based on system demand and storage capacities in 2016. This analysis uses the historical 2016 water demands for the entire system. Wholesale demands are included in the equalizing storage calculation, but not in the standby storage calculation.

The volume of dead storage was calculated based on the highest elevation served in each operating area, which can be found in **Table 8-1**. Each storage tank in an operating area was required to supply the highest elevation with at least 20 psi pressure. Any water below the level supplying 20 psi pressure was considered dead storage.

The fire flow storage requirements were different for each zone and based on the largest fire flow requirement according to requirements outlined in **Table 4-11** in **Chapter 4**. Due to the large size of the operating area, the 404 Zone fire flow storage amount shown in **Table 8-8** is based on a 4,000 gpm, 4-hour duration fire flow at four different industrial locations. The 490 Zone fire flow storage was based on a 3,500 gpm, 3-hour duration fire flow requirement for one public institutional location, and the 513 Zone fire flow storage was based on a 1,000 gpm, 2-hr duration fire flow requirement for one single family residential location. **Table 8-8** summarizes the existing (2016) storage evaluation.

Table 8-8
Existing (2019) Storage Evaluation Summary

Description	404 Zone Operating Area	490 Zone Operating Area	513 Zone Operating Area	Total System
Usable Storage (MG)				
Maximum Storage Capacity	24.60	1.83	0.60	27.04
Dead (Non-usable) Storage	4.37	0.00	0.00	4.37
Total Usable Storage	20.23	1.83	0.60	22.66
Required Storage (MG)				
Operational Storage	6.22	0.61	0.31	7.14
Equalizing Storage	0.00	0.00	0.00	0.00
Standby Storage	6.24	0.25	0.24	6.73
Fire Suppression Storage	3.84	0.63	0.12	4.59
Total Required Storage	16.30	1.49	0.67	18.46
Surplus Storage (MG)	3.93	0.34	-0.07¹	4.21

1. The storage deficiency in the 513 Zone is mitigated by the significant storage surplus in the 404 Zone because the 513 Zone has multiple, reliable connections to the 404 Zone.

The results of this existing storage evaluation indicate that the system meets the storage requirements. The analysis indicates that no equalizing storage is required in the existing system because the supply to each zone is larger than the peak hour demands.

Although the 513 Zone has, and will continue to exhibit, a storage deficiency, this slight storage deficiency is mitigated by the surplus of storage in the 404 Zone. The 513 Zone is connected to the 404 Zone by two pump stations, namely the Hemlock Hill Pump Station and the Deepwood Pump Station. These two pump stations provide redundancy to the system. In addition to this redundancy, the Deepwood Pump Station has a receptacle to connect a portable engine generator set for backup power, which provides reliability to the system. These levels of redundancy and reliability in the system’s ability to supply the 513 Zone from the 404 Zone make the District confident that they can use the 404 Zone’s storage surplus to offset the 513 Zone’s storage deficiency during normal operations and emergency situations.

8.5.3 Six-Year Planning Period Storage Evaluation

The six-year planning period storage facilities evaluation is based on forecasted 2024 system demand and storage capacities. It was performed to determine the adequacy of the District's storage facilities to meet future storage requirements. This analysis assumes that the new two million-gallon Nyanza Tank is active, and the existing 0.5 million-gallon tank has been decommissioned.

Table 8-10 summarizes the storage evaluation for 2024, the six-year planning period.

Table 8-9
Six-year Planning Period (2024) Storage Evaluation Summary

Description	404 Zone Operating Area	490 Zone Operating Area	513 Zone Operating Area	Total System
Usable Storage (MG)				
Maximum Storage Capacity	25.79	1.83	0.60	28.22
Dead (Non-usable) Storage	4.37	0.00	0.00	4.37
Total Usable Storage	21.42	1.83	0.60	23.85
Required Storage (MG)				
Operational Storage	6.48	0.61	0.31	7.39
Equalizing Storage	0.34	0.00	0.00	0.34
Standby Storage	6.40	0.26	0.25	6.90
Fire Suppression Storage	3.84	0.63	0.12	4.59
Total Required Storage	17.06	1.49	0.68	19.23
Surplus Storage	4.36	0.34	-0.08²	4.62

1. Includes new Nyanza Tank (1.6 MG) is online and existing Nyanza Tank (0.45 MG) is abandoned.

2. The storage deficiency in the 513 Zone is mitigated by the significant storage surplus in the 404 Zone because the 513 Zone has multiple, reliable connections to the 404 Zone.

Table 8-9 shows that both equalizing and standby storage requirements increase from 2016 to 2024. The increase in equalizing storage is caused by the projected increase in both wholesale and retail demand, while the increase in standby storage is due solely to the projected increase in retail demand. This evaluation indicates that the system will have sufficient storage through the six-year planning period.

8.5.4 10-Year Planning Period Storage Evaluation

The 10-year planning period storage facilities evaluation is based on forecasted 2029 system demand and storage capacities. It was performed to determine the adequacy of the District's existing storage facilities to meet future storage requirements. **Table 8-10** summarizes the storage evaluation for 2029, the 10-year planning period.

Table 8-10
10-year Planning Period (2029) Storage Evaluation Summary

Description	404 Zone Operating Area	490 Zone Operating Area	513 Zone Operating Area	Total System
Usable Storage (MG)				
Maximum Storage Capacity	25.79	1.83	0.60	28.22
Dead (Non-usable) Storage	4.37	0.00	0.00	4.37
Total Usable Storage	21.42	1.83	0.60	23.85
Required Storage (MG)				
Operational Storage	6.48	0.61	0.31	7.39
Equalizing Storage	0.02	0.00	0.00	0.02
Standby Storage	6.59	0.26	0.26	7.10
Fire Suppression Storage	3.84	0.63	0.12	4.59
Total Required Storage	16.92	1.50	0.69	19.09
Surplus Storage	4.50	0.33	-0.09²	4.74

1. Includes new Nyanza Tank (1.6 MG) is online and existing Nyanza Tank (0.45 MG) is abandoned. The results of this evaluation, summarized in **Table 8-10**, show that the required standby storage increases from 2024 to 2029, which is caused by the projected increase in retail demand. Equalizing storage requirements decrease during this time period because of the planned increase in pumping capacity during this time period, as shown in **Table 8.2** and **Figure 8.1**.
2. The storage deficiency in the 513 Zone is mitigated by the significant storage surplus in the 404 Zone because the 513 Zone has multiple, reliable connections to the 404 Zone.

8.5.5 20-Year Planning Period Storage Evaluation

The 20-year planning period storage facilities evaluation is based on forecasted 2039 system demand and storage capacities. It was performed to determine the adequacy of the District’s existing storage facilities to meet future storage requirements. This analysis assumes that the new two million-gallon 88th and Pine Tank is active, and the existing 0.5 million-gallon tank has been decommissioned.

Table 8-11 summarizes the storage evaluation for 2039, the 20-year planning period.

Table 8-11
20-year Planning Period (2039) Storage Evaluation Summary

Description	404 Zone Operating Area	490 Zone Operating Area	513 Zone Operating Area	Total System
Usable Storage (MG)				
Maximum Storage Capacity ¹	27.3	1.83	0.60	29.73
Dead (Non-usable) Storage ¹	4.37	0.00	0.00	4.37
Total Usable Storage	22.93	1.83	0.60	25.36
Required Storage (MG)				
Operational Storage	6.79	0.61	0.31	7.71
Equalizing Storage	0.23	0.00	0.00	0.23
Standby Storage	6.98	0.28	0.26	7.52
Fire Flow Storage	3.84	0.63	0.12	4.59
Total Required Storage	17.85	1.52	0.69	20.06
Surplus Storage	5.08	0.32	-0.09²	5.30

1. Includes new Nyanza Tank (1.6 MG) and new 88th and Pine Reservoir (2.0 MG). The old Nyanze Tank (0.45 MG) and old 88th & Pine Reservoir (0.5 MG) are abandoned.

2. The storage deficiency in the 513 Zone is mitigated by the significant storage surplus in the 404 Zone because the 513 Zone has multiple, reliable connections to the 404 Zone.

As in the previous analyses, the results of this evaluation show that the required standby storage continues to increase from 2024 to 2039, which is once again caused by the projected increase in retail demand. Equalizing storage requirements increases because of the increase in retail and wholesale demand.

8.5.6 Facility Deficiencies

The District plans on replacing two of their thirteen tanks during the twenty-year planning period. The new Nyanza Hill tank, which has a target completion date of 2020, will supply sufficient storage for the next 20 years. The 88th and Pine Reservoir, which is planned to be replaced between 2024 and 2039, will provide additional storage capacity to the 455 Zone and the 112th Street Intertie. The District inspects the interior and exterior coating of all tanks on a regular basis and has developed a program to recoat at least one tank approximately every year. The planned recoating of tanks within the next 20 years is identified in **Chapter 9**.

8.6 Transmission and Distribution Water Main

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

8.6.1 Hydraulic Model Description

The evaluation used the District's existing computerized hydraulic model of the District's water system and the InfoWater version 6.0, a GIS based modeling software developed by Innovyze. As part of this project, the model was updated to accurately reflect the District's existing water system. 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 as follows.

8.6.1.1 Allocation of Demands

Historical meter data from 2016 was used to accurately distribute demands throughout the system. The annual demand for each meter was used to calculate the average day demand for each meter. Using the GPS coordinates for each meter, these demands were mapped to the closest existing node in the system. The system-wide existing (2016) demand in the model matches the 2016 average day demand shown in **Chapter 4**.

A global demand factor was used to adjust the individual node demands to reflect the projected 20-year demands (2039), as shown in **Chapter 4**. The peaking factors from **Chapter 4** were used to adjust the average day demand levels to maximum day demand and peak hour demand. The demand allocation was adjusted slightly based on the latest data available from the Puget Sound Regional Council (2010 FAZ data), which reflects a slightly higher growth factor in certain areas including the Lakewood City Center.

8.6.1.2 Modeling Calibration

For a computer model to provide accurate results under test conditions it is essential that the model be calibrated with field conditions to reflect actual system operation. Initial calibration was accomplished by adjusting water main roughness coefficients based on a compilation of pipe material and year data. Additional calibration of the model was achieved using field flow and pressure data, which was collected from flow tests that the District performed throughout the system for this purpose. A summary of calibration efforts is included in **Appendix N**.

8.6.1.3 Facilities Data

To evaluate the existing conditions in the The District's water system all pressure reducing stations were modeled as being in service and at their normal settings. All tanks were operating, and initial elevation settings were set at the level recommend by DOH for each scenario. All wells that were reported as being active in the summer of 2018 were active during the modeling scenarios and running at their typical flow. A detailed summary of active wells can be found in **Table 8-12**. The following pump stations were operating: the 88th & Pine Pump Station, the Steilacoom Blvd. Pump Station, the Nyanza Hill Pump Station, the Hemlock Hill Pump Station and the Forster Tank Pump Station.

As discussed in the Water Supply Facilities Evaluation section of this Chapter, most of the system's water source enters in the 404 Zone and is then pumped into the higher-pressure zones. Therefore, the wells that supply the 404 Zone also supply the rest of the system. In the model, as in the field, pump stations pump water from the 404 Zone into the higher-pressure zones. A detailed list of supply facilities for each zone is included below.

Table 8-12
Existing System Supply Source Capacity

Well Name	Description	Zone	Status	Flow Rate (gpm)
A-3	Tillicum	404	Active	930
D-2	Interlake/Yard	404	Active	980
D-3	Interlake/Yard	404	Active	700
E-2	Washington Blvd	404	Active	925
E-3	Washington Blvd	404	Active	670
F-2	104th & Bridgeport	404	Active	1,000
G-1	Scotts	404	Active	1,375
G-2	Scotts	404	Active	800
H-1	Ponders	404	Active: Summer	1,200
H-2	Ponders	404	Active: Winter	900
I-1	Hipkins	404	Out of Service	-
I-3	Hipkins	404	Out of Service	-
J-1	88th & Pine	404	Active	850
J-2	88th & Pine	455	Out of Service	-
J-3	88th & Pine	455	Active	810
K-1	Lake Avenue	404	Out of Service	-
K-2	Lake Avenue	404	Active	1,050
L-1	Hemlock Hill	404	Out of Service	-
L-2	Hemlock Hill	404	Active	750
L-3	Hemlock Hill	513	Out of Service	-
N-1	View Road	404	Active	810
N-2	View Road	404	Out of Service	-
O-2	Oakbrook	404	Active	740
O-3	Oakbrook	404	Active	970
P-1	Steilacoom Boulevard	404	Out of Service	-
P-2	Steilacoom Boulevard	404	Active	1,590
Q-1	Deepwood	404	Active	800
R-1	112th Street	404	Active	1,400
S-1	Angle Lane	404	Active	550
S-2	Angle Lane	404	Active	700
U-1	Country Place	404	Active	820

8.6.2 Analysis Criteria

The transmission and distribution system was analyzed and compared against the requirements contained in WAC 246-290-230 and the 2009 DOH Water System Design Manual. In particular, a low-pressure analysis and a fire flow analysis were performed using the existing (2016) demand conditions, and the projected 20-year (2039) demand conditions.

For the low-pressure analysis, the system was tested to ensure that it can provide the system's peak hour retail demand plus wholesale while maintaining a minimum pressure of 30 psi. During this analysis, tanks were set at the bottom of equalizing storage (operating and equalizing storage have been depleted) (per DOH Section 8.1.5). Under PHD conditions, DOH recommends a maximum velocity of 8 fps in all distribution pipes, and no more than 10 fps in transmission mains.

For the fire flow analysis, the system was tested to ensure that it can provide the fire flow plus maximum day demand while maintaining a minimum pressure of 20 psi. During this analysis, tanks were set at the bottom of fire suppression storage (operating, equalizing, and fire suppression storage have been depleted) (per DOH Section 8.1.5). To calculate the initial level of the tanks in the zone where the fire flow analysis was being conducted, the fire flow requirement for the zone was distributed to the tanks in such a way that the initial level at each tank was the same elevation. DOH recommends a maximum velocity in all pipes of no more than 10 fps under fire flow conditions.

8.6.3 Low-Pressure Analysis Results

The low pressure analysis assumes peak hour demands and water levels in tanks are set at the bottom of equalizing storage. To satisfy the minimum pressure requirements, the residual pressure at all water service locations should be at least 30 psi during these conditions.

The existing (2016) low pressure scenario results indicated that the system can maintain pressures above 30 psi, and most of system can maintain pressures above 40 psi. Additionally, the 20-year planning period (2039) low pressure scenario results indicate that if all the proposed improvements included in **Chapter 9** are implemented and the demand of the system is consistent with projected values the system will be able to provide sufficient pressure to all service locations. Therefore, there are no critical improvements to improve pressures in the system.

8.6.4 Fire Flow Analysis Results

As stated above, the fire flow analysis determined the capability of the individual nodes in the system to deliver adequate fire flow under maximum day demand conditions. During the analysis, water levels in the tanks are set at the bottom of fire flow storage and all nodes must maintain a residual pressure at water services of 20 psi or greater. Water velocities in pipelines were not considered when identifying available fire flows. However, when sizing water main improvements to resolve deficiencies, water main velocities were considered to adequately size the proposed improvements. The available fire flows in the existing system are presented as **Figure 8-2**.

The available fire flow at each node was compared to the planning level fire flow requirement determined by its land use designation. The planning level fire flow requirements for each land use designation are described in **Chapter 4**. Areas where available fire flows are less than the planning level requirements are presented in **Figure 8-3**.

These results indicate that there are a number of areas that cannot provide the required planning level fire flow under the simulated conditions. These deficiencies are largely caused by undersized pipe. Capital improvement projects to address these deficiencies are sized to maintain velocities below 10 fps and are listed in **Chapter 9**.

Upon completion of the existing system fire flow analysis, the proposed improvements were included in the model and fire flow analyses were performed to confirm that the improvements eliminate the existing system deficiencies and meet the future demands of the system. These analyses were modeled under the 20-year planning period (2039) maximum day demand conditions without planned reductions from conservation to ensure that the improvements are sufficiently sized to meet anticipated future demands. The available fire flow after the improvements presented in **Chapter 9** have been implemented are presented as **Figure 8-4**. These results indicate that if all proposed improvements are implemented and the demand of the system is consistent with projected values the system will be able to provide sufficient fire flow to all service locations.

The results of the fire flow analyses with and without planned improvements are summarized in **Table 8-13**. These results highlight that fire flows are significantly increased with the proposed water main improvements. **Table 8-13** shows that some areas are anticipated to have a minor decrease in available fire flows in the future. The increase in wholesale and retail demands from 2019 to 2039 caused some areas to see a small reduction in available fire flows, but did not create any fire flow deficiencies.

Table 8-13
Fire Flow Analysis Summary

Description	Approximate Location	Pressure Zone	Available Fire Flow (gpm) at 20 psi		
			Existing System	Future System with Improvements	Target Fire Flow (gpm)
Alpine Estates Lakewood	6622 146th St SW	PZ-404	3,500	3,500	1,750
Clover Park High School	10801 Gravelly Lake Dr SW	PZ-404	3,300	5,300	3,500
Clover Park Technical College	4500 Steilacoom Blvd SW	PZ-404	5,590	4,900	3,500

Table 8-13 (Continued)
Fire Flow Analysis Summary

Description	Approximate Location	Pressure Zone	Available Fire Flow (gpm) at 20 psi		
			Existing System	Future System with Improvements	Target Fire Flow (gpm)
Four Heroes Elementary	9101 Lakewood Dr SW	PZ-404	6,710	6,770	3,500
Heartland Bank	42 Thunderbird Pkwy SW	PZ-404	2,560	6,100	2,500
Lakewood Town Center	10427 Gravelly Lake Dr SW	PZ-404	3,800	6,000	3,500
Northgate Village Apartments	3611 112th SW	PZ-404	2,830	10,500	4,000
Single Family Residential	8903 Newgrove Ave SW	PZ-404	550	2,980	1,000
Tillicum Baptist Church	Maple St SW & Washington Ave SW	PZ-404	650	2,500	2,000
Pacific Walk Apartments	8333 32nd Ave S	PZ-455	1,260	2,320	1,500
Single Family Residential	2515 91st St S	PZ-455	1,430	6,600	1,500
Single Family Residential	10514 Irene Ave SW	PZ-455	1,730	3,070	1,000
Western Inn	9920 S Tacoma Way	PZ-455	2,320	7,110	3,500
Single Family Residential	12328 Edgemere Dr SW	PZ-460	1,360	2,560	1,000
Single Family Residential	11028 Dean Ct SW	PZ-470	870	1,550	1,000
Central Washington University - Pierce County	9401 Farwest Dr SW	PZ-490	3,700	4,700	3,500
Single Family Residential	11201 108th St Ct SW	PZ-490	2,140	2,890	1,000
Single Family Residential	10613 Sherwood Dr SW	PZ-513	980	1,990	1,000
Single Family Residential	10123 Wauna St SW	PZ-513	390	1,570	1,000

8.7 System Capacity

A system capacity analysis was performed to determine the maximum number of equivalent residential units (ERUs) that the system can serve. The analysis references the source capacity and analysis and the storage analysis discussed earlier in this chapter, the water rights analysis shown in **Chapter 6**, and the demand projections discussed in **Chapter 4**.

8.7.1 Analysis Criteria

The physical capacity of the District's water system is limited by either its water source capacity, or its storage capacity. To evaluate these systems, the analysis calculated the number of ERUs that each component can support. The analysis assumed that all planned improvements identified in **Chapter 9** were completed on schedule.

The water source capacity analysis looked at the system's existing and planned well capacity as well as its water rights. It compared the system's projected MDD to its well capacity and instantaneous water rights, and the system's annual demand to its annual water rights.

The storage capacity analysis used the storage analysis to determine the total number of ERUs that the system can facilitate before running out of storage. Operational Storage and Fire Suppression Storage are not dependent on the number of ERUs in a system, and the system is not required to have Equalizing Storage until its PHD is greater than its supply capacity. Therefore, the amount of required Standby Storage has the greatest affect on the storage capacity.

This analysis uses values from **Chapter 4** to determine system capacity: 255 gpd/ERU, a MDD:ADD factor of 2.07, and a PHD:MDD factor of 1.62.

8.7.2 Analysis Results

A summary of the capacity analysis for the existing system is shown in **Table 8-14**.

Table 8-14
System Capacity Analysis

Demands per ERU Basis				
Year	2019	2024	2029	2039
Average Day Demand per ERU (gpd/ERU)			255	
Maximum Day Demand per ERU (gpd/ERU)	490		431	395
Peak Hour Demand per ERU (gpd/ERU)	754		629	565
Supply Capacity				
Year	2019	2024	2029	2039
18 Hour Well Pumping Capacity (gpd)	25,093,800	25,552,800	28,501,200	31,266,000
Maximum Day Demand per ERU (gpd/ERU)	490		431	395
Maximum Supply Capacity (ERUs)	51,254	59,294	66,136	79,104
Storage Capacity				
Year	2019	2024	2029	2039
Maximum Usable Storage Capacity (gal)	22,664,583	23,851,171	23,851,171	25,358,052
Available Standby Storage Capacity (gal)	10,937,598	11,523,984	11,847,004	12,822,106
Standby Storage Requirement per ERU (gpd/ERU)			200	
Maximum Storage Capacity (ERUs)	54,688	57,620	59,235	64,111
Maximum System Capacity				
Year	2019	2024	2029	2039
Based on Limiting Facility (ERUs)	51,254	57,620	59,235	64,111
Available System Capacity				
Year	2019	2024	2029	2039
Maximum System Capacity (ERUs)	51,254	57,620	59,235	64,111
Projected Average Day Demand (gpd)	10,598,400	14,520,960	14,058,720	18,590,400
Projected ERUs (ERUs)	21,647	33,695	32,623	47,035
Available System Capacity (ERUs)	29,607	23,925	26,612	17,076

The analysis shows that the District's existing well capacity is the limiting factor, which will reach capacity around 2030. The planned well improvements will extend this capacity to after 2040. See the well capacity analysis, earlier in this Chapter, for additional information about the District's well capacity and reference **Chapter 9** for a more detailed description of planned well projects. The annual water rights are anticipated to reach capacity shortly after 2040. See **Chapter 6** for additional information about the District's water rights.

8.8 Summary

The District's water system is large and complex, with a relatively large number of wells, storage facilities, pump stations, pressure zones, and many miles of water main that must be properly operated and maintained to ensure that customers are provided with a reliable supply of high-quality drinking water. 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 the existing and future water customers receive the high level of water service that has been provided for many years past. Recommended improvements are presented in **Chapter 9**.

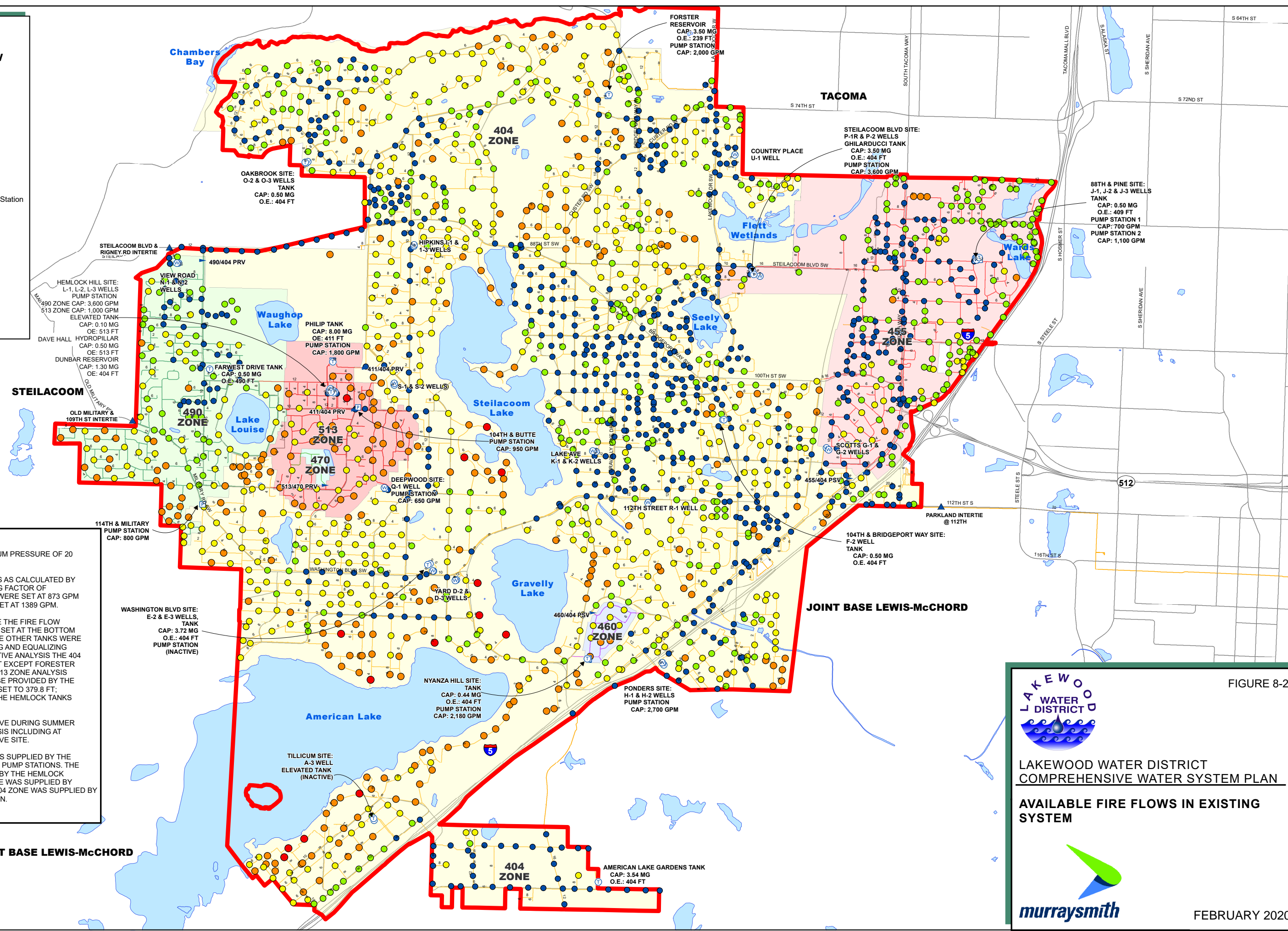
LEGEND

Available Fire Flow

- <500 gpm
- 50 - 1500 gpm
- 1500 - 2500 gpm
- 2500 - 3500 gpm
- >3500 gpm
- Water Tank
- Groundwater Well
- Pump Station
- ▲ Intertie
- ▶ Pressure Regulating Valve Station
- Water Bodies
- Retail Water Service Area

Pressure Zones

- 404
- 455
- 460
- 470
- 490
- 513



FIRE FLOW MODEL SETTINGS:

SIMULATION CONSTRAINTS: MINIMUM PRESSURE OF 20 PSI IN ALL PIPES.


DEMANDS: 2016 MAX DAY DEMANDS AS CALCULATED BY 2016 ADD MULTIPLIED BY A PEAKING FACTOR OF 2.07. THE STEILACOOM INTERTIES WERE SET AT 873 GPM AND THE 112TH ST INTERTIE WAS SET AT 1389 GPM.

TANKS: TANKS IN THE ZONE WHERE THE FIRE FLOW ANALYSIS WAS CONDUCTED WERE SET AT THE BOTTOM OF FIRE FLOW STORAGE WHILE THE OTHER TANKS WERE SET AT THE BOTTOM OF OPERATING AND EQUALIZING STORAGE. DURING THEIR RESPECTIVE ANALYSIS THE 404 ZONE TANKS WERE SET TO 378.5 FT EXCEPT FORESTER WHICH WAS SET TO 219.5 FT; THE 513 ZONE ANALYSIS ASSUMED ALL FIRE FLOW WOULD BE PROVIDED BY THE DUNBAR RESERVOIR, WHICH WAS SET TO 379.8 FT; DURING THE 513 ZONE ANALYSIS THE HEMLOCK TANKS WERE SET TO 498.3 FT.

WELLS: ALL WELLS TYPICALLY ACTIVE DURING SUMMER WERE ACTIVE DURING THIS ANALYSIS INCLUDING AT LEAST ONE WELL FROM EACH ACTIVE SITE.

PUMP STATIONS: THE 455 ZONE WAS SUPPLIED BY THE 88TH & PINE AND THE STEILACOOM PUMP STATIONS. THE 470 & 513 ZONES WERE SUPPLIED BY THE HEMLOCK HILLS PUMP STATION. THE 460 ZONE WAS SUPPLIED BY THE NYANZA PUMP STATION. THE 404 ZONE WAS SUPPLIED BY THE FORESTER TANK PUMP STATION.


FIGURE 8-2



LAKWOOD WATER DISTRICT

LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN

AVAILABLE FIRE FLOWS IN EXISTING SYSTEM



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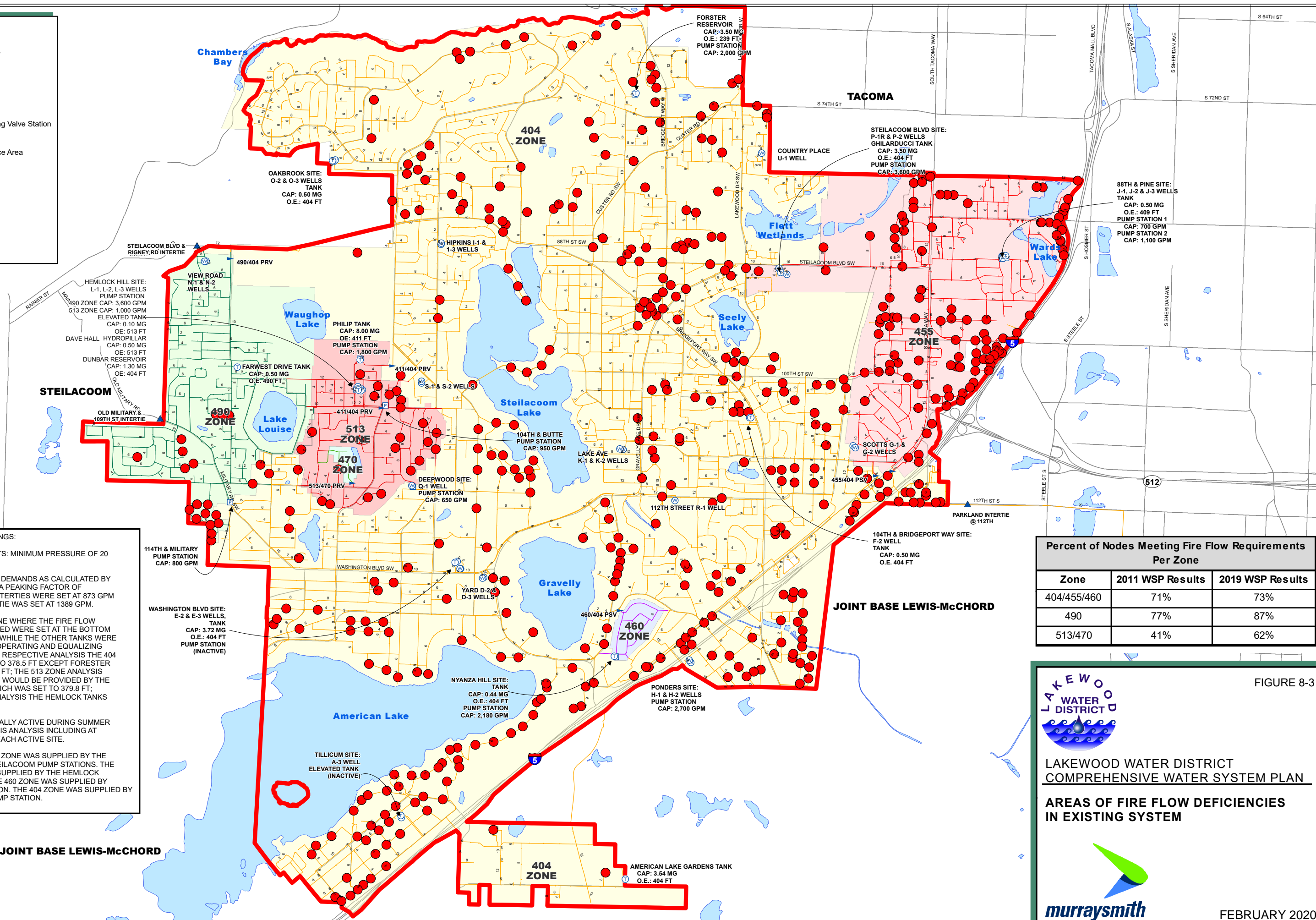
Document Path: K:\TACAC_Projects\171997 - Lakewood WSP\GIS\Final WSP_Figures\17-1997-WA-FIGURE-8-2.mxd

LEGEND

- Available Fire Flow
- ⊕ Water Tank
- ⊕ Groundwater Well
- ⊕ Pump Station
- ▲ Intertie
- ▶ Pressure Regulating Valve Station
- Water Bodies
- Retail Water Service Area

Pressure Zones

- 404
- 455
- 460
- 470
- 490
- 513



FIRE FLOW MODEL SETTINGS:

SIMULATION CONSTRAINTS: MINIMUM PRESSURE OF 20 PSI IN ALL PIPES.

DEMANDS: 2016 MAX DAY DEMANDS AS CALCULATED BY 2016 ADD MULTIPLIED BY A PEAKING FACTOR OF 2.07. THE STEILACOOM INTERTIES WERE SET AT 873 GPM AND THE 112TH ST INTERTIE WAS SET AT 1389 GPM.

TANKS: TANKS IN THE ZONE WHERE THE FIRE FLOW ANALYSIS WAS CONDUCTED WERE SET AT THE BOTTOM OF FIRE FLOW STORAGE WHILE THE OTHER TANKS WERE SET AT THE BOTTOM OF OPERATING AND EQUALIZING STORAGE. DURING THEIR RESPECTIVE ANALYSIS THE 404 ZONE TANKS WERE SET TO 378.5 FT EXCEPT FORESTER WHICH WAS SET TO 219.5 FT; THE 513 ZONE ANALYSIS ASSUMED ALL FIRE FLOW WOULD BE PROVIDED BY THE DUNBAR RESERVOIR, WHICH WAS SET TO 379.8 FT; DURING THE 513 ZONE ANALYSIS THE HEMLOCK TANKS WERE SET TO 498.3 FT.

WELLS: ALL WELLS TYPICALLY ACTIVE DURING SUMMER WERE ACTIVE DURING THIS ANALYSIS INCLUDING AT LEAST ONE WELL FROM EACH ACTIVE SITE.

PUMP STATIONS: THE 455 ZONE WAS SUPPLIED BY THE 88TH & PINE AND THE STEILACOOM PUMP STATIONS. THE 470 & 513 ZONES WERE SUPPLIED BY THE HEMLOCK HILLS PUMP STATION. THE 460 ZONE WAS SUPPLIED BY THE NYANZA PUMP STATION. THE 404 ZONE WAS SUPPLIED BY THE FORESTER TANK PUMP STATION.

Percent of Nodes Meeting Fire Flow Requirements Per Zone		
Zone	2011 WSP Results	2019 WSP Results
404/455/460	71%	73%
490	77%	87%
513/470	41%	62%

FIGURE 8-3

LAKWOOD WATER DISTRICT

**LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN**

**AREAS OF FIRE FLOW DEFICIENCIES
IN EXISTING SYSTEM**

FEBRUARY 2020

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LEGEND

Available Fire Flow

- <500 gpm
- 501 - 1500 gpm
- 1501 - 2500 gpm
- 2501 - 3500 gpm
- >3500 gpm
- ⊙ Water Tank
- ⊕ Groundwater Well
- ⊞ Pump Station
- ▲ Intertie
- ▶ Pressure Regulating Valve Station
- Water Bodies
- Retail Water Service Area

Pressure Zones

- 404
- 455
- 460
- 470
- 490
- 513

FIRE FLOW MODEL SETTINGS:

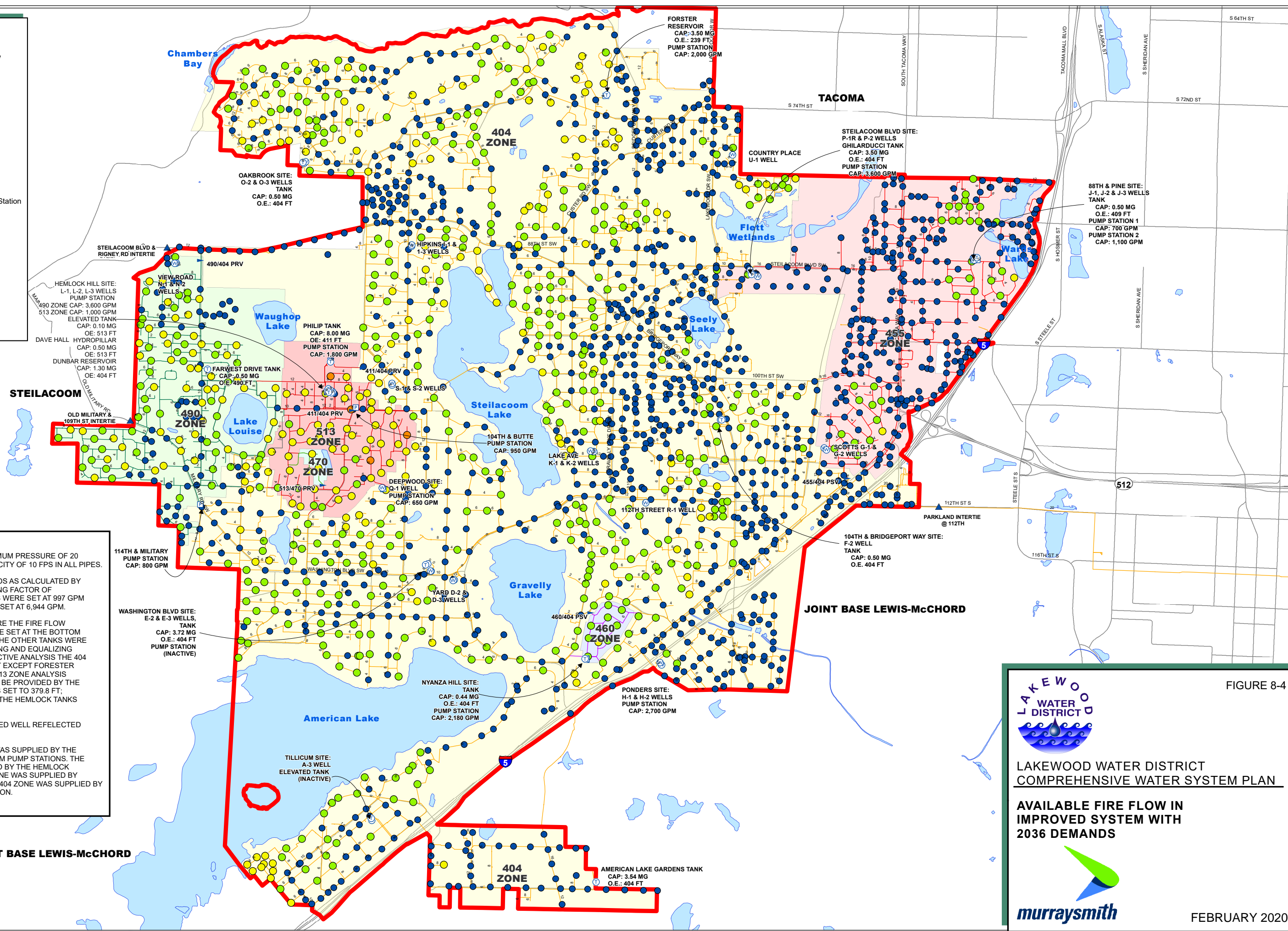
SIMULATION CONSTRAINTS: MINIMUM PRESSURE OF 20 PSI IN ALL PIPES, MAXIMUM VELOCITY OF 10 FPS IN ALL PIPES.

DEMANDS: 2036 MAX DAY DEMANDS AS CALCULATED BY 2036 ADD MULTIPLIED BY A PEAKING FACTOR OF 2.07. THE STEILACOOM INTERTIES WERE SET AT 997 GPM AND THE 112TH ST INTERTIE WAS SET AT 6,944 GPM.


TANKS: TANKS IN THE ZONE WHERE THE FIRE FLOW ANALYSIS WAS CONDUCTED WERE SET AT THE BOTTOM OF FIRE FLOW STORAGE WHILE THE OTHER TANKS WERE SET AT THE BOTTOM OF OPERATING AND EQUALIZING STORAGE. DURING THEIR RESPECTIVE ANALYSIS THE 404 ZONE TANKS WERE SET TO 379 FT EXCEPT FORESTER WHICH WAS SET TO 222 FT; THE 513 ZONE ANALYSIS ASSUMED ALL FIRE FLOW WOULD BE PROVIDED BY THE DUNBAR RESERVOIR, WHICH WAS SET TO 379.8 FT; DURING THE 513 ZONE ANALYSIS THE HEMLOCK TANKS WERE SET TO 498.3 FT.

WELLS: EACH ACTIVE AND PLANNED WELL REFLECTED THE IMPROVED CAPACITY.

PUMP STATIONS: THE 455 ZONE WAS SUPPLIED BY THE 88TH & PINE AND THE STEILACOOM PUMP STATIONS. THE 470 & 513 ZONES WERE SUPPLIED BY THE HEMLOCK HILLS PUMP STATION. THE 460 ZONE WAS SUPPLIED BY THE NYANZA PUMP STATION. THE 404 ZONE WAS SUPPLIED BY THE FORESTER TANK PUMP STATION.




JOINT BASE LEWIS-McCHORD



LAKEWOOD WATER DISTRICT

**LAKEWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN**

**AVAILABLE FIRE FLOW IN
IMPROVED SYSTEM WITH
2036 DEMANDS**



murraysmith

FIGURE 8-4

Chapter 9

Water System Improvements

9.1 Introduction

This chapter presents proposed water system improvements recommended for construction within the District’s 20-year planning period. The water system improvements recommended in this chapter consider system deficiencies described in **Chapter 8** as well as the District’s knowledge of what facilities need to be maintained, renovated, or replaced. These improvements help ensure that the District’s customers will continue to receive high-quality water service.

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 District project planning efforts and its annual budgeting process.

9.2 Completed Water System Improvements Since Last Plan

Since the last Comprehensive Water System Plan was prepared in 2011, the District has spent considerable time and expense improving their water system for both their retail and wholesale customers. The District has replaced approximately 91,000 linear feet of water main and about 10,000 linear feet of transmission main within its the Retail Service Area. It has installed a new PSV/PRV station and has done work on several wells. A more detailed summary of the water system improvements completed since 2011 is presented in **Table 9-1**.

Table 9-1
Water System Improvements Completed Since 2011

2013 CWSP CIP No.	Project Description
WM1	Constructed approximately 91,000 linear feet of water main as part of the District’s Annual Water Main Replacement Program since 2011.
WM7	Constructed approximately 200 linear feet of 12-inch transmission main in Gravelly Lake Drive, and abandoned approximately 5,100 linear of aging, undersized main.
WM9	Constructed approximately 1,200 linear feet of 12-inch transmission main in Pacific Hwy.
WM10	Constructed approximately 4,300 linear feet of 12- and 16-inch transmission main in Pacific Hwy and S Tacoma Way, and abandoned approximately 2,300 linear of aging, undersized main.
WM11	Constructed approximately 3,800 linear feet of 16-inch transmission main in Steilacoom Blvd.
WM13a	Constructed approximately 500 linear feet of 12-inch transmission main at the I-5 crossing at Seattle Street.

Table 9-1 (Continued)
Water System Improvements Completed Since 2011

2013 CWSP CIP No.	Project Description
PC1	District continues to conduct periodic verifications and readjustments of the valve settings at existing pressure reducing, sustaining, and relief stations to ensure their optimum functionality.
PC2	Installed a new 455/404 Zone pressure sustaining station at Pacific Highway between 108th Street and 112th Street to supply water from the 455 Zone to the 404 Zone.
P2	Installed an additional pump at the existing Steilacoom Pump Station equipped with variable frequency drives. The District still plans on installing another additional pump at this site.
P4	Installed a stationary engine generator set with an automatic transfer switch at the site to ensure an uninterrupted supply of water to the 460 Zone in an event of power outage.
T2	District is in the design process of replacing the new Nyanza Hill Tank. The new tank will be operational in 2020.
T4	District periodically inspects the condition of interior and exterior coatings of the District's storage facilities and recoats, as needed.
W1	The A-3 Well starter was replaced in 2015
W2	Both E-2 and E-3 pumps and motors were replaced in 2015 and 2016, respectively.
W5	District is currently drilling G-3 well.
W11	Both D-2 and D-3 VFDs have been replaced, in 2014 and 2016 respectively. D-3 pump and motor also replaced in 2016.
M2	District continues to perform its ongoing water use efficiency measures, including public education programs, as outlined in its WUE Plan included. The District also continues its existing leak detection program.
M3	District updated its Comprehensive Water System Plan in 2019.
M4	District updated its Cross-Connection Control Plan in 2016.
M5	District updated its Wellhead Protection Plan in 2015.
M6	District purchased its Philip Tank (formerly Western State Tank) property in 2012.

9.3 Proposed 2019 Water System Improvements

The proposed Capital Improvement Program (CIP) is described below with a brief description of the water system improvements, planning-level project cost estimates, and an implementation schedule. The proposed water system improvements are illustrated in **Figures 9-1** and **9-2** and are also summarized in **Table 9-3** as the District's planning-level CIP. All proposed water system improvements are assigned a CIP number for reference.

The proposed water system improvements presented in this chapter are grouped into categories representing improvement type. Each improvement type includes a range of project numbers assigned to individual projects and are listed below.

- Water Main Improvements (WM1 – WM3)

- Storage Improvements (T1-T6)
- Pump Station Improvements (P1 – P2)
- Well Source Improvements (W1-W4)
- Miscellaneous Improvements (M1-M5)

Some of the proposed water system improvements were identified from the results of distribution and transmission systems' hydraulic analyses presented in **Chapter 8**. Considerations were also given to non-hydraulic issues related to repair, rehabilitation, operation, and maintenance while identifying the proposed water system improvements. The improvement types listed above are discussed in detail the following sections.

9.3.1 Proposed 2019 Water System Improvements

The water main improvements make up the largest part of the Capital Improvement Program in terms of dollar amounts. This is partially because of the large number of water main leaks caused by Pierce County Sewer Department's ULID projects between 1978 through 1985.

As described in **Chapter 2** of this Plan, shortly after the sewer construction was finished, the District leakage jumped to approximately 40 percent. To combat these leaks, the District initiated a leak detection and system repair program. The District observed substantial corrosion in the galvanized water services and fittings that were installed during the sewer construction, which has led to premature failure and leaks. The District has also observed leaks caused by settling that resulted from the sewer construction. In response to these observations, in 1995 the Board of Commissioners adopted a resolution that all water mains installed prior to 1985 had a 50-year life.

The water main improvement projects are broken into three categories: Fire Flow Improvements, Material & Age Improvements, and Transmission Main Improvements. These categories will help the District to identify the primary reason and function of the identified improvements. **Figure 9-1** presents these water main improvements by type. Water main improvements are primarily accomplished as part of the District's annual renewal and replacement (R&R) program. A more detailed description of these sub-categories follows.

CIP WM1 Fire Flow Improvements:

Deficiency: Undersized water distribution mains exist throughout the water system. These mains are not sized for current fire flow requirements and create fire flow deficiencies. Many of these mains are aging and are constructed of materials that are known to have instances of leaks or breaks.

Improvement: Replace deficient water mains with new water mains in accordance with the District's construction standards. In addition to resolving the fire flow deficiencies, many of these projects will also address water distribution mains that have had reported occurrences of leaks or breaks, are constructed of non-standard (e.g. asbestos cement) materials or are aging and deteriorating.

CIP WM2 Material and Age Improvements:

Deficiency: Existing water distribution mains in many areas of the water system are constructed of non-standard asbestos-cement material. These pipes are deteriorating due to age as well as the Pierce County sewer projects described previously. Therefore, these pipes have an increased likelihood of leaks or breaks. These mains are more than 50 years old and most have reached their design life.

Improvement: Replace existing asbestos-cement water distribution mains with new water mains in accordance with the District's construction standards. The improvements included in the CIP WM2 are water mains that do not contribute directly to fire flow deficiencies and thus are not included in WM1. Many of these projects will also address water distribution mains that have had reported occurrences of leaks or breaks and will help in improving pressures and fire flow capacity. The minimum size criteria established by the District will be followed during the replacement of these projects.

CIP WM3 Transmission Main Improvements:

Deficiency: Transmission mains are critical to the distribution system as a whole. Undersized transmission mains create pressure and fire flow deficiencies for large areas of the system. Transmission main improvements will also facilitate the supply of water to wholesale customers served by the 112th Street Intertie.

Improvement: Replace undersized transmission mains with new water mains in accordance with the District's construction standards. These projects will also address water mains that cause fire flow deficiencies, are constructed of non-standard (e.g. asbestos cement) materials, are aging and deteriorating, or have had reported occurrences of leaks or breaks.

The transmission main projects included in the CIP are as follows:

WM3-A 12-inch Diameter Transmission Main in Old Military Road: Replace approximately 6,600 linear feet of existing 8-inch and 10-inch diameter asbestos-cement transmission main along Old Military Road from Washington Boulevard to the Town of Steilacoom Intertie, with new 12-inch diameter ductile iron transmission mains. This transmission main improvement will also help in resolving fire flow deficiencies southwest of Old Military Road in the 490 Zone.

WM3-B 12-inch Diameter Transmission Main in Onyx Drive, Phillips Road, and 75th Street: Replace approximately 11,900 linear feet of existing 8-inch and 12-inch diameter asbestos-cement transmission main with new 12-inch diameter ductile iron transmission main along Onyx Drive from the Oakbrook Tank to Phillips Road, along Phillips Road from Onyx Drive to 75th Street, and along 75th Street from Phillips Road to Bridgeport Way. Install a new 12-inch diameter water main to create a loop by connecting the proposed transmission main to the existing water main on the east side of Bridgeport Way. This loop will complete the District's transmission system from the Oakbrook Tank to Bridgeport Way.

WM3-C 12-inch Diameter Transmission Main in Hipkins Road: Replace approximately 9,100 linear feet of existing 10-inch and 12-inch diameter asbestos-cement transmission main with new 12-inch diameter ductile iron transmission main along Hipkins Road from 104th Street to Garnett Lane. Also, replace the existing 12-inch diameter asbestos-cement water main in Garnett Lane from Hipkins Road to Onyx Drive. This proposed transmission main will connect with the proposed 12-inch diameter transmission main in Onyx Drive, part of CIP WM3-B, to strengthen the District's transmission system from the Oakbrook Tank up to 104th Street.

WM3-D 12-inch Diameter Transmission Main in Custer Road and John Dower Road: Replace approximately 5,300 linear feet of existing 4-inch to 12-inch Diameter asbestos-cement transmission main with new 12-inch diameter ductile iron transmission main along Custer Road from John Dower Road to Ardmore Drive and along John Dower Road from Custer Road to 75th Street. This proposed transmission main improvement will strengthen the District's transmission system from the Forster Reservoir to Ardmore Drive.

WM3-E 12-inch Diameter Transmission Main in 112th Street, Highland Avenue, 111th Street and Bridgeport Way: Replace approximately 5,400 linear feet of existing 8-inch to 12-inch diameter asbestos-cement transmission main with new 12-inch diameter ductile iron transmission main along 112th Street from 60th Avenue to Highland Street, along Highland Street from 112th Street to 111th Street, along 111th Street from Highland Street to Bridgeport Way and along Bridgeport Way from 111th Street to the 104th Street up to the Bridgeport Way Tank. This proposed transmission main improvement will improve the District's transmission system between the Bridgeport Way Tank and R-1 Well.

WM3-F 12-inch Diameter Transmission Main in 112th Street, Interlaken Drive, and Washington Boulevard: Replace approximately 11,100 linear feet of existing 6-inch to 12-inch diameter transmission main with new 12-inch diameter ductile iron transmission main along 112th Street from the Q-1 Well site to Interlaken Drive, along Interlaken Drive from 112th Street to Washington Boulevard, along Washington Boulevard from Interlaken Drive to Old Military Road on the west side of Interlaken Drive, and also along Washington Boulevard from Interlaken Drive connecting to the existing 12-inch diameter PVC transmission main in Gravelly Lake Drive on the east side of Interlaken Drive.

WM3-G 12-inch Diameter Transmission Main in Pacific Highway and Bridgeport Way: Replace approximately 6,000 linear feet of existing 6-inch and 8-inch diameter aging asbestos-cement transmission main along Pacific Highway from Forest Glen Lane to Bridgeport Way with new 12-inch diameter ductile iron transmission main. Install new 12-inch diameter water mains to create loop by connecting the proposed transmission main to the existing water mains along Pacific Highway and Bridgeport Way. Additionally, abandon approximately 4,900 linear feet of existing parallel asbestos-cement water main along Pacific Highway constructed of 2-inch, 4-inch, and 8-inch asbestos-cement pipe.

WM3-H 20-inch and 24-inch Diameter Transmission in 112th Street and Pacific Hwy South near Wholesale Intertie: Construct approximately 7,200 linear feet of 20-inch and 24-inch diameter ductile iron transmission mains along 112th Street and Pacific Highway, including underneath I-5,

in the vicinity of the 112th Street Intertie. These transmission mains will consist of replacing the undersized existing water distribution mains to supply water to the wholesale customers.

WM3-I 12-inch Diameter Water Main in South Tacoma Way: Replace approximately 2,500 linear feet of existing 6-inch to 10-inch diameter transmission mains along South Tacoma Way from 96th Street to 88th Street with new 12-inch diameter ductile iron transmission mains. Additionally, abandon approximately 1,200 linear feet of existing asbestos-cement parallel water main along South Tacoma Way.

WM3-J 12-inch and 16-inch Diameter Water Main in Front Street, 96th Street, and 32nd Avenue South: Construct approximately 7,400 linear feet of 12-inch and 16-inch ductile iron transmission mains along the eastern edge of the 455 Zone. This transmission main runs in Front Street, 96th Street, and 32nd Avenue South to provide a secondary transmission main through the 455 Zone along the eastern edge of the District. This transmission main is fundamental in bringing the pumped supply from the 88th Street & Pine Pump Station south. This project is also important in improving the District's ability to serve the 112th St. Intertie.

WM3-K 16-inch and 20-inch Diameter Water Main in 39th Avenue SW, 40th Avenue SW, 100th Street SW, Earley Avenue SW, St. Francis Street SW, Irene Avenue SW, and Rainer Avenue SW: Construct approximately 7,800 linear feet of 16-inch and 20-inch ductile iron transmission mains along the western edge of the 455 Zone. This transmission main is fundamental in bringing the pumped supply from the Steilacoom Pump Station south. This project is also important in improving the District's ability to serve the 112th St. Intertie.

WM3-L 12-inch Diameter Water Main in 88th Street S and Steilacoom Boulevard SW: Construct approximately 3,000 linear feet of 12-inch ductile iron transmission mains along 88th Street S and Steilacoom Boulevard SW. This transmission main runs between the two primary supply sources for the 455 Zone, the Steilacoom Blvd Pump Station and the 88th & Pine Pump Station.

9.3.1.2 Water Main Improvement Prioritization

All recommended water main improvements are prioritized to guide the District in its scheduling and budgeting process. Prioritization was assigned to each individual water main improvement using the criteria listed in **Table 9-2**. Points were assigned to the following prioritization criterion: water system function, water main material, water main age, percentage of flow through pipe.

"Water system function" categorized pipes by the driving reason they need to be replaced. "Water Main Material" and "Water Main Age" are the material and age of the existing pipes, respectively. "Percentage of flow through pipe" prioritizes pipes that will carry the largest flows, and therefore are more critical to the system, in the future. This prioritization was developed by reviewing the amount of flow in each pipe segment during the future (2039) system analysis under peak hour(?) conditions. Pipes that were in the 99th percentile, or carried more water than 99% of the pipes in the system, receive the highest priority. Pipes that were in the 50th percentile and below received no points for this category.

**Table 9-2
Water Main Improvement Ranking Criteria for Prioritization**

Prioritization Criteria	Points
Water System Function	
Wholesale Transmission / Fire Flow	5
Transmission	4
Looping	3
Facility	2
Abandon	1
Material/Age	0
Water Main Material	
Asbestos Cement (AC) / Cast Iron (CI)	5
Polyvinyl Chloride Pressure Pipe (C900) / High Density Polyethylene Pipe (HDPE)	2
Ductile Iron (DI)	0
Existing Water Main Age	
70 to 80 Years	5
60 to 70 Years	4
50 to 60 Years	3
40 to 50 Years	2
0 to 40 Years	0
Future	5
Percentage of Flow through Pipe	
99 th percentile or greater flow	30
95 th to 99 th percentile flow	25
90 th to 95 th percentile flow	20
85 th to 90 th percentile flow	15
75 th to 85 th percentile flow	10
Less than 75 th percentile flow	0

For each project, the individual scores for each criterion were summed to provide a total prioritization score for the individual project. Individual projects' scores were then used to determine the project implementation priority as high, medium or low. Projects whose characteristics gave them a total rank between 30 – 45 are considered high, between 20 – 29 are considered medium, and between 1 - 19 are considered low priority for planning purposes.

The selection of specific projects will be accomplished annually during the District's budget development and will be guided by the prioritization shown in **Figure 9-2**. This will provide the District with the flexibility to coordinate these projects with other projects that may occur within the same area.

9.3.2 Storage Improvements

The following improvements focus on updating the District's storage facilities. Improvements include upgrade to existing tanks' controls, valving, and telemetry as well as replacing entire tanks due to age and seismic deficiencies.

CIP T1: Tank Maintenance and Recoating Program

Deficiency: Regular recoating and tank maintenance, including cleaning and spot recoating as needed, is required to maintain the tanks' integrity, and thereby, extending a tank's lifespan. The interior and exterior of the District's storage facilities will need to be fully recoated after every 30 years, and top coated every 15 years. Maintenance and spot repairs will be needed periodically as well. Recently, the District completed an evaluation of the coating system conditions at all of its tanks, which inform the proposed scheduling of individual tank maintenance and recoating projects.

Improvement: Periodically inspect the condition of interior and exterior coatings of the District's storage facilities. Perform maintenance, cleaning, spot recoating, or full recoating, as needed. Also, thoroughly inspect interior and exterior coatings of the storage facilities approximately one year prior to the commencement of the coating. This is needed to determine the properties of the existing coating and the extent of recoating required.

CIP T2: Seismic Retrofits

Deficiency: The District has identified several seismic deficiencies based on the increase in expected seismic loads from the USGS (United States Geological Survey), and the adoption of the current building codes.

Improvement: Increase seismic resistance in several tanks throughout the District. Specifically, extend the foundation and replace the anchor bolts on the Farwest Drive Tank, Washington Boulevard Tank, and the American Lake Gardens Tank; add additional bracing to the 104th and Bridgeport Tank; replace the foundation and anchor bolts on the Ghilarducci Tank; prestress the exterior of and add epoxy injections to the Forster Tank.

CIP T3: Nyanza Hill Tank Replacement

Deficiency: The Nyanza Hill Tank located along 127th Street acts as a supply source for the 404 Zone as well as the pumped 460 Zone. The tank was constructed in 1952 and is deteriorating due to its old age. The tank also does not likely meet the current seismic requirements and is in need

of replacement. Also, after repairs were made as a result from the Nisqually quake in 1996, there was damage to the base and support bolts.

Improvement: Replace the existing Nyanza Hill Tank located along 127th Street with a new tank. The final location, size and storage requirements will be determined during the preliminary design phase of the project. The new tank must be constructed in accordance with the District's construction standards and must meet the seismic requirements at the time of construction. This project is under design at the time of this writing.

CIP T4: 88th Street and Pine Tank Replacement

Deficiency: The 0.5 MG capacity 88th Street and Pine Tank is an aging facility that was constructed in 1953. The tank also does not likely meet the current seismic requirements and is in need of replacement.

Improvement: Remove the existing steel tank and replace with a new tank. The final location, size, and storage requirements will be determined during the preliminary design phase of the project. The new tank must be constructed in accordance with the District's construction standards and must meet the seismic requirements at the time of construction.

CIP T5: Farwest Drive Tank Replacement

Deficiency: The 0.5 MG capacity Farwest Drive Tank is an aging facility that was constructed in 1969. The tank also does not meet the current seismic requirements and will most likely need to be replaced in the next twenty years.

Improvement: Remove the existing steel tank and replace with a new tank. The final location, size, and storage requirements will be determined during the preliminary design phase of the project. The new tank must be constructed in accordance with the District's construction standards and must meet the seismic requirements at the time of construction.

CIP T6 (Recommendation): Scotts Site Reservoir & Pump Station Construction

Deficiency: As the District increases its supply to its wholesale customers through the 112th Street Intertie, the Scotts site will become a critical source of supply to these customers. Adding storage at this location will increase operational flexibility and reliability of supply in this area. Due to the ground elevation at the site a ground level storage tank and pump station is anticipated to serve the 404 and 455 Zone at the proposed facility.

Improvement: Recommend constructing a reservoir and pump station at the Scotts site to improve reliability. The final location, size, and storage requirements will be determined during the preliminary design phase of the project. The new tank and pump station must be constructed in accordance with the District's construction standards and must meet the reliability and seismic requirements at the time of construction.

9.3.3 Pumped Station Improvements

The following improvements are focused on maintaining zone pressures by managing pressure reducing stations and pressure sustaining stations.

CIP P1: Pump Stations Maintenance

Improvement: The District should continue to evaluate each pump station and apply improvements as needed. Specifically, add a new pump to the Steilacoom Boulevard Pump Station; relocate power, starter and telemetry to above grade and construct lighting and ventilation improvements at the 104th & Butter Drive pump station.

CIP P2: 88th Street and Pine Pump Station Improvement

Deficiency: The existing 88th Street and Pine Pump Station 1 is aging and should be replaced. The existing 88th Street and Pine Pump Station 2 needs general rehabilitation. Additional pumping capacity will be needed at this site in order to provide adequate pressure for the forecasted wholesale demand.

Improvement: Construct a new pump station with a reliable capacity of 6,000 gpm and abandon the existing pump stations at the site. Construct general facility improvements including motor starters, ventilation, and equipment access improvements. Also, construct fencing improvements at the pump station site.

9.3.4 Well Source Improvements

The following improvements are focused on rehabilitating and upgrading existing well facilities as well as constructing new wells to fully utilize the District's water rights and improve supply capacity and reliability. Improvements include upgrading well mechanical equipment to improve capacity and reliability as well as well facilities to improve aesthetics, usefulness, safety, and serviceability.

CIP W1: Well Rehabilitation & Maintenance Program

Deficiency: Regular maintenance is required to keep the District's wells running efficiently, and several of the wells in the District do not supply their maximum capacity due to various deficiencies including, but not limited to, motor failure, water quality issues, and aging. Pacific Ground Water Group recently completed an analysis concerning the existing state of wells which should be a part of consideration in the implementation part of the R&M program.

Improvement: The District should continue to regularly inspect and evaluate each of the wells and implement recommended improvements as required. Where needed, the District will rehab existing wells, update well housing, replace aging pipes, and/or install new pump motors, starters, treatment systems, and valve actuators systems. These improvements will help the District capitalize on their existing well capacities and instantaneous water rights.

CIP W2: New Well Sources

Deficiency: The District does not have adequate well pumping capacity to capitalize on all of their instantaneous water rights, and additional well capacity will be required to meet the projected maximum day retail and wholesale demands with the recommended 18-hour pumping capacity.

Improvement: This program includes replacing failed wells and drilling new wells in order to maximize the District's existing Water Rights. In general, the District would like to go its total pumping capacity from 22,235 gpm in 2019 to 27,950 gpm in 2039. A preliminary layout of where and how many new wells are planned is included in **Table 8-2**. **Table 8-2** also shows some existing wells reducing their total capacity during the twenty-year planning window, which is based on a well capacity study performed by Pacific Groundwater Group. The number, location, and capacity of each future well shown in **Table 8-2** is preliminary and should be used for planning purposes only. Additional studies will be required to determine the best location for each new well. The capacity of each new well will not be known until the well has been drilled and tested. The total required capacity from new wells depends on how the District's existing well continue to perform and the District's ability to rehab existing wells. This program includes, but is not limited to, studies and reports by consultants, decommissioning existing wells, drilling new well, constructing well facilities, and installing well equipment. Any required treatment for new wells is covered under CIP W3: Treatment.

CIP W3: Treatment

Deficiency: Due to past experience, the District knows that new wells may have water quality deficiencies due to high manganese and sulfate levels. In addition, the District knows that some of its existing wells and potentially some future wells will need to be treated for PFAs. However, which wells will need treatment is still undetermined because the legislation has not yet been finalized and exact water chemistry of new wells is unknown until they are drilled and tested.

Improvement: This program will include installing water treatment equipment for iron, manganese and sulfate at new well sites and PFAs at both new and existing well sites, where required. Additional studies will be required to determine which wells require treatment and the best method of treatment and will be completed during the design phase of these projects. This program includes the necessary studies and reports as well as the construction of treatment facilities at existing and new well sites.

9.3.5 Miscellaneous Improvements

The following miscellaneous improvements are program-level planned efforts required to comply with various water regulations.

CIP M1: Operation & Control Adjustments

Improvement: Conduct periodic verifications and readjustments of the operation and control settings at water facilities to ensure needed functionality is accomplished. This includes adjusting

pressure settings at pressure reducing, sustaining and relief stations, and adjusting pump station and well pump controls.

CIP M2: Water Wise Usage Program and Leak Detection

Deficiency: Approximately 60 percent of the District’s water mains are aging asbestos-cement pipes. These aging water mains are approaching the end of their design life and have had reported occurrences of leaks or breaks. The potential for leaks is likely increasing with the aging of numerous repair clamps and fittings installed and undermining of the water mains that occurred during the large Lakewood area sewer construction project between 1978 and 1985. To prevent an increase in unaccounted water use, the current leak detection program should be continued on a regular basis. The District should also continue to encourage efficient water use through its WUE Program.

Improvement: The District will perform its ongoing water use efficiency measures, including public education programs, as outlined in the WUE Plan included in **Appendix G**. The District will also continue its existing leak detection program.

CIP M3: Comprehensive Water System Plan Update

Deficiency: WAC 246-290-100 requires the District to update its Comprehensive Water System Plan every ten years and submit it to the Department of Health for review and approval. Drinking water regulations are continuously changing and new water system planning requirements must be addressed in the District's future Comprehensive Water System Plan.

Improvement: Update the Comprehensive Water System Plan every ten years to meet the requirements that are in effect at the time of the update.

CIP M4: Cross Connection Control Plan Update

Deficiency: The District is required to prepare, enforce, and periodically review and update its Cross Connection Control Plan.

Improvement: Update the Cross Connection Control Plan every ten years along with the District's Comprehensive Water System Plan update.

CIP M5: Wellhead Protection Plan Update

Deficiency: The District has implemented a Wellhead Protection Plan and should continue to periodically review and update it.

Improvement: Update the Wellhead Protection Plan every ten years along with the District's Comprehensive Water System Plan Update.

9.3.6 Water System Improvement Costs Estimation

An estimated project cost has been developed for each recommended improvement presented in this section. Then each project was phased within the District’s 20-year planning period and beyond. The estimated project costs included in this plan are planning level budget estimates presented in 2019 dollars. Project costs include construction costs and an allowance for administrative, engineering and other project related costs.

These project costs estimates were derived from the bid tabs of similar projects completed in or around the District within the past 10 years. The American Association of Cost Engineers (AACE) classifies cost estimates of this nature to have an expected accuracy range of -30 percent to +50 percent. As the projects are better defined the accuracy level of the estimates can be narrowed.

The water main costs were estimated based on several bid tabs from projects in the District’s annual water main repair and replacement program. Additional costs were added to the cost per linear foot to account for administrative, engineering, and other project related costs. This estimated cost per linear foot also includes an allowance for the City of Lakewood’s recently implemented pavement fee, which is assessed by the City based on the condition of the existing roadway at the time of construction.

A portion of these water main improvements will likely be installed as part of development projects. As a result, cost sharing of these projects may remove some of the financial burden on the District and its customers. To be conservative, cost estimates presented in this chapter include the planning level costs of the projects and do not assume cost sharing.

Table 9-3 shows the estimated project cost per linear foot used for the water main project construction cost estimates.

Table 9-3
Water Main Unit Costs for Construction

Diameter (in)	Unit Cost (\$/ft)
Construction Cost	
8-inch	\$240
10-inch	\$260
12-inch	\$275
16-inch	\$495
18-inch	\$530
20-inch	\$560
24-inch	\$615
Abandonment Cost	
All Diameters	\$12

9.3.7 Capital Improvement Program

Based on the discussion presented in the Water System Improvements and Water System Improvement Cost Estimation sections, a planning-level phased Capital Improvement Program was prepared. The recommended Capital Improvement Program consists of the proposed water system improvements grouped by their respective improvement categories, planning-level project cost estimates, and an implementation schedule and budget. **Table 9-4** summarizes the recommended Capital Improvement Program. As shown in **Table 9-4**, due to the large cost of replacing all of the deficient water mains in the District's system, a 50-year timeline was assumed to accomplish the Water Main Improvements. Project costs shown in **Table 9-4** include an allowance for engineering and administrative costs in addition to construction costs. All other improvements are identified to be completed within the 20-year planning period of this plan.

9.3.8 Condition Management Programs

The District actively assesses and plans for the maintenance, repair, and replacement of all its major facilities through three condition management programs: one for watermains, one for storage facilities, and one for source and supply facilities. These programs account for the maintenance, repair, and eventual replacement of these major facilities by building the cost into their annual budget.

These programs set a minimum annual funding level, allowing the District to collect a minimum amount annually, and then pulls from those funds when needed. A more detailed description of how the District tracks each of these facility types is included below.

- **Watermains:** The District has an annual repair and replacement program that replaces its watermains before the end of their expected life. This program has been in place and funded since 2014 and is funded and tracked separately in the District's billing system. The District tracks all mains through GIS by tagging the install date and comparing that with the expected life (assumed to be 100 years).
- **Storage Facilities:** The District has established a Storage Maintenance and Replacement program based on a conditions and seismic assessment of its existing facilities. This assessment established a repair and replacement schedule for all storage facilities that includes costs to replace the facilities. The District's Tank Assessment Study is included in **Appendix C**.
- **Sources and Supply Facilities:** The District established a Source and Supply Facilities Replacement program based on a wells condition assessment. This assessment reviewed the history of the wells and identified volume issues, sanding issues, increased Iron and Manganese build-up, and other well condition factors. This information was then used to establish the estimated remaining useful life of the District's wells and project when the District would need to replace them or add additional wells to meet demand requirements. Based on this information the District has assigned a replacement schedule and cost to

establish a funding level necessary to respond to the needs of its wells as it moves forward. The District's Well Assessment Study is included in **Appendix C**.

The District has the systems in place to track its most significant assets, monitor them, and schedule replacements as needed. Most importantly the District has established a funding source for those maintenance and replacement costs.

Table 9-4
Recommended Capital Improvement Program Summary

CIP ID	Description	Linear Feet	Estimated Project Cost (\$)	20-Year Schedule of Improvements Planned Year of Project Estimated Cost (2019 \$\$)											
				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2039
	Water Main Rehabilitation & Replacement Improvements	761,400	200,949,000	\$ 2,255,000	\$ 4,176,850	\$ 4,176,850	\$ 4,176,850	\$ 3,700,000	\$ 3,700,000	\$ 3,700,000	\$ 3,700,000	\$ 3,700,000	\$ 3,700,000	\$ 3,700,000	\$ 37,000,000
WM1	Fire Flow Improvements (1)	426500	\$ 119,548,000	2,255,000	4,176,850	4,176,850	4,176,850	3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	37,000,000
WM2	Material & Age (50+ years) Improvements (2)	334900	\$ 81,401,000												
	Transmission Main Improvements (3)	89,400	27,881,000	\$ -	\$ 806,800	\$ 1,613,600	\$ 1,613,600	\$ 1,636,500	\$ 1,636,500	\$ 2,619,400	\$ 1,122,600	\$ 825,000	\$ 1,497,000	699,000	13,811,000
WM3-A	12" in Old Military Rd	6600	\$ 1,807,000												1,807,000
WM3-B	12" in Onyx Dr, Phillips Rd, & 75th St	11900	\$ 3,274,000												3,274,000
WM3-C	12" in Hipkins Rd	9100	\$ 2,511,000												2,511,000
WM3-D	12" in Custer Rd & John Dower Rd	5300	\$ 1,457,000												1,457,000
WM3-E	12" in 112th St, Highland Ave, 111th St, & Bridgeport Way	5400	\$ 1,497,000										1,497,000		
WM3-F	12" in 112th St, Interlaken Dr, & Washington Blvd	11100	\$ 3,052,000												3,052,000
WM3-G	12" in Pacific Hwy & Bridgeport Way	6000	\$ 1,654,000												1,654,000
		4900	\$ 56,000												56,000
WM3-H	20" & 24" in 112th St & Pacific Hwy S near Wholesale Intertie (4)	7200	\$ 3,742,000							2,619,400	1,122,600				
WM3-I	12" in S Tacoma Way (4)	2500	\$ 685,000											685,000	
		1200	\$ 14,000											14,000	
WM3-J	12" & 16" in Front Street, 96th Street, and 32nd Avenue South (4)	7400	\$ 3,273,000					1,636,500	1,636,500						
WM3-K	16" & 20" in 39th Ave SW, 40th Ave SW, 100 St SW, Earley Ave SW, St Francis St SW, Irene Ave SW, & Rainer Ave SW (4)	7800	\$ 4,034,000		806,800	1,613,600	1,613,600								
WM3-L	12" in 88th Street S and Steilacoom Blvd SW (4)	3000	\$ 825,000									825,000			
	Storage Improvements		26,971,000	\$ 2,326,800	\$ 3,908,400	\$ 2,500,000	\$ 2,000,000	\$ -	\$ 3,190,000	\$ 1,360,000	\$ 2,040,000	\$ 1,123,600	\$ 1,011,200	1,517,900	5,993,400
T1	Tank Maintenance & Coating Program		\$ 2,446,000	15,400	460,400				973,600			15,400	15,400	72,400	893,400
T2	Seismic Retrofits		\$ 7,725,000	1,156,400	803,000				2,216,400			1,108,200	995,800	1,445,500	
T3	Replace Nyanza Hill Tank (4)		\$ 3,300,000	1,155,000	2,145,000										
T4	Construct new Scotts Site Reservoir & Pump Station (4)		\$ 5,000,000		500,000	2,500,000	2,000,000								
T5	Replace 88th St & Pine Tank (4)		\$ 3,400,000							1,360,000	2,040,000				
T6	Replace Farwest Drive Tank		\$ 5,100,000												5,100,000
	Pump Station Improvements		\$ 1,105,000	\$ -	\$ -	\$ 50,000	\$ -	\$ 45,000	\$ -	\$ -	\$ 1,010,000	\$ -	\$ -	\$ -	\$ -
P1	Pump Stations Maintenance		\$ 95,000			50,000		45,000							
P2	Replace 88th St & Pine Pump Station (4)		\$ 1,010,000								1,010,000				

Table 9-4 (Continued)
Recommended Capital Improvement Program Summary

<i>Well Source Improvements</i>		\$ 28,050,000	\$ 2,855,000	\$ 1,855,000	\$ 1,905,000	\$ 685,000	\$ 305,000	\$ 1,405,000	\$ 1,002,005	\$ 2,185,000	\$ 1,405,000	\$ 1,405,000	\$ 1,165,000	\$ 12,178,404
W1	Well Rehabilitation & Maintenance Program	\$ 6,100,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	3,050,000
W2	Drilling New Wells (11 Wells)/ Replacing Failed Wells (8 Wells)	\$ 13,450,000	750,000	350,000	500,000	380,000			697,005	780,000	1,100,000		860,000	8,028,404
W3	Well Treatment (3 New Wells, 2 Exist)	\$ 5,500,000			1,100,000			1,100,000		1,100,000			1,100,000	1,100,000
W4	Ponders Wells Treatment Plan Replacement	\$ 3,000,000	1,800,000	1,200,000										
<i>Wholesale Improvements (5)</i>		\$ 18,000,000	\$ 16,200,000	\$ 1,800,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
WS1	Wholesale Transmission Main Extension	\$ 15,400,000	15,400,000											
WS2	Wholesale Booster Pump Station Upgrade	\$ 800,000	800,000											
WS3	Wholesale Booster Pump Station Phase 2	\$ 1,800,000		1,800,000										
<i>Miscellaneous Improvements</i>		\$ 1,275,000	\$ 40,000	\$ 45,000	\$ 40,000	\$ 45,000	\$ 40,000	\$ 45,000	\$ 40,000	\$ 45,000	\$ 90,000	\$ 280,000	\$ 90,000	\$ 475,000
M1	Operation & Control Adjustments	\$ 50,000		5,000		5,000		5,000		5,000		5,000		25,000
M2	Water Wise Usage Program and Leak Detection	\$ 840,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	400,000
M3	Comprehensive Water System Plan (every 6-10 years)	\$ 250,000									50,000	100,000	50,000	50,000
M4	Cross Connection Control Plan Update	\$ 50,000										50,000		
M5	Wellhead Protection Plan Update	\$ 85,000										85,000		
TOTAL ESTIMATED PROJECT COSTS		\$ 304,231,000	\$ 23,676,800	\$ 12,592,050	\$ 10,285,450	\$ 8,520,450	\$ 5,726,500	\$ 9,976,500	\$ 8,721,405	\$ 10,102,600	\$ 7,143,600	\$ 7,893,200	\$ 7,171,900	\$ 69,457,804

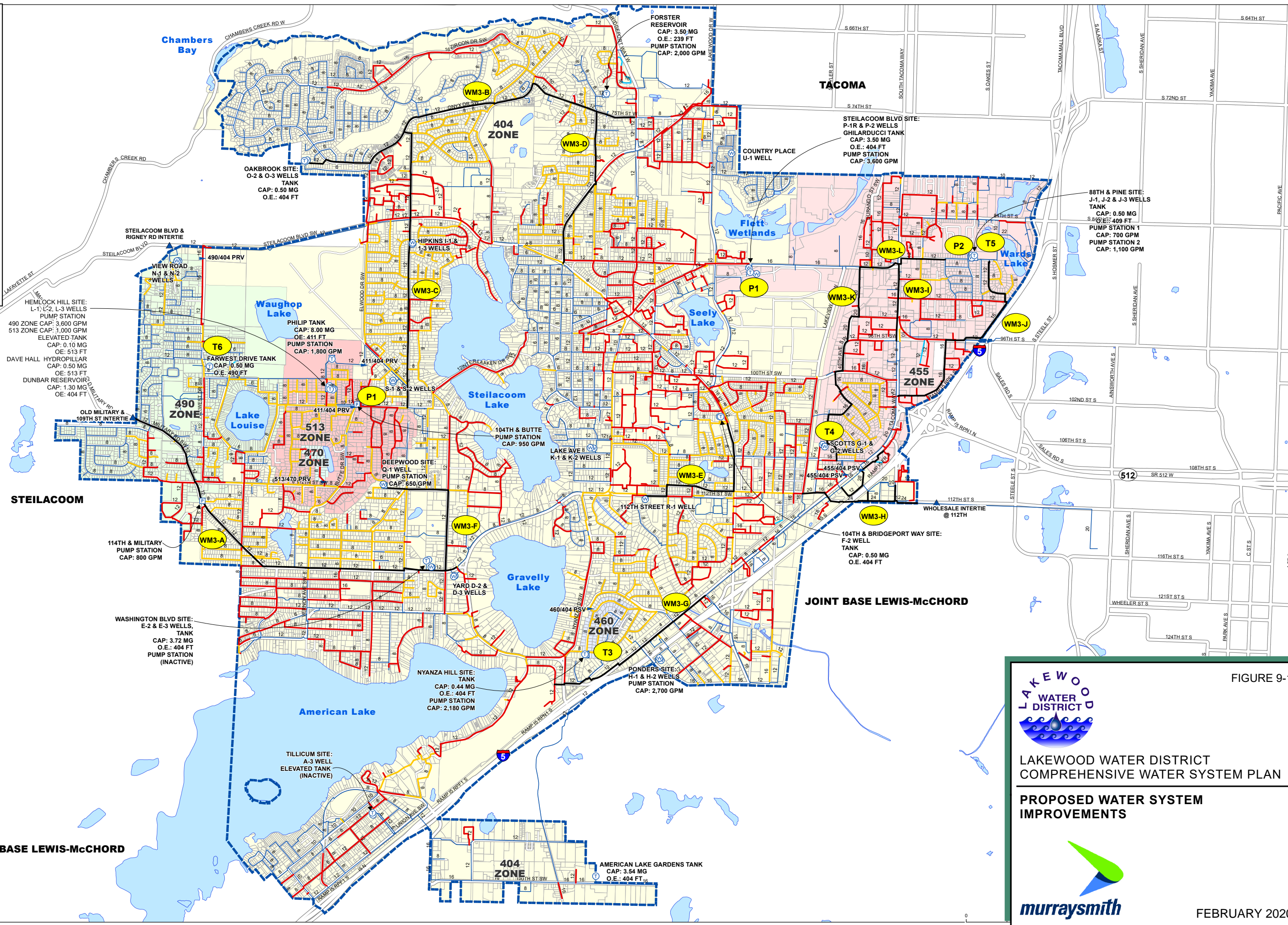
Notes:

- ¹ Fire Flow improvements will also address some of the non standard material and aging pipes.
- ² Material & Age improvements will also address aging pipes and improve the system capacity.
- ³ Transmission main improvements will also address some of the non standard material and aging pipes as well as improve the system capacity.
- ⁴ These capital improvement projects will benefit both retail and wholesale customers.
- ⁵ Wholesale improvements addresses projects only benefit wholesale customers. These projects are outside the District's Retail Service Area.

LEGEND

- Water Tank
- Groundwater Well
- Pump Station
- Intertie
- Pressure Regulating Valve Station
- Water Bodies
- Retail Water Service Area
- Transmission Main Projects
- Fire Flow Projects
- Material/Age Projects
- Looping Projects
- Existing Water Main

- Pressure Zones**
- 404
 - 455
 - 460
 - 470
 - 490
 - 513



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FIGURE 9-1








**LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN**

**PROPOSED WATER SYSTEM
IMPROVEMENTS**







FEBRUARY 2020

LEGEND







-  Water Tank
-  Groundwater Well
-  Pump Station
-  Intertie
-  Pressure Regulating Valve Station
-  Water Bodies
-  Retail Water Service Area

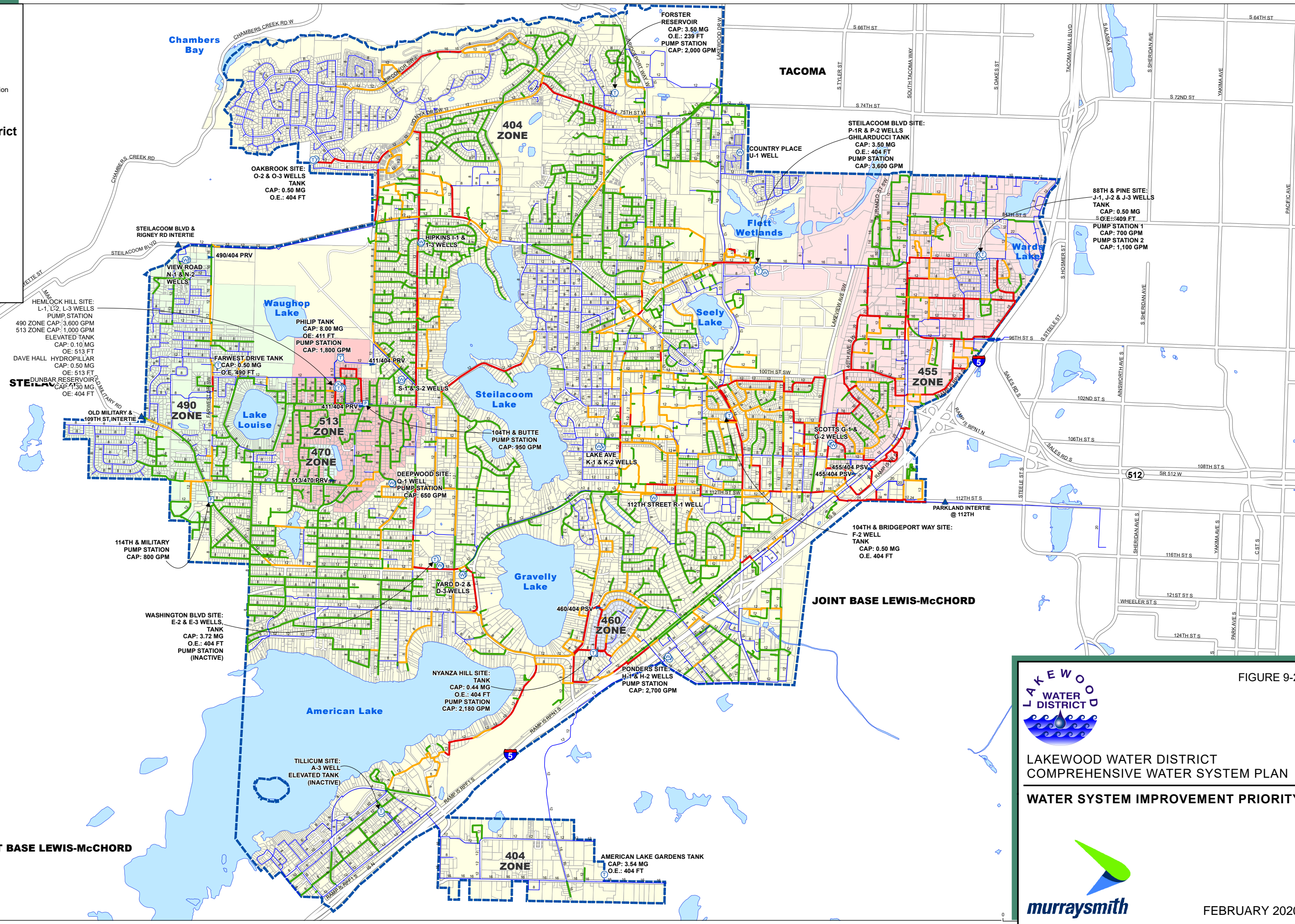
Lakewood Water District

Total Rank

-  Existing Water Main
-  Low
-  Medium
-  High

Pressure Zones

-  404
-  455
-  460
-  470
-  490
-  513



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FIGURE 9-2

**LAKWOOD WATER DISTRICT
COMPREHENSIVE WATER SYSTEM PLAN**

WATER SYSTEM IMPROVEMENT PRIORITY



FEBRUARY 2020

Chapter 10

Financial Analysis

10.1 Introduction

This chapter was prepared by FCS GROUP to develop a financial program that allows the District to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, operation and maintenance (O&M) needs, and the ability to support the financial impacts related to the completion of the capital projects identified in this Comprehensive Water System Plan (WSP). Furthermore, this chapter provides a review of the District's current rate structure with respect to rate adequacy and customer affordability.

10.2 Financial History

Table 10-1 summarizes the District's financial performance for the 2013 – 2018 time period as documented in the District's audited financial statements (Statement of Revenues, Expenses and Changes in Net Position). Important take-aways from this analysis include:

- Customer sales and service fees increased by 61.4% since 2013. The increase in revenues was concentrated between 2013 and 2016 and was due in part to growth in water sales, both retail and wholesale, as well as rate increases. In 2014 the District began a new Renewal and Replacement (R&R) program to replace aging water pipe infrastructure. In order to fund this program a 24.0 percent rate increase was implemented. Water sales increased by 7.0% in 2014 and 9.7 percent in 2015. Contributing to the overall revenue growth for this period were warmer than average weather conditions.
- Operating expenses have risen by approximately 29.3% over the time period – excluding depreciation, the increase over the time period is 30.0%. In both cases, operating expenses have increased at a rate lower than the total escalation of rate revenues.
- Operating income has remained positive since 2013.
- The operating ratio summarizes the ability of annual operating revenues to cover annual operating costs. Including depreciation expense in this calculation provides insight as to whether the District is charging customers enough to fund the replacement of assets in addition to daily operating costs. **Table 10-1** indicates that the District was able to cover operating costs and fully fund depreciation expense in each of the past six years.
- The current ratio is a measure of short-term liquidity or the District's ability to pay its current bills – it is calculated by dividing unrestricted current assets (excluding inventories

and prepaid items) by current liabilities. A ratio of 1.0 indicates that the utility has exactly enough to pay its bills; higher values are desirable as they suggest an ability to pay large or unanticipated bills. The District has attained a current ratio varying from 1.38 to 4.40 over the past six years, suggesting that the utility has ample capacity to meet its short-term financial obligations.

- Days cash on hand is a measure of financial security, quantifying how long the District would be able to fund daily operating and maintenance costs if it received no additional revenue. It is calculated by dividing unrestricted cash by the average daily cost of operations (excluding depreciation). While there is no firm minimum standard for this metric, bond rating agencies have recently expressed a preference for a minimum of 180 days of cash on hand for utilities seeking the highest bond ratings. **Table 10-1** indicates that the District has been able to maintain 55 – 286 days cash on hand over the past six years. While the District fell short of the 180 days target from 2013 – 2015, it has met or exceeded the target in each of the past three years. However, it is worth noting that high cash balances can also result from decisions to defer capital investment.
- The debt-to-asset ratio is a measure of indebtedness. This metric is often used to evaluate whether a utility is overleveraged, with values above 60.0% suggesting that a utility may have too much debt. Excessive indebtedness can be viewed negatively in the context of a fiscal health evaluation, as debt comes with incremental costs (e.g. interest) and requirements (e.g. coverage, reserves) that may reduce a utility's financial flexibility. The District's ratio has hovered around 30.0% for the past six years, reflecting a healthy level of debt.
- The District maintained an outstanding debt principal balance on the order of \$13.0 – \$25.3 million from 2013 – 2018. It began 2013 with an outstanding principal balance of \$13.8 million and has since reduced that balance by \$11.9 million through its annual principal payments. However, the District has drawn an additional \$21.6 million in loan funds to pay for capital projects including the R&R program and meter replacement – as a result, the District ended 2018 with an outstanding principal balance of \$23.5 million.
- The District's debt service coverage ratio ensures that "net revenue" (generally defined as system revenue net of operating expenses) is greater than or equal to a specified multiple of annual parity debt service. The District has a policy target of 2.0 times the annual debt service, which is higher than the 1.25 target typically required by bond covenants. While the District's coverage ratio dipped below 2.0 in 2013, they exceeded the target in each following year.

Table 10-1
Historical Financial Performance (2013 – 2018, \$000s)

	2013	2014	2015	2016	2017	2018
Operating Revenues						
Customer Sales and Service Fees	\$6,463	\$8,001	\$8,855	\$9,793	\$10,012	\$10,431
Water Tanks Rents	411	409	432	499	534	546
Total Operating Revenues	\$6,874	\$8,410	\$9,287	\$10,292	\$10,546	\$10,977
Operating Expenses						
Operations	\$3,023	\$2,782	\$3,067	\$3,317	\$3,316	\$3,545
Maintenance	1,015	1,000	956	1,233	1,341	1,603
Depreciation	1,717	1,643	1,821	1,979	2,096	2,193
Taxes Other than Income Taxes	288	346	399	439	458	474
Total Operating Expenses	\$6,043	\$5,771	\$6,243	\$6,967	\$7,211	\$7,815
Net Operating Income (Loss)	\$831	\$2,638	\$3,044	\$3,326	\$3,335	\$3,161
Non-Operating Revenues (Expenses)						
Interest Expense	\$(351)	\$(608)	\$(689)	\$(618)	\$(780)	\$(854)
Amortization of Debt Expense	(388)	-	-	-	-	-
Debt Issuance Expense	-	(102)	-	-	-	-
Gains (Losses) on Capital Assets Disposition	-	-	(710)	(67)	8	29
Interest Income	3	7	-	15	68	192
Other Income	32	19	4	11	8	562
Other Expense	-	-	-	(38)	-	-
Total Non-Operating Revenues (Expenses)	\$(705)	\$(684)	\$(1,395)	\$(697)	\$(696)	\$(71)
Net Income (Loss) Before Contributions	\$127	\$1,954	\$1,649	\$2,628	\$2,639	\$3,091
Capital Contributions	\$281	\$443	\$695	\$1,951	\$2,424	\$1,320
Change in Net Position	\$407	\$2,397	\$2,344	\$4,580	\$5,063	\$4,411
Net Position at Beginning of Year	\$44,396	\$44,803	\$47,200	\$47,159	\$51,844	\$56,907
Effect of changes in accounting principle	-	-	(2,385)	-	-	-
Net Position at End of Year	\$44,803	\$47,200	\$47,159	\$51,739	\$56,907	\$61,318
Operating Ratio (Excluding Depreciation)	1.59	2.04	2.10	2.06	2.06	1.95
Operating Ratio (Including Depreciation)	1.14	1.46	1.49	1.48	1.46	1.40
Current Ratio	2.00	1.38	1.57	1.68	4.40	2.65
Days Cash On Hand	58	90	55	286	279	180
Outstanding Debt Principal at Year-End	\$13,045	\$21,733	\$20,496	\$19,292	\$25,323	\$23,529
Debt-to-Asset Ratio	24%	36%	31%	28%	35%	30%
Debt Service Coverage (All Debt)	1.72	2.36	2.12	2.78	3.05	2.89

10.3 Capital Funding Resources

In addition to cash financing, there are a variety of resources available to the District to help fund the water capital improvement program.

10.3.1 Government Programs

Federal and state grant programs were historically available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, significantly reduced in scope and amount, or replaced by low-interest loan programs. Remaining grants programs are usually lightly funded and heavily subscribed. Nonetheless, even the benefit of low-interest loans makes the effort of applying worthwhile. Funding programs for which the District might be eligible include:

10.3.1.1 Public Works Board (PWB) Loan Program

Cities, counties, special purpose districts, public utility districts, and quasi-municipal governments are eligible to receive loans from the PWB. Eligible projects include repair, replacement, and construction of infrastructure for domestic water, sanitary wastewater, stormwater, solid waste, road, and bridge projects that improve public health and safety, respond to environmental issues, promote economic development, or upgrade system performance. The target for opening the next application cycle is July 2019 for both the construction and pre-construction loan programs, with funding subject to Governor and Legislative appropriation. Information regarding the application process, status of the funding process, as well as rates and terms are posted on the PWB website. Further detail is available at <http://www.commerce.wa.gov/building-infrastructure/pwb-home-page>.

10.3.1.2 Drinking Water State Revolving Fund (DWSRF) Loan Program

DWSRF funding has historically targeted protection of public health and compliance with drinking water regulations. A 20-year repayment term is offered, and no local match is required. In some cases, partial loan forgiveness is offered. Applicants need an approved water system plan (or plan amendment) containing the DWSRF project prior to submitting an application. All public water systems that receive a DWSRF loan must undergo an environmental review, a cultural review, and an Investment-Grade Efficiency Audit (IGEA). The IGEA is an effort to apply energy efficiency to water systems and may be financed as part of the DWSRF loan. The Fall 2019 application cycle will begin October 1st and conclude November 30th, 2019.

More information regarding the DWSRF Loan Program can be found at <https://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/WaterSystemAssistance/DrinkingWaterStateRevolvingFundDWSRF>.

10.3.1.3 Community Economic Revitalization Board (CERB) Grant and Loan Program

A division of the Washington State Department of Commerce, CERB was formed in 1982 to respond to local economic development issues in Washington communities. It provides funding to local governments and federally recognized tribes for public infrastructure (including water, stormwater, wastewater, public buildings, telecommunications, and port facilities) that supports private business growth. It prioritizes projects that create or retain jobs for low and moderate-income residents. CERB generally provides funding through three programs:

- Committed Private Partner Program: This program provides loans and grants to public agencies that have a commitment from the private sector to help fund the construction of infrastructure necessary for private business expansion. Applicants must submit evidence that private development is contingent on CERB funding and demonstrate that no other timely source of funding is available at terms comparable to what CERB offers.
- Planning Grant Program: This program provides limited funding for studies to evaluate high-priority economic development projects that target job growth and long-term economic prosperity.
- Prospective Development Program: This program loans and grants to rural communities for public infrastructure that facilitates future business development. It requires an economic feasibility study demonstrating that the project will lead to a significant level of job creation and private capital investment. Applicants must also show a need for CERB assistance and evidence that no other timely source of funding is available at terms comparable to what CERB offers.

CERB offers a maximum of \$2 million per project, per policy with interest rates ranging from 1.0% to 3.0%. The Board meets every two months to consider projects and make funding decisions. CERB is intended to be a “last-resort” measure relative to other funding sources, and therefore the District might not qualify for assistance under this program.

More information can be found at <http://www.commerce.wa.gov/building-infrastructure/community-economic-revitalization-board>.

10.3.1.4 Infrastructure Assistance Coordination Council

The Infrastructure Assistance Coordinating Council is comprised of state and local agencies whose function is to provide funding for infrastructure repair and development. Its purpose is not to directly provide funding, but to assist local governments in coordinating funding efforts for infrastructure improvements. As a result, they are a valuable resource to provide awareness of any new funding opportunities. An example of this is their annual conference where they offer sessions dedicated to teaching attendees about available resources.

More information can be found at <http://www.infracfunding.wa.gov/>.

10.3.2 Bond Financing

10.3.2.1 Revenue Bonds

Commonly used to fund capital improvements that exceed a utility's financial resources, revenue bonds are secured by revenues of the issuing utility. Because repayment is limited to the financial capacity of the utility, revenue bonds typically bear higher interest rates than other types of debt and often require additional security measures to protect bondholders from default risk. Such measures may include the maintenance of dedicated reserves and minimum financial performance standards (e.g. bond debt service coverage).

Washington State law does not require a public vote for issuing revenue bonds. While there is no explicit statutory bonding limit, the conditions that come with revenue bonds often impose practical limits on a utility's level of indebtedness. Excessive levels of debt may reduce flexibility to phase in rate increases as well as increase the overall cost of capital investment given the related interest payments. It is important to note that bond rating agencies also consider debt service coverage when assigning a debt rating – higher levels of indebtedness make it more difficult for a utility to meet the coverage ratios that the rating agencies require for the highest rating. In recent years, the coverage ratios required for higher ratings have often exceeded the minimum legal standards outlined in the applicable bond covenants. Ratings are financially important because higher ratings generally provide access to lower interest rates.

10.3.3 Other Funding Sources

10.3.3.1 General Facilities Charges (GFCs)

Under the authority of RCW 57.08.005 (11), the District imposes a GFC on development as a condition of connecting to its utility systems. This charge recovers an equitable share of the cost of utility infrastructure from growth, which promotes equity between new and existing customers. GFC revenues provide a source of cash funding for utility capital needs and related debt service payments. The current GFC is \$3,317 for a 5/8-inch meter. The GFC increases with meter size.

10.4 Financial Plan

The District is responsible for funding all of its costs. The primary source of funding is derived from ongoing monthly charges for service, with additional revenues coming from wholesale revenue and other miscellaneous revenue. The District has authority to control the level of user charges and, subject to the Board of Commissioners, can adjust user charges as needed to meet financial objectives.

The financial plan can only provide a qualified assurance of financial viability if it considers the total system costs of providing services, both operating and capital. To meet these objectives, the following elements have been completed:

- The capital funding plan develops a funding strategy for the CIP that considers rate revenues, existing reserves, GFCs, debt financing, and other anticipated resources (e.g. grants, developer contributions). It can impact the overall financial plan through the use of debt financing (resulting in annual debt service) and capital funding embedded in rates.
- The revenue requirement analysis determines the amount of revenue necessary to fund the ongoing operation, maintenance, and administration of the utility on an annual basis. This analysis focuses specifically on the needs funded from operating revenues. It includes a framework of fiscal policies intended to promote long-term financial stability and viability.

10.4.1 Financial Policies

The key financial policies employed by the District, as well as those recommended and incorporated in the financial program, are summarized and discussed below.

10.4.1.1 Utility Reserves

Reserves are a key component of any utility financial strategy, as they provide the ability to manage variations in costs and revenues that could otherwise have an adverse impact on ratepayers. For the purpose of this analysis, resources are separated into the following funds:

- **Operating Fund:** This fund provides an unrestricted fund balance to accommodate short-term cycles of cash flow. It intends to address variations in revenues and expenses, whether anticipated (e.g. billing/receipt cycles, payroll cycles) or unanticipated (e.g. weather, economic conditions). The District’s financial policies establish a minimum balance equal to 90 days of operating expenses in this fund. Based on the District’s 2019 Budget, this target is approximately \$1.60 million.
- **Capital Fund:** This fund provides a source of cash for unanticipated capital expenditures such as an emergency asset replacement or capital project overruns. In the context of the financial analysis, it also enforces an appropriate segregation of resources restricted (or otherwise designated) for capital purposes. The District’s financial policies establish a minimum balance equal to 1.0% of the cost of system assets, which is approximately \$1.27 million in 2019.
- **Debt Reserve:** Bond covenants often establish reserve requirements as a means of protecting bondholders against the risk of nonpayment. The District began 2019 with \$1.51 million in bond payment reserves.

The financial forecast presented in **Table 10-4** reflects rate increases that were set to maintain these minimum balances while meeting the District’s operating and capital needs.

10.4.1.2 System Reinvestment

System reinvestment funding promotes system integrity by ensuring adequate capital to fund the replacement of aging system facilities. Reinvestment funding policies intend to generate a reasonable level of cash funding for capital investment, rather than guarantee full cash funding at any point in time. When choosing a benchmark or a target amount for system reinvestment funding it is worth noting that a higher target will have a greater upfront impact on existing ratepayers, but will reduce future debt issuance and result in lower costs in the long-term.

In 2014 the District developed a renewal and replacement (R&R) plan to renew and replace its existing aging pipe infrastructure over a 50-year planning horizon. The plan funded half of the costs through cash financing and assumed revenue bond proceeds for the remaining portion. Based on the average annual expense, the cash financed portion was approximately equal to the District's annual depreciation. For the purposes of this plan, system reinvestment is tied to annual depreciation expense - \$2.25 million in 2019, increasing by an average of \$200,000 per year based on annual project additions and their useful lives – which is consistent with the annual funding currently provided by the R&R program.

10.4.1.3 Financial Performance Standards

The revenue requirement analysis uses a pair of sufficiency tests to establish the amount of revenue needed to meet the District's financial obligations on an annual basis.

- **Cash Flow Test:** This test defines “sufficient revenue” as the amount needed to fund all known cash requirements including O&M expenses, debt service payments, system reinvestment funding (and other rate-funded capital outlays), and reserve funding.
- **Coverage Test:** Intended to ensure compliance with the District's bond covenants, satisfying this test requires that “net revenue” (generally defined as system revenue net of operating expenses) is greater than or equal to a specified multiple of annual parity debt service. This analysis assumes a minimum coverage ratio of 2.00 times the annual debt service, which is higher than the 1.25 target required by covenants. Targeting a higher coverage ratio may help the District achieve a better credit rating, which may lower the interest rate for future debt issues.

The annual revenue requirement can be loosely defined as the amount needed to satisfy both tests. Cash flow deficits may occur as part of a strategy to phase in rate increases, but the District must always meet any coverage standards required by debt covenants.

10.4.1.4 Capital Funding Plan

The 2019 – 2039 CIP developed for this plan identifies \$181.3 million in project costs (in 2019 dollars). Adjusting for inflation at an assumed rate of 3.0% per year, the total projected CIP expenditure is \$236.9 million. **Table 10-2** summarizes the annual CIP expenditures in current and future dollars.

Table 10-2
Capital Improvement Program (2019 – 2039, \$000s)

Description	Year												
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030-2039	
Water Main Rehabilitation & Replacement Improvements													
Fire Flow Improvements	\$ 2,255	\$ 4,177	\$ 4,177	\$ 4,177	\$ 3,700	\$ 3,700	\$ 3,700	\$ 3,700	\$ 3,700	\$ 3,700	\$ 3,700	\$ 3,700	\$ 37,000
Material & Age (50+ years) Improvements	-	-	-	-	-	-	-	-	-	-	-	-	-
Transmission Main Improvements													
12" in Old Military Rd	-	-	-	-	-	-	-	-	-	-	-	-	1,807
12" in Onyx Dr, Phillips Rd, & 75th St	-	-	-	-	-	-	-	-	-	-	-	-	3,274
12" in Hipkins Rd	-	-	-	-	-	-	-	-	-	-	-	-	2,511
12" in Custer Rd & John Dower Rd	-	-	-	-	-	-	-	-	-	-	-	-	1,457
12" in 112th St, Highland Ave, 111th St, & Bridgeport Way	-	-	-	-	-	-	-	-	-	-	1,497	-	-
12" in 112th St, Interlaken Dr, & Washington Blvd	-	-	-	-	-	-	-	-	-	-	-	-	3,052
12" in Pacific Hwy & Bridgeport Way	-	-	-	-	-	-	-	-	-	-	-	-	1,654
20" & 24" in 112th St & Pacific Hwy S near Wholesale Intertie	-	-	-	-	-	-	2,619	1,123	-	-	-	-	-
12" in S Tacoma Way	-	-	-	-	-	-	-	-	-	-	-	685	-
12" & 16" in Front Street, 96th Street, and 32nd Avenue South	-	-	-	-	1,637	1,637	-	-	-	-	-	-	-
16" & 20" in 39th Ave SW, 40th Ave SW, etc.	-	807	1,614	1,614	-	-	-	-	-	-	-	-	-
12" in 88th Street S and Steilacoom Blvd SW	-	-	-	-	-	-	-	-	825	-	-	-	-
Storage Improvements													
Tank Maintenance & Coating Program	\$ 15	\$ 460	\$ -	\$ -	\$ -	\$ 974	\$ -	\$ -	\$ 15	\$ 15	\$ 72	\$ 893	
Seismic Retrofits	1,156	803	-	-	-	2,216	-	-	1,108	996	1,446	-	-
Replace Nyanza Hill Tank	1,155	2,145	-	-	-	-	-	-	-	-	-	-	-
Construct new Scotts Site Reservoir & Pump Station	-	500	2,500	2,000	-	-	-	-	-	-	-	-	-
Replace 88th St & Pine Tank	-	-	-	-	-	-	1,360	2,040	-	-	-	-	-
Replace Farwest Drive Tank	-	-	-	-	-	-	-	-	-	-	-	-	5,100
Pump Station Improvements													
Pump Stations Maintenance	\$ -	\$ -	\$ 50	\$ -	\$ 45	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Replace 88th St & Pine Pump Station	-	-	-	-	-	-	-	1,010	-	-	-	-	-
Well Source Improvements													
Well Rehabilitation & Maintenance Program	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 305	\$ 3,050
Drilling New Wells (11 Wells)/ Replacing Failed Wells (8 Wells)	750	350	500	380	-	-	697	780	1,100	-	860	-	8,028
Well Treatment (3 New Wells, 2 Exist)	-	-	1,100	-	-	1,100	-	1,100	-	1,100	-	-	1,100
Ponders Wells Treatment Plan Replacement	1,800	1,200	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous Improvements													
Operation & Control Adjustments	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ 25	
Water Wise Usage Program and Leak Detection	40	40	40	40	40	40	40	40	40	40	40	40	400
Comprehensive Water System Plan (every 6-10 years)	-	-	-	-	-	-	-	-	50	100	50	50	50
Cross Connection Control Plan Update	-	-	-	-	-	-	-	-	-	50	-	-	-
Wellhead Protection Plan Update	-	-	-	-	-	-	-	-	-	85	-	-	-
Wholesale Improvements													
Existing BPS Improvements	\$ 15,400	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Phase 2 Booster Pump Station	800	-	-	-	-	-	-	-	-	-	-	-	-
Additional Water Supply of 4 MGD from LWD	-	1,800	-	-	-	-	-	-	-	-	-	-	-
Total Estimated Project Costs	\$ 23,677	\$ 12,592	\$ 10,285	\$ 8,520	\$ 5,727	\$ 9,977	\$ 8,721	\$ 10,103	\$ 7,144	\$ 7,893	\$ 7,172	\$ 69,458	
plus: Construction Cost Inflation	\$ -	\$ 378	\$ 626	\$ 790	\$ 719	\$ 1,589	\$ 1,692	\$ 2,322	\$ 1,906	\$ 2,406	\$ 2,467	40,763	
Total Escalated Project Costs	\$ 23,677	\$ 12,970	\$ 10,912	\$ 9,311	\$ 6,445	\$ 11,565	\$ 10,414	\$ 12,425	\$ 9,049	\$ 10,299	\$ 9,638	\$110,220	

Table 10-3, which summarizes the projected capital funding strategy for the CIP, indicates that the District’s existing cash resources (including cash balances, interest earnings, system reinvestment, and GFCs) will not be sufficient to fund the projected capital costs. This analysis assumes that the District will issue revenue bonds every other year starting in 2021 to cover the projected funding gap.

Table 10-3
Summary of Projected Capital Funding Strategy (\$000s)

Year	Capital Expenditures Escalated	Revenue Bond Financing	Cash Funding	Total Financial Resources
2019	\$ 23,677	\$ -	\$ 23,677	\$ 23,677
2020	12,970	-	12,970	12,970
2021	10,912	4,500	6,412	10,912
2022	9,311	-	9,311	9,311
2023	6,445	4,500	1,945	6,445
2024	11,565	-	11,565	11,565
2025	10,414	8,000	2,414	10,414
2026	12,425	-	12,425	12,425
2027	9,049	6,000	3,049	9,049
2028	10,299	-	10,299	10,299
2029	9,638	5,000	4,638	9,638
Subtotal	\$ 126,705	\$ 28,000	\$ 98,705	\$ 126,705
2030-2039	110,220	25,500	84,720	110,220
Total	\$ 236,925	\$ 53,500	\$ 183,425	\$ 236,925

10.4.2 Revenue Requirement

The revenue requirement analysis evaluates the District’s ability to cover its projected costs under its currently adopted rates. In the event of any projected deficiencies, this analysis will serve as the basis for a strategy of recommended rate adjustments.

10.4.2.1 Projected Financial Performance

The financial forecast is established from 2019 budget documents along with other key factors and assumptions to develop a complete portrayal of the District’s annual financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- The rate revenue forecast is initially based on 2019 budgeted revenue, and reflects growth assumptions based on the “medium” growth forecast discussed in **Chapter 4.4** (average of 0.56% per year).
- Wholesale revenue is based on existing wholesale customer agreements, with 1.0% growth assumed.

- Interest earnings are computed based on projected fund balances, assuming an interest rate of 2.5% per year.
- Other operating revenues are held at the budgeted 2019 levels.
- The forecast of operating expenses is based on the 2019 Budget, with future projections reflecting adjustments for inflation.
 - Most expenses are adjusted for general inflation at a rate of 3.15% per year.
 - Variable operating costs (pumping, treatment, etc.) reflect adjustments for inflation as well as customer growth.
 - Taxes are calculated based on the projected revenues and prevailing rates:
 - Excise tax of 5.029%, applied to rate revenue.
 - Business & occupation (B&O) tax of 1.50%, applied to miscellaneous non rate revenue.
- The forecast of existing debt service costs is based on the District's debt schedules. The terms assumed for new revenue bonds include a 30-year repayment period, an interest rate of 5.00%, and issuance costs equal to 1.50% of the amount issued.
- System reinvestment is benchmarked to annual depreciation expense.

Table 10-4 summarizes the District's projected financial performance and rate revenue requirements through 2029 based upon the above assumptions.

Table 10-4

Projected Financial Performance & Revenue Requirements (2019 – 2029, \$000s)

Description	Year										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue											
Rate Revenue at 2019 Rates	\$9,972	\$10,074	\$10,112	\$10,149	\$10,188	\$10,226	\$10,265	\$10,330	\$10,393	\$10,459	\$10,524
Other Operating Revenue	1,770	5,421	5,447	5,474	5,502	5,532	5,669	5,702	5,738	5,776	5,826
Total Revenues	\$11,742	\$15,495	\$15,560	\$15,623	\$15,690	\$15,758	\$15,934	\$16,032	\$16,132	\$16,235	\$16,350
Expenses											
Cash Operating Expenses	\$6,478	\$6,967	\$7,177	\$7,394	\$7,618	\$7,849	\$8,088	\$8,339	\$8,599	\$8,867	\$9,144
Debt Service	2,266	2,462	3,947	3,848	3,670	3,938	4,460	3,651	4,604	4,609	4,921
System Reinvestment	2,240	2,499	2,718	2,904	3,033	3,264	3,472	3,721	3,902	4,108	4,301
Total Expenses	\$10,985	\$11,928	\$13,841	\$14,146	\$14,320	\$15,051	\$16,020	\$15,711	\$17,105	\$17,584	\$18,366
Net Operating Cash Flow	\$757	\$3,567	\$1,718	\$1,477	\$1,369	\$708	\$(86)	\$321	\$(973)	\$(1,349)	\$(2,016)
Annual Rate Increase	0.00%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%
Summary After Rate Increases											
Rate Revenues	\$9,972	\$10,368	\$10,772	\$11,189	\$11,625	\$12,077	\$12,547	\$13,068	\$13,609	\$14,174	\$14,761
Net Operating Cash Flow	\$757	\$3,846	\$2,344	\$2,465	\$2,734	\$2,465	\$2,081	\$2,922	\$2,081	\$2,179	\$2,009
<i>Debt Service Coverage</i>	3.15	4.56	2.59	2.64	2.77	2.66	2.40	3.11	2.49	2.58	2.47
Combined Ending Fund Balance	\$15,996	\$10,722	\$9,971	\$6,592	\$10,906	\$5,669	\$9,275	\$4,309	\$7,915	\$4,681	\$7,048
Combined Minimum Fund Balance Target	\$2,869	\$3,119	\$3,280	\$3,427	\$3,546	\$3,719	\$3,882	\$4,068	\$4,223	\$4,392	\$4,556

Table 10-4 indicates current annual revenue meets annual obligations through 2024. In 2025, existing rates are no longer sufficient to cover projected operating expenditures and debt obligations. This cash flow deficiency is primarily driven by the combination of system reinvestment and debt service. Funding system reinvestment is an important part of the capital funding strategy, representing approximately 29% of the funding needed during the 2019 – 2029 period (as shown in **Table 10-3**). The District could opt to fund system reinvestment at a lower level, but it would require that more debt be issued or capital projects be deferred to make up the difference.

While the District could defer rate increases until the 2025 deficiency, the longer the increases are postponed the greater they would have to be. Starting the rate strategy in 2020 allows the District to “smooth” increases over time, mitigating impacts on ratepayers and avoiding large spikes in rates. **Table 10-4** shows that 3.5% annual rate increases allow the District to cover system reinvestment and additional debt service for the revenue bonds identified in **Table 10-3** while meeting reserve and coverage targets in each year of the forecast. The long-term rate forecast (2030-2039) also includes 3.5% annual rate increases and meets the District’s policy targets in each year.

It is important to note that these financial projections are based upon current assumptions and the current capital program. Circumstances might change over time, causing actual rate adjustments to be higher or lower once actual costs are known. The District currently reviews rates on an annual basis during the budget process, and it is recommended that this practice continue. Reviewing and updating the key underlying assumptions that compose the multi-year plan will help ensure that adequate revenues are collected to meet the District’s financial obligations.

10.4.3 Rate Affordability

The Washington State Department of Health and the Public Works Board use an affordability index to prioritize low-cost loan awards. They typically look at how a system’s rates compare to the median household income (MHI) for the demographic area – a community’s rates are considered to be “affordable” if they result in bills that are below 2.0% of the MHI.

The District’s customer base lives primarily in the City of Lakewood. U.S. Census Bureau data indicates that the MHI for Lakewood was \$47,636 in 2017 dollars. Adjusting to 2019 for inflation (2.11% actual in 2018 & 3.0% projected for 2019) the estimated MHI for the District’s customers increases to \$50,100. **Table 10-5** summarizes the affordability evaluation of the District’s rates with 3.5% annual increases.

Table 10-5 suggests that the District’s rates are, and will remain, within the affordability threshold of 2.0% of MHI during the 2019 – 2029 time period.

Table 10-5
Affordability Evaluation (2019 – 2029)

	Year										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bi-Monthly Bill @ 15 ccf ¹	\$50.06	\$51.81	\$53.63	\$55.50	\$57.45	\$59.46	\$61.54	\$63.69	\$65.92	\$68.23	\$70.61
Median Household Income ²	\$50,100	\$51,603	\$53,151	\$54,746	\$56,388	\$58,080	\$59,822	\$61,617	\$63,466	\$65,370	\$67,331
Annual Bill as a % of MHI	0.60%	0.60%	0.61%	0.61%	0.61%	0.61%	0.62%	0.62%	0.62%	0.63%	0.63%

Notes:

1. Average usage for single family customer with 5/8-inch meter.
2. Adjusted annually for labor cost inflation at 3.0% per year.

10.5 Conclusion

Table 10-3 indicates that the District will require external financing to complete the \$236.9 million in projects included in the capital program. As shown in **Table 10-4**, the District will need to increase its water rates to help fund the capital program and keep up with rising operating costs. The recommended rate strategy calls for annual rate increases of 3.5% – even with these rate increases, the median residential bill is expected to remain below the affordability threshold of 2.0% of median household income for the twenty-year planning period.

It is recommended that the District continue its practice of reviewing rates annually during the budget process, revisiting the key underlying assumptions that make up this analysis and verifying that the District’s revenues remain adequate to meet its financial obligations.

**STANDARD SERVICE AGREEMENT
ESTABLISHING WATER UTILITY
SERVICE AREA BOUNDARIES**

PREAMBLE

THIS AGREEMENT establishing water utility service area boundaries is entered into this day for purposes of identifying the external boundaries of the service area for which this water purveyor has assumed water service responsibility.

WHEREAS, service area agreements are required by WAC 246-293-250 to help assure that water reserved for public water supply purposes within Pierce County will be utilized in the future in an efficient and planned manner; and

WHEREAS, the designation of retail water service area and future service planning areas, together with the cooperation of other utilities, will help assure efficient planning to accommodate growth, avoid duplication of service, and facilitate the best use of resources; and

WHEREAS, The responsibilities applicable to water purveyors are outlined in the Pierce County Coordinated Water System Plan (CWSP) and by the adopted rules and regulations of the Washington State Department of Health (DOH); and

WHEREAS, It is not the intent of this Agreement to give new authority or responsibilities to the water purveyor or to the County or State regulatory agencies, in addition to those requirements imposed by law; and

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

Section 1. The terms used within the contract shall be as defined in the implementing regulations of Chapter 70.116 RCW, except as identified below.

- A. Lead Agency shall mean the department or organization within Pierce County that has been designated by the Pierce County Executive as being administratively responsible for the coordination and filing of the Pierce County Water Service Area map, Standard Service Agreement Establishing Water Utility Service Area Boundaries, Agreements for Retail Service Areas, Utility Service Policies, and other administrative documents necessary for the implementation of the Pierce County CWSP.
- B. Pierce County Coordinated Water System Plan (CWSP) shall mean the plan adopted by the Pierce County Council for public water systems within critical water supply service areas within Pierce County which identifies the present and future needs of the systems and sets forth means for meeting those needs in the most efficient manner possible.
- C. Pierce County Water Service Area Map shall mean the map referenced in this Agreement for the retail service area signed by the water purveyor, except as amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

- D. Retail Service Area shall mean the designated geographical area within Pierce County in which the undersigned water purveyor assumes full responsibility for providing water service to individual customers.
- E. Utility Service Policies shall mean those policies and conditions of service that are attached to the provision of water service for individual customers. The identified policies and conditions of service are those conditions incorporated within the water purveyor's water system improvement and expansion plans required under the provisions of the Public Water Systems Coordination Act and DOH.

Section 2. Lead Agency. The lead agency for administering the Pierce County Water Utility service area agreements shall be the Pierce County Department of Public Works and Utilities unless otherwise established by the Pierce County Executive. The lead agency shall function only as a coordination center. The lead agency will maintain the original documents and will be responsible for updating the water system map and agreements as provided for in the CWSP.

Section 3. Authority The authority for this Agreement is granted by the Public Water Systems Coordination Act of 1977, Chapter 70.116 RCW.

Section 4. Service Area Boundaries. The undersigned Water Purveyor acknowledges that the Pierce County Water Service Area Maps identifying its retail service area boundaries, dated October 2012 and included as Attachment A to this Agreement, identify the Water purveyor's present and future service area. The undersigned further acknowledges that there are no service area conflicts with an adjacent water utility or purveyor, or, if such a conflict exists, agrees that no new water service will be extended within disputed areas except as stipulated in an adjudication by DOH.

This agreement shall apply to service areas existing as of August, 1994, and to the service area boundaries identified in the above referenced maps, or as shown on current revisions thereof, provided that no revisions of service areas shown on these maps shall be made without prior written concurrence of the water utilities/purveyors involved and such written concurrence is filed with the Lead Agency. Revisions may also require an amendment to the purveyor's or utility's service plans.

Section 5. Boundary Adjustments. If, at some time in the future it is in the best interest of the undersigned parties to make service area boundary adjustments, such modifications must be by written concurrence of all involved utilities and the proper legislative authority(ies), and must be noted and filed with the designated Pierce County lead agency and DOH. It is understood by the undersigned utility that it may decline to provide service within its designated service area boundary, but in that case, an applicant may be referred to other adjacent purveyors or utilities or a new utility may be created and the original service area boundary will be adjusted accordingly.

Section 6. System Extension Policies. The undersigned utility agrees that in order to expand its existing water service area, (other than by addition of retail customers to existing water mains), or to serve in the capacity of a pre-qualified satellite system management agency (SSMA), it shall have adopted design standards and Utility Service extension policies. The

design standards shall meet or exceed the Pierce County Water System Minimum Standards and Specifications.

A water utility anticipating expansion of retail service in unincorporated areas of Pierce County, or intending to operate as an SSMA, shall identify utility service policies in its updated water system plan. The undersigned utility agrees to identify, for information, its utility service policies or provide a copy of the updated water system plan to the Lead Agency prior to application for extension of its existing water system into new service areas within the unincorporated areas of Pierce County.

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 the level of service provided for their customers inside the city limits with similar service requirements, and must also meet or exceed Pierce County's minimum design standards.

Section 7. Special Working Agreements. Special working agreements, if they exist and are relevant, between this water purveyor and any adjacent water purveyor shall be attached to this Agreement as Attachment B and incorporated herein by this reference.

Section 8. Compliance with the CWSP. Nothing in this Agreement shall waive any requirement of the state, federal or local government regarding the provision of water service. This Agreement shall comply with the interlocal agreement requirement of the CWSP.

IN WITNESS WHEREOF, the undersigned party has executed this Agreement as of

3/4/2013
Date

Lakewood Water District
Water Purveyor
Randall M. Black
Representative Randall M. Black
General Manager
Title

Receipt Acknowledged:

Dan Carwell
Pierce County Public Works and Utilities Department PALS

7/3/13
Date

**STANDARD SERVICE AGREEMENT
ATTACHMENT B**

Utility shall include copies of separate agreements, relating to common service areas, transfer arrangements, special working agreements, and/or retail service agreements with adjacent utilities. These agreements will be included by reference in this Interlocal Agreement.

1 Sponsored by: Councilmember Douglas G. Richardson
2 Requested by: County Executive/Planning and Public Works

3
4
5 **ORDINANCE NO. 2018-4**
6

7
8 **An Ordinance of the Pierce County Council Granting a Nonexclusive**
9 **Franchise to Lakewood Water District for Location of Water**
10 **Lines on Certain County-Owned Rights-of-Way; and**
11 **Authorizing the County Executive to Execute Said Franchise.**
12

13 **Whereas**, Lakewood Water District of Pierce County, Washington, has
14 applied for a nonexclusive Franchise to construct, operate, and maintain a
15 waterline system under and along Pierce County roads, highways, and other
16 County property in Pierce County, Washington, as hereinafter set forth; and
17

18 **Whereas**, the proposed franchise is nonexclusive and does not establish a
19 right, either expressly or implied, to the water purveyor to provide water service to
20 properties located outside of their approved water service area. Furthermore, the
21 request for this franchise is consistent with the Pierce County Coordinated Water
22 System Plan (CWSP) provided that no extension of water service occurs without
23 following the service area adjustment provisions outlined in the CWSP; and
24

25 **Whereas**, said application for Franchise came on regularly for hearing
26 before the Pierce County Council on the date set forth below under the provisions
27 of Chapter 36.55, Revised Code of Washington; and
28

29 **Whereas**, it appears to the Council that notice of said hearing has been
30 duly given to the public and those interested in providing the same service applied
31 for by the applicant as required by law and that it is in the public interest to grant
32 the Franchise; **Now Therefore**,

33
34 **BE IT ORDAINED by the Council of Pierce County:**
35

36 Section 1. A nonexclusive Franchise, a copy of which is attached hereto
37 and identified as Exhibit A, is hereby given and granted to Lakewood Water
38 District of Pierce County, Washington, hereinafter referred to as the Grantee, for a

1 period of 15 years, from and after the date of filing of the Franchise to be granted
2 with the Clerk of the Pierce County Council.

3
4 Section 2. Lakewood Water District must indicate their full acceptance of
5 this Franchise and all its terms and conditions within 60 days from the effective
6 date of the Ordinance. Said acceptance is to be in writing and filed with the Clerk
7 of the Pierce County Council and shall be a condition precedent to the validity of
8 said Franchise, and unless the Franchise is accepted within such time, this grant
9 of permission shall be null and void.

10
11 Section 3. The Executive of Pierce County is hereby authorized to execute
12 said Franchise.

13
14 PASSED this 27th day of February, 2018.

15
16 ATTEST:

PIERCE COUNTY COUNCIL

Pierce County, Washington

17
18 Denise D. Johnson
19
20 **Denise D. Johnson**
21 Clerk of the Council

Douglas G. Richardson
Douglas G. Richardson
Council Chair

Bruce F. Dammeier
Bruce F. Dammeier
Pierce County Executive

Approved Vetoed , this
7th day of March,
2018.

22
23
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30 Dates of Publication of
31 Notice of Public Hearing: January 31, 2018 and February 7, 2018

32
33 Effective Date of Ordinance: March 17, 2018

34
35 Recording Number: _____

36
37 Date Recorded: _____

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In the Matter of the Application of)
Lakewood Water District of Pierce County,)
State of Washington, for a Franchise)
to construct, operate, and maintain)
pipelines for a Water System under)
and along certain Public Roads and)
Highways in Pierce County, Washington)

FRANCHISE

Application of Lakewood Water District of Pierce County, Washington, for a nonexclusive Franchise to construct and maintain water pipelines with appurtenances for a water system under and along certain public roads, highways, and other County property in Pierce County, Washington, as hereinafter set forth, having come on regularly for hearing before the County Council of Pierce County, Washington, under the provisions of Chapter 36.55, Revised Code of Washington (RCW), and it appearing to the Council that notice of said hearing has been duly given as required by law, and that it is in the public interest to grant the Franchise herein requested;

NOW, THEREFORE, IT IS ORDERED, that a Franchise be, and the same is, hereby given and granted Lakewood Water District of Pierce County, Washington, hereinafter called "Grantee" for a term of 15 years from and after the date of filing this Franchise with the Clerk of the Pierce County Council. This Franchise is a license for the privilege, and authority to construct, maintain, and operate for the said period of time, a water pipeline with appurtenances for a water system under and along public roads, highways, and other County property in Pierce County, Washington, as follows:

All County roads, rights-of-way, highways, and other County property lying within Township 15 North through Township 21 North, inclusive of Range 1 East through Range 9 East, Willamette Meridian, lying east of the Narrows and lying within the boundaries of unincorporated Pierce County, Washington.

In the construction and installation of water system appurtenances and the excavation of trenches on County roads for the purposes of laying relaying, connecting, disconnecting, and repairing mains and pipes and making connections between the same to dwellings and other buildings of the consumers, Grantee shall be governed by and conform to the general rules adopted by Pierce County Public Works, it is understood and agreed that Grantee is fully responsible for all such water system appurtenances within the limits of Pierce County right-of-way (inclusive of any lines or appurtenances conveying water from the Grantee); and Grantee, at no expense to the County, shall complete all such work and shall repair the County roads and leave the same in as good condition as before the work was commenced;

1
2 PROVIDED, HOWEVER, that no such work shall be done prior to obtaining
3 permits therefore issued by the Pierce County Engineer (hereinafter "Engineer"), which
4 permits shall set forth conditions pertaining to the work to be done and specifications for
5 the restoration of the roads to the same condition as they were prior to such work; and
6

7 PROVIDED FURTHER, the Engineer, in his or her discretion, may require a
8 bond in a sum sufficient to guarantee to Pierce County that such roads shall be restored
9 to the same condition as existed prior to such work. If Grantee does not repair County
10 roads to the satisfaction of the Engineer, Pierce County Planning and Public Works
11 may, at its sole discretion, repair such County roads, or cause them to be repaired, and
12 Grantee hereby agrees to reimburse the County of Pierce for the cost of such work,
13 including overhead costs.
14

15 Before any work is performed under this Franchise, which may affect any existing
16 monuments or markers of any nature relating to section subdivisions, plats, roads, and
17 all other surveys, Grantee shall reference all such monuments and markers in
18 accordance with RCW 58.09.130. The reference points shall be so located that they will
19 not be disturbed during Grantee's operations under this Franchise. The method of
20 referencing these monuments or other points to be referenced shall be approved by the
21 County Engineer. The replacement of all such monuments or markers disturbed during
22 construction shall be made as expeditiously as conditions permit, and as directed by the
23 County Engineer. The cost of monuments or other markers lost, destroyed, or
24 disturbed, and the expense of replacement with approved monuments shall be borne by
25 Grantee.
26

27 A complete set of reference notes for monuments and other ties shall be filed
28 with Pierce County Public Works.
29

30 II

31 The water mains and pipes shall be laid down as directed by the Engineer at a
32 depth of not less than 36 inches below the surface of the ground under and along the
33 County roads, and in such a manner as not to interfere unnecessarily with the
34 construction of sewers and drains, or with the grading of County roads. All surface
35 appurtenances to the water system shall be installed or constructed as approved by the
36 Engineer.
37

38 III

39 All work done under this Franchise shall be done in a thorough and professional
40 manner. In the laying of water pipes and conduits and the digging of ditches therefore,
41 Grantee shall leave ditches in such a way as to interfere as little as possible with public
42 travel and shall take all due and necessary precautions to ensure that damage or injury
43 shall not occur or arise by reason of such work; and that where any ditches or trenches
44 are left open at night, Grantee shall place at all crossings suitable lights in such a
45 position to guard against danger, and Grantee shall be liable for all property damage or
46 personal injury that may be caused by reason of any injury sustained through Grantee's
negligence by reason of any person, animal or property being injured through any



1 negligence of Grantee, or by reason of any damage caused through the neglect to
2 properly guard any ditches or trenches dug or maintained by Grantee. The Engineer
3 may specify actions to be taken to ensure the safety of the public and Grantee shall
4 comply with such specifications.

5
6 All abandoned underground utilities shall be removed from the right-of-way within
7 90 days from abandonment. The underground utility shall be considered abandoned
8 upon completion of the permitted work. In the abandonment of hazardous materials
9 such as asbestos concrete pipe, the materials being removed will be in accordance with
10 Chapter 296-65 of the Washington Administrative Code (WAC).

11
12 IV

13 The County of Pierce, in granting this Franchise does not waive any rights that it
14 now holds or may hereafter acquire and shall not be construed to deprive the County of
15 Pierce of any powers, rights, or privileges that it now has or may hereafter acquire,
16 including the right of eminent domain to regulate use and control of County roads
17 covered by this Franchise, or to go upon any and all County roads and highways for the
18 purpose of constructing and improving the same in such a manner as the County of
19 Pierce, or its representatives may elect.

20
21 V

22 Grantee shall provide a certificate of insurance showing evidence of commercial
23 general liability and property damage liability insurance that includes but is not limited to
24 the operations of Grantee, Grantee's protective liability, products completed operation's
25 coverage, broad form blanket contractual liability:

<u>COVERAGES</u>	<u>LIMITS OF LIABILITY</u>
Commercial General Liability Insurance	\$2,000,000 Each
Bodily Injury Liability	Occurrence
Property Damage Liability	\$250,000 Each
	Occurrence

32 or
33 COMBINED SINGLE
34 LIMIT COVERAGE OF
35 \$2,000,000
36

37 The general requirements of the policy shall contain:

38
39 Pierce County is named as an additional insured in this Franchise, to applicable
40 coverage.

41
42 In the event of nonrenewal, cancellation, or material change in the coverage
43 provided, 30 days' written notice will be furnished to the County prior to the date
44 of nonrenewal, cancellation, or change. Such notice shall be sent to the
45 Engineer, Pierce County Planning and Public Works, 4301 South Pine Street,
46 Suite 628, Tacoma, Washington 98409.



1
2 Pierce County has no obligation to report occurrences to the insurance
3 companies unless a claim is filed with the County; and Pierce County has no
4 obligations to pay premiums.

5
6 Grantee's insurance policies shall contain a "cross-liability" endorsement
7 substantially as follows:

8
9 The inclusion of more than one Insured under this policy shall not affect
10 the rights of any Insured with respect to any claim, suit, or judgment made
11 or brought by or for any other insured or by or for any employee of any
12 other Insured. This policy shall protect each Insured in the same manner
13 as though a separate policy has been issued to each, except that nothing
14 herein shall operate to increase Grantee's liability beyond the amount or
15 amounts for which Grantee would have been liable had only one Insured
16 been named.

17
18 Grantee's insurance is primary over any insurance that may be carried by
19 Pierce County. Grantee agrees to provide proof of insurance each year to
20 Pierce County.

21
22 Grantee agrees to defend, indemnify, and hold harmless Pierce County,
23 its appointed and elected officials, its agents, and its employees, from and
24 against all loss or expense arising out of any act, error or omission, or the
25 exercise of any of the rights and privileges granted under this Franchise,
26 including but not limited to, judgments, settlements, attorney's fees and
27 costs, and any and all claims and demands upon the County, its elected or
28 appointed officials, its agents, or its employees. Additionally, for damages
29 because of personal or bodily injury including death at any time resulting
30 therefrom, sustained by any person or persons, and for damages on
31 account of damage to property, including loss of use thereof, where such
32 injury to persons or damage to property is due to the negligence of
33 Grantee, its contractors, it's or their employees or agents, Grantee agrees
34 to defend, indemnify, and hold harmless Pierce County, its appointed or
35 elected officers, or its employees, or its agents, except only such injury or
36 damage as shall have been occasioned by the sole negligence of Pierce
37 County, its appointed or elected officials, or its agents, or its employees;
38 and the Grantee expressly waives its immunity under Title 51 of the
39 Revised Code of Washington, the Industrial Insurance Act, and this waiver
40 has been mutually negotiated by the parties to this Franchise.

41
42 If the claim, suit, or action for injuries, death, or damages as provided for
43 in this Franchise agreement is caused by or results from the concurrent
44 negligence of (a) Pierce County or Pierce County's agents or employees;
45 or (b) Grantee, or Grantee's agents or employees, the indemnity



1 provisions provided for in this Franchise shall be valid and enforceable
2 only to the extent of Grantee's negligence.

3
4 Grantee specifically and expressly waives any immunity under Industrial
5 Insurance Title 51 RCW, and acknowledges that this waiver was mutually
6 agreed upon by the parties herein.

7
8 VI

9 If, at any time, the County of Pierce shall vacate any County street, road or alley
10 that is subject to rights granted by this Franchise, the Pierce County Council may, at its
11 option, and by giving 30 days written notice to Grantee, its successors and assigns,
12 terminate this Franchise with reference to such County road, street, or alley so vacated
13 and the County of Pierce shall not be liable for any damages or loss to Grantee by
14 reason of such termination.

15
16 VII

17 If, at any time, a new County road is created or established, and constructed, or
18 an existing County road is reconstructed, realigned, or its grade is changed, or if sewer
19 or drainage facilities, or any other facilities within future or existing County road rights-
20 of-way are constructed, reconstructed, maintained, or relocated (all such work to be
21 called "County Projects" hereinafter) and if the installation of the facilities as allowed in
22 this Franchise, and all supplements and changes thereto, should interfere in any
23 manner with any such County Projects then Grantee at no expense to Pierce County
24 shall, upon notice, change the location or adjust the elevation of its facilities so that such
25 facilities shall not interfere with such County Projects.

26
27 When relocation of Grantee's facilities are required by such County Projects, the
28 following procedures shall be followed:

- 29
- 30 1. Pierce County shall make available to Grantee a list of anticipated projects
31 for each new budget period as soon as is reasonably possible.
 - 32
 - 33 2. Pierce County shall provide to Grantee two sets of preliminary plans for
34 individual projects as soon as such plans are developed to a state of
35 reasonable certainty, and shall advise Grantee of the anticipated date of
36 start of work on such projects.
 - 37
 - 38 3. Grantee shall, when requested by Pierce County in writing, locate its
39 facilities in the field, show those locations on one set of preliminary plans
40 provided, and return that set to Pierce County Public Works within four
41 weeks of receiving the written request.
 - 42
 - 43 4. Pierce County shall provide to Grantee final plans for such projects as soon
44 as such plans are available and shall confirm or correct the anticipated date
45 of start of work on such projects.
 - 46



- 1 5. Pierce County shall assist Grantee in determining how its facilities shall be
2 relocated. Such assistance by Pierce County shall include, at a minimum,
3 copies of plans (as required above) and specifications for such County
4 Projects, and information known to Pierce County as to existing survey
5 control available for location of such County Projects. Such assistance shall
6 not subject Pierce County to any liability for the costs of relocating the
7 subject facilities a second time if Grantee incorrectly relocated its facilities
8 the first time.
9
- 10 6. When requested, Pierce County and Grantee shall meet to discuss how
11 County Projects and utility relocations can be accomplished with the least
12 impact on the other. Pierce County's decision shall be final in such matters,
13 but shall not be unreasonable.
14
- 15 7. Relocation of Grantee's facilities shall be completed in a timely manner
16 defined as follows:
17
- 18 Relocation of Grantee's facilities shall normally be accomplished in
19 advance of County Projects. In the event relocation of Grantee's
20 facilities is done concurrently with such Projects, Pierce County shall
21 be so notified and agree to a written schedule for relocation.
22 Compliance with such a written schedule shall be Grantee's duty. In
23 no event shall relocation of Grantee's facilities interfere with County
24 Projects.
25
- 26 8. If Grantee does not relocate its facilities in a timely manner as required
27 above, Pierce County may relocate, or cause to be relocated, such facilities
28 of Grantee as Pierce County deems necessary, and in the manner Pierce
29 County deems necessary, in its sole discretion. Grantee hereby indemnifies
30 and holds Pierce County, its employees, officers, officials, and agents totally
31 free and harmless from all and any liability which may arise from damages
32 caused by the relocation by Pierce County of the facilities of Grantee, even
33 if such damages and liability arise from the negligence of Pierce County, its
34 employees, officers, officials, and agents.
35
- 36 9. Grantee hereby indemnifies and holds harmless Pierce County, its officers,
37 officials, and employees, from damages that may arise from Grantee's
38 failure to relocate its facilities in accordance with the dates for completion of
39 relocation of facilities set forth above, or any other act or omission by
40 Grantee, its contractor(s), agents, officers, or employees related to the
41 provisions of this Franchise.
42



- 1 10. It shall be conclusively presumed that Pierce County will have suffered
2 damages as a result of exercising its rights as set forth in Item 8 above, and
3 compensation for such damages will be difficult to ascertain, and therefore,
4 Grantee shall compensate Pierce County for such damages in the amount
5 of twice the amount of the cost of such relocation of Grantee's facilities by
6 Pierce County.
7
- 8 11. The exercise of its rights, as set forth in Item 8 above, by Pierce County in
9 no way relieves Grantee of completing and/or finalizing the relocation of its
10 facilities at no expense to Pierce County, if the relocation work done by
11 Pierce County is incomplete.
12
- 13 12. In the event a lawsuit is brought by Pierce County against Grantee to collect
14 damages presumed under Item 10 above for the exercise by Pierce County
15 of its rights under Item 8 above, Grantee hereby agrees the only issue will
16 be the actual cost to Pierce County for relocating Grantee's facilities. The
17 party prevailing in such an action shall be allowed its legal fees and costs.
18

19 VIII

20 Grantee shall not sell, transfer, or assign this Franchise without first notifying the
21 Pierce County Council. The terms and conditions set forth herein shall be binding on
22 Grantee's successors and assigns unless amended by the Council of Pierce County.
23

24 IX

25 This Franchise is granted upon the further express condition that it shall not be
26 an exclusive Franchise and shall not, in any manner, prohibit the County of Pierce from
27 granting any other Franchise under and along any of the said County roads of any kind
28 and character or territories that may be deemed proper by the Pierce County Council,
29 and this Franchise shall not in any way prevent the County of Pierce from using the
30 County rights-of-way, or affect the jurisdiction over them, and every part of them by the
31 County of Pierce with full power to make the necessary repairs, changes and alterations
32 in the same and like manner as though this Franchise had never been granted.
33

34 Pierce County reserves for itself the right to so change, amend, modify, or
35 amplify this Franchise to conform to any State statute, order of the Washington Utilities
36 and Transportation Commission, or County regulation, ordinance, or right-of-way
37 regulation, as may hereafter be enacted, adopted, or promulgated. This Franchise may
38 be terminated at any time upon 90 days written notice to Grantee to terminate this
39 Franchise if Grantee fails to comply with its terms and conditions, or if Grantee fails to
40 comply with such changes, amendments, modifications, or amplifications and upon
41 termination Pierce County shall have a lien upon all equipment and materials erected or
42 placed under this Franchise, which lien may be enforced to reimburse Pierce County for
43 any reasonable expenses and payments incurred in terminating this Franchise, and to
44 cure defaults by Grantee.
45



1 Grantee agrees to and shall provide available financial information to the County
2 upon reasonable request. Grantee agrees to and shall during regular business allow
3 agents of Pierce County access for inspection and reproduction of all of Grantee's
4 business records, gross revenue reports, or rules and regulations relevant to a
5 determination of the gross revenues received by Grantee from the area served by the
6 facilities permitted by this Franchise.
7

8 Furthermore, all Grantees shall, within 30 days after written demand thereof on
9 the anniversary of said grant, modification, amendment, renewal, or transfer of any
10 franchise, reimburse Pierce County for all direct and indirect costs and expenses
11 incurred by the County in the preceding 12 months in connection with any said
12 franchise. Any and all costs associated with providing service to County customers that
13 has been approved by Pierce County for invoicing shall be presented to the County on
14 the anniversary of the franchise.
15

16 X

17 In the event that the territory covered by this Franchise shall at any time during
18 the Franchise period be included within the limits of any incorporated city or town, the
19 authorities of said city or town shall have the right, to be exercised at their discretion, to
20 acquire by purchase or condemnation, any part of such pipes, conduits, and water
21 system other than transmission lines at a price to be based upon the reasonable value
22 of the same at the time, without any additional value for the Franchise or any unexpired
23 period thereof, and upon such acquirement, this grant and Franchise shall immediately
24 terminate, only that portion to be incorporated.
25

26 XI

27 Grantee acknowledges that Pierce County Charter Section 9.20 Franchises
28 provides in part: All Franchises shall be subject to the right of the Council, or the people
29 acting for them through referendum, to repeal for cause, amend, or modify the
30 Franchise in the interest of the public, and agrees to said condition.
31

32 XII

33 Any failure to render adequate service to the patrons of said water system, or the
34 discontinuance of such water services without fault on the part of the patron or patrons
35 involved, for a period of 30 days, shall work a forfeiture of this Franchise, at the
36 discretion of the Pierce County Council, unless the failure should result from causes
37 beyond human control.
38

39 XIII

40 Venue and jurisdiction for any controversy arising from the Franchise shall be in
41 Pierce County, Washington.
42



XIV

Grantee shall provide full acceptance of this Franchise and all its terms and conditions by filing a signed copy of the Franchise with the Clerk of the Pierce County Council within 60 days from March 17, 2018. This requirement shall be a condition precedent to the Franchise taking effect. If Grantee does not provide a signed copy of the Franchise as set forth in this Section, this Franchise shall be null and void.

Pursuant to RCW 36.55.080, a copy of this Franchise shall be recorded in the Office of the Pierce County Auditor.

DATED at Tacoma, Washington, this 7th day of March, 2018.



Bruce F. Dammeier
Pierce County Executive

Lakewood Water District accepts and agrees to comply with all terms and conditions of this Franchise.



Name Lawrence R. Ghilarducci, Jr.

Title President, Board of Commissioners

Lakewood Water District
Company Name

3/30/18
Date



AN ORDINANCE OF THE CITY OF LAKEWOOD, WASHINGTON, GRANTING TO THE LAKEWOOD WATER DISTRICT, A MUNICIPAL CORPORATION OF THE STATE OF WASHINGTON, ITS SUCCESSORS AND ASSIGNS, THE RIGHT, PRIVILEGE, AUTHORITY, AND NONEXCLUSIVE FRANCHISE, FOR TWENTY YEARS, TO CONSTRUCT, MAINTAIN, OPERATE, REPLACE, AND REPAIR WATER SYSTEMS, IN, ACROSS, OVER, ALONG, UNDER, THROUGH, AND BELOW THE PUBLIC RIGHTS-OF-WAY OF THE CITY.

WHEREAS, The Lakewood Water District, ("District"), a special purpose municipal corporation, owns and operates a water supply system located partially within the City of Lakewood ("City"), a municipal corporation; and

WHEREAS, the District and the City desire to enter into a franchise to install, operate, and maintain the District's water supply system in the public rights-of-way of the City; and

WHEREAS, the District has been a willing partner with the City in many important infrastructure projects; and

WHEREAS, the District has shown a continued willingness to partner with the City for use of their facility crossing under Interstate 5 to assist with the Tillicum/American Lake Garden sewer project; and

WHEREAS, the District has provided a reliable and cost effective service to the citizens of Lakewood; and

WHEREAS, the City Council has the authority to grant franchises for the use of its streets and other public properties (RCW-35A-47.040).

NOW, THEREFORE, THE CITY OF LAKEWOOD, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. Franchise Granted. Subject to the terms and conditions hereinafter set forth, the City grants to the district a franchise for a water supply and distribution system. The initial term of the franchise shall be twenty (20) years commencing on the date of acceptance by the district. Within the initial twenty (20) year term shall be one formal review period, which shall commence nine years into the initial term of the franchise with each party notifying the other of any of the following issues:

- Issues of capacity regarding fire flow when it is out of compliance with state law and regulations.
- Issues regarding water quality when it is out of compliance with either or both the local or state departments of health.

At the commencement of the tenth year of the initial term of the agreement, the parties shall have sixty (60) days to resolve any of the properly noticed issues from the above list or any issues that the parties mutually agree would benefit the franchise. Without resolution of the issues, the franchise shall terminate at the end of the tenth year.

Without review at the tenth year, or if the review resolves properly noticed issues, the initial term of the agreement shall continue to completion of the initial twenty (20) year term. At the expiration of the initial twenty (20) year term, the franchise shall automatically extend for an additional term of five (5) years, unless either party gives notice to the other written notice of termination at least six (6) months before the expiration date, At the expiration of the extended term, this franchise shall be automatically extended for an additional term of five (5) years, unless either party gives notice to the other written notice of termination at least six (6) months before the expiration date.

This franchise grants to the district the right, privilege, and authority to construct, operate, maintain, remove, replace, and repair all necessary facilities for a water supply and distribution system, in, under, on, across, over, through, along, or below the public right-of-way located in the City, as approved under City permits issued pursuant to applicable City codes and regulations.

Public "rights-of-way" means all public streets, roads, alleys, highways, and easements of the City as now or hereafter laid out, platted, dedicated, or improved. Whenever the City vacates a public right-of-way in which District facilities are located, the City shall reserve to the District a 20-foot easement for access to the facility for operation, maintenance, repair and replacement, which shall be described as ten feet in width on either side of the center line of the as built location of the District's facility as subject to and limited by the boundaries of the right-of-way being vacated.

Section 2. Non-Exclusive Franchise. This franchise is non-exclusive, and the City reserves the right to grant other or further franchises in, along, over, through, under, below, or across any of its public rights-of-way. This franchise shall in no way prevent or prohibit the City from using any of its public rights-of-way or other public properties or affect its jurisdiction over them or any part of them, and the City shall retain power to make all necessary changes, relocations, repairs, maintenance, establishment, improvement, and dedication of same, including the dedication, establishment, maintenance, and improvement of all new rights-of-way, thoroughfares, and other public properties of every type and description.

Section 3. Cooperative Administration.

A. Planning. The District and the City each recognize its respective obligation to plan in accordance with the laws of the State. In furtherance of that obligation, the District will prepare its comprehensive plan(s) consistent with the Washington State Growth Management Act, both substantively and procedurally, so that it is compatible with City planning documents and the planning documents of other jurisdictions that are served by, or are adjacent to, the District. To assure such compatibility, the District will solicit input from the City with regard to District planning activities early in the planning process, so that City comments may be considered by the District and, if appropriate, incorporated into the draft District plan(s). To facilitate the District's efforts to comply with Growth Management Act requirements, the City will supply the District with requested information in a timely manner.

B. Budgeting. The City recognizes that relocation costs impose a significant burden on the District's budget, particularly when such relocations are not anticipated. To reduce potential impacts from unanticipated relocations, the City shall provide the District with the City's current capital improvement plan and any future amendments thereto or replacements thereof. Understanding the city's final budget is not adopted until December, no later than the end of November of each year, the City shall provide the district with a list of Public Works improvement projects included in the preliminary budget planned for implementation the following year. In addition thereto, upon receipt of a Street Use permit application for work within the City right-of-way by a public or private applicant, the City will provide a copy thereof to the District.

C. District Facilities. The City will require its contractors and private parties when constructing within the right-of-way with City permission or when doing maintenance work within the right-of-way which could impact District facilities to exercise due care to protect District facilities and to apply District standards when working near District facilities, provided that the District has provided the City a copy of its construction standards.

Section 4. Relocation of Water System Facilities.

4.1 The District shall, at its sole cost and expense, protect, support, temporarily disconnect, relocate, or remove from any public right-of-way within the City's corporate limits as it exists now or in the future, any of its installations when so required by the City by reason of traffic conditions or public safety, dedications of new rights of-way and the establishment and improvement thereof, widening and improvement of existing rights-of-way, street vacations, freeway construction, change or establishment of street grade, or the construction within the right-of-way by the City of any public works project provided that, with City approval, the District may temporarily bypass, in the authorized portion of the same street, any section of main required to be temporarily disconnected or removed. Provided, however, the City and the District shall be 50/50 responsible for costs associated with City facilities that generate revenue such as storm drainage or sanitary sewer facilities excluding those relocations where the District failed to comply with its obligations under chapter 19.122 of the RCWs or legal obligations.

4.2 Any condition or requirement imposed by the City upon any person or entity which reasonably necessitates the relocation of the District's facilities within the franchise area shall be a required relocation under subsection 4.1, subject to the District's right to establish terms for such utility relocation with such person; provided, such arrangements do not unduly delay a City construction project. Whenever the cost of relocating District facilities results from improvements installed pursuant to a City formed local improvement district or a utility local improvement district, the cost of such relocation shall be paid by the City and District, 50/50.

4.3 Except as stated in section 4.5 herein, if the City determines that a project necessitates the relocation of District facilities, the City shall:

A. At least ninety (90) days before commencement of the improvement project, provide the District with written notice requiring a utility relocation; provided that, the City shall notify the District of a relocation required by a City capital improvement project as soon as the City acting with reasonable diligence learns that relocation of utilities are required; and

B. Provide the District with copies of pertinent portions of 30 percent plans for such improvement project and a proposed location for District facilities so that the District may relocate its facilities in other City rights-of-way in order to accommodate such improvement project.

C. After receipt of such notice and such plans and unless the City disagrees that the relocation should occur in conjunction with the City's project, the District shall complete relocation of its facilities at least ten (10) days prior to commencement of the City's project at no charge or expense to the City. Relocation shall be accomplished in such a manner as to accommodate the City's project. The District shall not be considered in breach of this Section if the City fails to give the required notice or if it is delayed by the time required

(i) to comply with state bid law requirements for contracting out any of the relocation work and the District has diligently pursued the award of the necessary contract; or

(ii) to obtain or comply with any permits necessitated by environmental or endangered species requirements.

D. The District shall not be required at its own expense to relocate the same portion of its facilities more than once for each project. Should the District relocate facilities and it is subsequently requested to relocate the same facilities again within five years of the date of the original relocation, the City shall bear the expense.

4.4 Except as stated in section 4.5 herein, the District may submit to the City written alternatives to any requested relocation, to which the City shall give full and fair consideration. The District shall submit additional information requested by the City to aid its evaluation. The City shall advise the District in writing if one or more of the alternatives are acceptable. If the City determines that no other reasonable or feasible alternative exists, the District shall relocate its facilities as otherwise provided in this Section.

4.5 Where the City has relied upon the as-built maps, plans, and/or the best available information submitted by the District to determine that the District's pipe and/or facilities (live/or abandoned) will not be affected by a proposed City improvement project, and subsequently during the construction of the City improvement project, the City finds that the District's pipe and/or facilities are in the construction area, the City shall notify the District, and the District shall expeditiously remove and relocate it facilities.

4.6 The District may establish terms for any utility relocation that is requested by a third party if the utility is not being relocated at the direction of the City; provided such arrangements do not unduly delay a City construction project.

Section 5. Maps and Records. After construction of new facilities in the City rights-of-way, the District shall provide to the City, upon request and at no cost, a copy of all as-built plans, maps, and records detailing the location and condition of its facilities within the public rights-of-way and public places.

Section 6. Abandonment of Water Pipe and System Facilities. Whenever the District proposes to abandon in place any District property containing asbestos cement that is located in right-of-way, the District shall provide the City with (1) as-built drawings showing the location of the facilities to be abandoned; and (2) written documentation showing its plans for compliance with all applicable regulations pertaining to abandonment of asbestos materials.

Whenever a conflict cannot be resolved except by removal from the right-of-way of abandoned district property containing asbestos, then the District shall, at the District's expense, remove that abandoned property. In removing such material, the District shall conform to all local, state, and federal regulations applicable to asbestos abatement.

Section 7. Excavations. All work performed by the District or its contractors shall be accomplished in a safe and workmanlike manner and in a manner that will minimize interference with traffic and the use of adjoining property. The District shall post and maintain proper barricades and comply with all applicable safety regulations during construction as required by the ordinances of the City or the laws of the State of Washington.

The District shall submit to the Director or Public Works or his/her designee ("Director") for review and approval the requested number of plan sets drawn to an accurate scale showing the location, character, position, dimension, depth, and height of the work to be done. The plans shall provide sufficient detail, as determined by the Director with respect to the relative position and location of all pipes, conduits, mains, manholes, facilities, and appurtenances to be constructed, laid, re-laid, installed, replaced, repaired, connected or disconnected, and the existing street, avenue alley, highway, right-of-way or property line including the local improvements therein.

Except as otherwise provided herein, the District shall apply for and secure all necessary City permit(s) to work in the public rights-of-way and, in addition, shall give the City at least five (5) working days' notice of its intent to commence work in the public rights-of-way.

If either party plans to excavate in the public rights-of-way, then upon a written request from the other, that party may share such excavation upon mutually agreed terms and conditions.

Section 8. Restoration. After completion of work in a public right-of-way, the District shall restore the surface of the right-of-way to a condition as good as or better than existed immediately prior to the work and to the standards established on the approved plans, or permit conditions, whichever is greater. The Public Works Director shall have final approval of the condition of such streets and public places after restoration, such approval not being unreasonably withheld. All concrete encased monuments which have been disturbed or displaced by such work shall be restored pursuant to all federal, state, and local standards and specifications. The District shall complete all restoration work promptly and promptly repair any damage caused by such work.

Section 9. Emergency Work—Permit Waiver. Whenever a District facility located in a right-of-way endangers property, health, or safety, the District shall immediately take proper emergency measures, without first obtaining a permit as required by this franchise. However, the District shall notify the City of the work no later than the next succeeding business day and apply for a right-of-way permit within two (2) business days.

Section 10. Dangerous Conditions, Authority for City to Abate. If work related to facilities authorized by this franchise endangers property or the public's health and safety, the Public Works Director may direct the District, at the District's own expense, to take appropriate protective action, including compliance within a prescribed time. Unless otherwise notified in writing by the District, the City shall notify the District as follows: name: _____; phone number: _____; cell/pager number: _____.

If the District does not comply with such directions, or if immediate action is required to protect property or the public's health and safety, the City may take reasonable emergency measures, and the District shall be liable to the City for the costs thereof.

Section 11. Indemnification. The District shall release, indemnify, and defend the City, its officers, employees, agents, and representatives from any and all claims, costs, judgments, awards, or liability to any person for injury or death of any person or damage to property caused by or arising out of the negligent acts or omissions of the District, its agents, servants, officers, or employees, performed under authority of this franchise; provided, that for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the District and the City, its officers, employees, and agents, the District's obligation shall be only to the extent of the District's negligence. This indemnification includes claims by the District's own employees for which the District might otherwise be immune under Title 51 RCW, and the District waives its immunity under Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties.

The foregoing obligation and waiver shall also extend to any claims, costs, judgments, awards, fines or penalties or liability to any person for injury or death of any person or damage to

property caused by or arising out of the District's abandonment or removal of asbestos material under section 6.

Inspection or acceptance by the City of any work performed by the District at the time of completion of construction shall not relieve the District of any of its obligations under this Section.

If a court or other tribunal agreed upon by the parties determines that the District wrongfully refused the tender of defense in any suit or any claim made pursuant to this indemnification provision, the District shall pay all of the City's costs for defense of the action, including all expert witness fees, costs, and attorney's fees, including costs and fees incurred in recovering under this indemnification provision.

Section 12. Insurance. The District shall procure and maintain for the duration of the franchise, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the exercise of the rights, privileges, and authority granted hereunder to the District, its agents, representatives, or employees. The District shall provide an insurance endorsement, naming the City as an additional insured, to the City for its inspection prior to the adoption of this franchise Ordinance, and such endorsement shall evidence a policy of insurance that includes:

- A. Automobile Liability insurance with limits no less than \$1,000,000 Combined Single Limit per occurrence for bodily injury and property damage; and
- B. Commercial General Liability insurance, written on an occurrence basis with limits no less than \$1,000,000 combined single limit per occurrence and \$2,000,000 aggregate for personal injury, bodily injury, and property damage. Coverage shall include but not be limited to: blanket contractual; products and completed operations; broad form property damage; explosion, collapse, and underground (XCU); and employer's liability.

The District may satisfy the requirements of this section by a self-insurance program or membership in an insurance pool providing coverage substantially the same as set forth above.

Section 13. Agreement not to Compete – Non-Assumption.

13.1. a. Each year during the term of this franchise, the District agrees to pay to the City annually an amount equal to (6%) of the total prior year's water operating revenue billed to property within the City of Lakewood's city limits. This payment may be recovered from the affected customer and reflected on that customer's monthly bill as a separate line item.

b. In consideration of the District's agreement to allow the City to use, without charge, the District's bore under Interstate 5 and the railroad tracks within Sound Transit's right of way at Tillicum for sewer line purposes in perpetuity, the City agrees that unless both parties agree

otherwise the amount established in 13.1 a shall not increase during the term of this franchise. Further the District grants to the City the right to transfer its sewer purposes rights granted herein to Pierce County and that these rights shall continue on in perpetuity and shall survive the expiration of this franchise agreement.

13.2 For the purposes of this section 13, "operating revenue" is defined as accrued revenue realized from selling water to the District's retail customers located within the City, excluding the 6% paid under section 13.1 by the District's water customers and any state excise tax imposed thereon. District "operating revenue" shall be recorded and reported on the District's financial statements as of December 31 of the prior fiscal year.

13.3 The District shall determine the amount payable to the City before the end of first quarter of the next calendar (fiscal) year. The District shall pay one-fourth amount payable to the City no later than thirty days after the end of each calendar quarter.

13.4 Upon the City's request, the District shall, within thirty days, make available to the City for examination, audit and review the District's books and records pertaining to all revenue derived by the District by virtue of this Franchise, to verify the accuracy of payments. The City shall maintain confidentiality of information provided by the District to the extent permitted by law when the District has notified the City of the confidential nature of the information.

13.5 Should such a review result in the discovery of an error in payment (over or under payment), the City shall notify the District in writing of its findings and the error shall be mitigated by the District in the next quarterly payment cycle.

13.6 In consideration of the payments to the City made under this section 13, the City shall not (1) establish a City owned water utility, or (2) exercise its current statutory authority under Chapter 35.13A RCW (or as that chapter may be amended or recodified) to assume jurisdiction over the District or any part thereof during the term of this Franchise, provided, ~~however, a successful citizen's initiative that results in either an assumption of the District or creation of a City water utility shall terminate the City's obligation to forebear as provided in this paragraph 13.6 and the District's obligation to make payment under paragraph 13.1 hereof.~~

~~13.7 The City shall defend, indemnify, and hold the District harmless from and against any and all claims, suits, actions or liabilities (including litigation costs and attorney's fees) arising from or in any way related to the imposition of the water surcharge, its collection from its customers, or payment thereof to the City.~~

Section 14. Modification. The terms and conditions of this franchise may be modified upon written agreement of the parties.

Section 15. Forfeiture and Revocation. If the District willfully fails to comply with any provision of this franchise, or through willful misconduct or gross negligence fails to comply with

any notice given the District by the City under the provisions of this franchise, then this franchise may be revoked by the City Council after a hearing held upon notice to the District.

Section 16. Remedies to Enforce Compliance. In addition to any other remedy, the City may obtain a superior court order compelling the District to comply with the provisions of this Ordinance and seek to recover damages and costs incurred by the City by reason of the District's failure to comply. The pursuit of any right or remedy by the City shall not prevent the City from acting under Section 14.

Section 17. City Ordinances and Regulations. This franchise shall not prevent the City from adopting and enforcing all necessary and appropriate ordinances regulating the performance of the conditions of this franchise, including any valid ordinance made in the exercise of its police powers. The City retains its authority to control by reasonable regulations the location, elevation, manner of construction, and maintenance of District water delivery facilities in the public rights-of-way, and the District shall conform with all such regulations, unless compliance would cause the District to violate other requirements of law. In the event of a conflict between the provisions of this franchise and any other ordinance(s) enacted under the City's police power, such other ordinance(s) shall take precedence.

Section 18. Cost of Publication. The cost of the publication of this Ordinance shall be born by the District.

Section 19. Acceptance. Unless extended by Ordinance, the District shall have sixty (60) days after the passage and approval of this Ordinance to file with the City Clerk its unconditional written acceptance of this franchise; otherwise, the District shall be deemed to have rejected this franchise.

Section 20. Survival. Sections 4, Relocation of Water Facilities; 6, Abandonment of Water Pipe and System Facilities; 7, Excavation; 8, Restoration; 10, Dangerous Conditions, Authority for City of Abate; and 11, Indemnification shall be in addition to any and all other obligations and liabilities the District may have to the City at common law, by statute, or by contract, and shall survive the City's franchise to the District for the use of the City rights-of-way. This Ordinance is binding upon the successors and assigns of the District and all privileges, as well as all obligations and liabilities of the District shall inure to its successors and assigns.

Section 21. Assignment. This franchise may not be assigned or transferred without the written approval of the City, which shall not be unreasonably withheld.

Section 22. Notice. Any notice required or permitted by this franchise may be sent to the following addresses unless otherwise specified in writing:

CITY OF LAKEWOOD
Public Works Director
6000 Main St. SW
Lakewood, WA 98499-5027

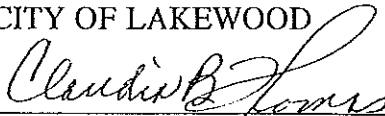
LAKEWOOD WATER DISTRICT
General Manager
11900 Gravelly Lake Drive SW
P.O. Box 99729
Lakewood, WA 98496

Section 23. Severability. If any section, sentence, clause, or phrase of this Ordinance should be held to be invalid or unconstitutional by a court, the validity or constitutionality of any other section, sentence, clause, or phrase of this Ordinance shall not be affected, unless the rights, privileges, duties, or obligations hereunder are materially altered, whereupon either party may request renegotiation of these remaining terms. The parties retain the right to modify the terms and conditions of the franchise upon written agreement.

Section 24. Effective Date. This Ordinance, being an exercise of a power specifically delegated to the City legislative body, is not subject to referendum, and shall take effect (5) days after passage and publication of an approved summary thereof consisting of the title.


APPROVED by the Lakewood City Council this 18th day of Dec, 2006.

CITY OF LAKEWOOD



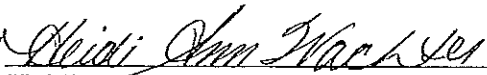
Claudia B. Thomas, Mayor

ATTEST/AUTHENTICATED:



Alice M. Bush, MMC, CITY CLERK

APPROVED AS TO FORM:

BY 

Heidi Ann Wachter, City Attorney

FILED WITH CITY CLERK: 12-18-06
PASSED BY THE CITY COUNCIL: 12-18-06
PUBLISHED: 12-21-06
EFFECTIVE DATE: 12-25-06

ACCEPTANCE OF FRANCHISE

The Lakewood Water District accepts the nonexclusive franchise to the City of Lakewood approved by the Lakewood City Council on Dec 18, 2006, by the adoption of Lakewood City Ordinance No. 434.

DATED this 21st day of December, 2006.

LAKWOOD WATER DISTRICT

By: 
President, Board of Commissioners

1 Sponsored by: Councilmember Derek Young
2 Requested by: Executive/Planning and Public Works
3
4

5 **RESOLUTION NO. R2018-39s2**
6

7 **A Resolution of the Pierce County Council Updating the Pierce County**
8 **Water Utility Coordinating Committee (WUCC) Membership and**
9 **Authorizing the WUCC to Review and Recommend an Update to**
10 **the Pierce County Coordinated Water System (CWSP), and**
11 **Approving the Scope of the CWSP Update.**
12

13 **Whereas**, the "Water Resources Act" of 1971, RCW 90.54, sets forth the State's
14 fundamentals for water resource management intended to ensure that the waters of
15 the State will be protected and fully utilized for the greatest benefit to the people of the
16 State; and
17

18 **Whereas**, on March 8, 1983, the Pierce County Council passed Ordinance No.
19 83-9 declaring Pierce County a critical water supply service area pursuant to Revised
20 Code of Washington (RCW) 70.116; and
21

22 **Whereas**, the last update to the Pierce County CWSP occurred on October 6,
23 2003 through Ordinance 2003-69; and
24

25 **Whereas**, since the last update of the Pierce County CWSP many changes have
26 occurred relating to water resource, water supply, and land use planning; and
27

28 **Whereas**, a review and update of the Pierce County CWSP would make it more
29 applicable to current and anticipated issues, and is provided for under law; and
30

31 **Whereas**, the Pierce County WUCC was created by the Pierce County Council
32 through Resolution No. R83-130, which identified the criteria for committee
33 composition including water purveyors with over fifty (50) service connections; and
34

35 **Whereas**, the WUCC membership was last updated on June 24, 2008 through
36 Resolution No. R2008-84; and
37

38 **Whereas**, Washington Administration Code (WAC) 246-293-150 directs Pierce
39 County to establish a Water Utility Coordinating Committee (WUCC) within thirty (30)
40 days following the declaration of a critical water supply service area; and
41



1 **Whereas**, WAC 246-293-150 states composition of the WUCC shall consist of
2 one representative from each of the following:

- 3
4 a. County legislative authority within the declared area;
5 b. County planning agency having jurisdiction within the declared area;
6 c. Health agency having jurisdiction within the declared area under Chapters
7 70.08, 70.05, 43.20 RCW; and
8 d. Water purveyors with over fifty (50) services within the declared area; and
9

10 **Whereas**, WAC 246-293-150 allows that other interested persons may also be
11 appointed as nonvoting members of the WUCC; and
12

13 **Whereas**, the process to update the Pierce County CWSP will begin in 2018;
14 and
15

16 **Whereas**, the WUCC is the responsible stakeholder group to review and
17 recommend updates to the CWSP; and
18

19 **Whereas**, the designation of WUCC members needs to be updated to reflect the
20 current status of water purveyors with over fifty (50) service connections and other
21 interested parties; and
22

23 **Whereas**, Pierce County recognizes that there are other State statutes that
24 govern water purveyors; and
25

26 **Whereas**, the County recognizes the Pierce County CWSP does not supersede
27 the authorized powers and functions as set out in State statutes and applicable
28 regulations; and
29

30 **Whereas**, per RCW 70.116.060, any revisions to the CWSP must be approved
31 by the Washington State Department of Health; and
32

33 **Whereas**, it is efficient and productive to establish the scope of the CWSP
34 update and identify the topics that will be and will not be addressed in the update of the
35 Pierce County CWSP; **Now Therefore**,

36
37 **BE IT RESOLVED by the Council of Pierce County:**
38
39
40



1 Section 1. The Pierce County Council hereby updates the Water Utility
2 Coordinating Committee (WUCC) membership and authorizes the WUCC to reconvene
3 to review and update the County's Coordinated Water System Plan (CWSP) consistent
4 with the topics identified in Exhibits C and D, which are attached hereto and
5 incorporated herein by reference.

6
7 Section 2. The voting and nonvoting membership of the WUCC is hereby
8 updated, consistent with RCW 70.116 and WAC 246-293-150, as identified in Exhibit
9 A, which is attached hereto and incorporated herein by reference. Each entity listed
10 shall select its own representative.

11
12 Section 3. The Pierce County Council shall annually appoint a Councilmember to
13 serve on the WUCC.

14
15 Section 4. The amended WUCC Rules and Procedures, as identified in Exhibit C,
16 are hereby adopted to establish rules for conducting business, including voting
17 procedures, and appointing a Chair.

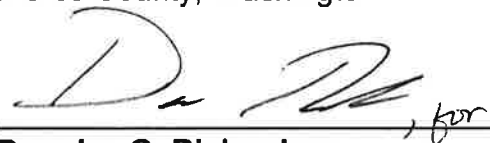
18
19 Section 5. The Pierce County Council acknowledges and approves the scope of
20 the CWSP update as identified in Exhibit D. The WUCC shall transmit any
21 recommended revisions to the CWSP to the County Executive and County Council for
22 review and adoption.

23
24 **ADOPTED** this 22nd day of May, 2018.

25
26 ATTEST:

27 **PIERCE COUNTY COUNCIL**
28 Pierce County, Washington

29
30 
31 **Denise D. Johnson**
32 Clerk of the Council

33
34 
Douglas G. Richardson, for
Council Chair



Water Utility Coordinating Committee (WUCC) – Voting Membership

- A. Pierce County Councilmember Representative
- B. Pierce County Planning and Public Works Representative
- C. Tacoma-Pierce County Health Department Representative
- D. One representative from each of the following water purveyors with over fifty (50) service connections including:
 1. Alpine Village Property Owners
 2. Ashford Water District
 3. Bethel Green Acres Water Association
 4. Bethel Water Company
 5. Blue Horizon Water Company
 6. Camp Benbow
 7. Canterbrook Village Apartments
 8. Canterwood Water System
 9. Cherrywood Mobile Home Manor
 10. City of Bonney Lake
 11. City of Buckley
 12. City of DuPont
 13. City of Eatonville
 14. City of Fife
 15. City of Fircrest
 16. City of Gig Harbor
 17. City of Milton
 18. City of Orting
 19. City of Puyallup
 20. City of Roy
 21. City of Sumner
 22. City of Tacoma
 23. Clear Lake Water District
 24. Coach Country Corral
 25. Cougar Rock Campground
 26. Crestview Mobile Manor
 27. Crystal Mountain Inc.
 28. Crystal River Ranch Association
 29. Crystal Village I, II, III
 30. East Gig Harbor Water District
 31. Eric G. Sandstrom VFW 969
 32. Firgrove Mutual Inc.



- 1 33. Forest Beach Water System
- 2 34. Forest Hills Water System
- 3 35. Fox Island Mutual Water Association
- 4 36. Fruitland Mutual Water Company
- 5 37. Gig Harbor RV Resort
- 6 38. Graham Hill Mutual Water Company Inc.
- 7 39. Harbor Country Apartments
- 8 40. Harborland Mobile Park
- 9 41. Hillcrest Mobile Home Park
- 10 42. HMC Management Water System
- 11 43. Joint Base Lewis-McChord
- 12 44. Kopachuck Ridge Water District
- 13 45. Lake Holiday Association
- 14 46. Lake Josephine Riviera
- 15 47. Lake of the Woods Community Club
- 16 48. Lakewood Water District
- 17 49. Loveland Mobile Estates
- 18 50. Majestic Mobile Manor
- 19 51. Marion Water Company, Inc.
- 20 52. McKenna Water District
- 21 53. McNeil Island Water
- 22 54. Meridian Terrace Mobile Home Park
- 23 55. Minter Beach Estates
- 24 56. Mountain View - Edgewood Water Company
- 25 57. Northwest Trek
- 26 58. Olman Point Tracts Club
- 27 59. Olympic Sunset West
- 28 60. One Point Fosdick Water Company
- 29 61. Parkland Light & Water Company
- 30 62. Peninsula Light
- 31 63. Point Fosdick
- 32 64. Rainbow Resort
- 33 65. Rainier Ranch Maintenance Association
- 34 66. Rainier View Water Company
- 35 67. Riverside Villa
- 36 68. Shore Acres Water Company
- 37 69. Spanaway Village Water System
- 38 70. Spanaway Water Company
- 39 71. State – Rainier School
- 40 72. Stroh's Water Company Inc.
- 41 73. Summit Water & Supply Company
- 42 74. Sunrise Terrace Community LLC
- 43 75. Sunwood Graham
- 44 76. Tacoma Country Estates



- 1 77. Tapps Island Water System
- 2 78. Taylor Bay Beach Club Inc.
- 3 79. Thurston County PUD
- 4 80. Town of Carbonado
- 5 81. Town of South Prairie
- 6 82. Town of Steilacoom
- 7 83. Town of Wilkeson
- 8 84. Twin Firs Mobile Estates
- 9 85. Uncle John's RV Park & Mini Storage
- 10 86. Valley Water District
- 11 87. Washington State Corrections – Women
- 12 88. Washington Water Service
- 13 89. Weatherswood Vista Water District
- 14 90. West Wynd
- 15 91. Western Ranchettes, Inc.
- 16 92. Western State Hospital
- 17 93. Winchester Mobile Homes Water
- 18 94. Wollochet Harbor Club, Inc.
- 19
- 20



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Water Utility Coordinating Committee (WUCC) – Nonvoting Membership

Note: Water purveyors that are also SMAs are not reflected in this list because they are a voting member.

- A. Cascade Water Alliance
- B. Chambers-Clover Creek Watershed Council
- C. Clearwater Utility Services LLC (SMA #146)
- D. Master Builders Association Representative
- E. Muckleshoot Indian Tribe Representative
- F. Nisqually Indian Tribe Representative
- G. Northwest Water Systems (SMA #119)
- H. Pierce Conservation District
- I. Pierce County Department of Emergency Management Representative
- J. Pierce County Fire Chief’s Association Representative
- K. Pierce County Fire Prevention Bureau Representative
- L. Pierce County Stormwater Management Representative
- M. Puyallup Indian Tribe Representative
- N. Squaxin Island Indian Tribe Representative
- O. Tacoma-Pierce County Board of Realtors Representative
- P. U.S. Geological Service Representative
- Q. Washington State Department of Ecology
- R. Washington State Department of Health Representative

**Rules and Procedures for
Pierce County Water Utility Coordinating Committee (WUCC)**

Purpose

The WUCC shall serve in an advisory capacity to recommend updates to the Coordinated Water System Plan (CWSP) for Pierce County and conduct review of the CWSP.

Function

In carrying out its general purpose, the WUCC may consider or make recommendations on:

1. Applicable state laws;
2. Implementation of the Washington State Watershed Management Act (RCW 90.82) for Water Resource Inventory Areas (WRIAs) located within Pierce County;
3. Establishment or modification of water service areas and reconciliation of any conflicts between claimed water service areas within Pierce County;
4. Water supply and demand forecasting within Pierce County and regional efforts that may impact Pierce County;
5. Identification of water sources and interties between purveyors in Pierce County;
6. Minimum standards and specifications for planning, design, and construction of water supply facilities in Pierce County;
7. Satellite System Management Program;
8. Dispute resolution process;
9. Well inspection and decommissioning permit process;
10. Implementation of the CWSP;
11. Resolution of any service area or timely and reasonable disputes; and
12. Other topics specifically identified by County Council Resolution to be addressed through a CWSP update process.

Membership Composition

1. The WUCC shall consist of one representative from each of the following:
 - a. County legislative authority within the declared area (all of Pierce County);
 - b. County planning agency having jurisdiction within the declared area;
 - c. Health agency having jurisdiction within the declared area under Chapters 70.08, 70.05, and 43.20 RCW; and
 - d. Water purveyor with over fifty (50) services within the declared area.
2. WAC 246-293-150 allows that other interested persons may also be appointed as nonvoting members of the WUCC. Exhibits A and B to Resolution No. R2018-39s2



1 identify the voting and nonvoting membership of the WUCC. Each entity listed shall
2 select its own representative to participate in WUCC activities and meetings.

- 3 3. New voting members and nonvoting members may only be added or deleted
4 through County Council authorization.
- 5 4. WUCC voting members should designate a primary and alternate representative. In
6 addition, other individuals who either work for, or are on the elected governing
7 board of, that entity may also serve as a WUCC representative.

8

9 Officers

- 10 1. The WUCC shall elect a Chair and Vice Chair from the voting membership. The
11 roles of the Chair and Vice Chair are as follows:
- 12 a. The Chair shall serve as the presiding officer of the WUCC including:
13 communicate with Pierce County Planning and Public Works (PPW) staff to
14 propose meeting topics and agenda items, evaluate the implementation needs
15 for the CWSP, and sign any formal WUCC correspondence regarding
16 recommendations to the Pierce County Executive, County Council, or State
17 agencies.
- 18 b. The Vice Chair shall perform the duties of the Chair in the absence of the
19 Chair.
- 20 2. The Chair and Vice Chair shall serve for a one-year term, and may be reappointed
21 into those positions for consecutive years up to a total of four consecutive terms.
- 22 3. If the Chair is unable to fulfill a complete full annual term, the Vice Chair shall serve
23 as Chair for the remainder of the year. The Vice Chair position shall be nominated
24 and elected by the voting membership at the next regularly scheduled meeting to
25 serve for the remainder of the year.
- 26 4. The Pierce County PPW staff shall serve as the secretary for the WUCC.
- 27 5. Should both the Chair and Vice Chair be absent from a meeting, the Pierce County
28 PPW staff shall serve as Acting Chair during the meeting.

29 Meeting Notice, Agendas, Recording, and Meeting Summaries

- 30 1. A minimum of 5 business days' prior written notice of any meeting shall be provided
31 to all members. When possible, meeting notice via electronic email shall be used in-
32 lieu-of standard paper mailings.
- 33 2. The Pierce County PPW staff, in consultation with the WUCC Chair or Vice Chair,
34 will prepare a proposed agenda for each scheduled meeting.
- 35 3. Each meeting agenda shall provide an opportunity, under Other Business, for the
36 members or visitors to raise issues not already discussed at the meeting.
- 37 4. The Pierce County PPW staff shall record substantive motions in writing, record
38 votes by a call for the vote and show of hands, and prepare a meeting summary
39 which shall be considered, revised (if necessary), and adopted by the WUCC at its
40 next regular meeting.
- 41 5. The Pierce County PPW staff shall maintain a written summary of WUCC business
42 and meetings. Copies of the WUCC meeting materials shall be kept in the Pierce
43 County PPW archives pursuant to a retention schedule approved by Records
44 Specialist assigned to Planning and Public Works and the State Archivist.



1
2 Rules of Operation

- 3 1. The WUCC shall adopt Rules and Procedures before it transacts any business. The
4 rules contained in the current edition of "Robert's Rules of Order" shall govern the
5 WUCC in all cases to which they are applicable and in which they are not
6 inconsistent with these Rules and Procedures. In cases where Robert's Rules of
7 Order are in conflict with, or contrary to these rules, these rules shall govern.
8
9 2. The Rules and Procedures may be amended by the WUCC at any regular or
10 special meeting through a vote by a quorum of voting members. Amendments shall
11 become effective at the next regularly scheduled meeting after the date of the
12 meeting where the amendment was enacted.
13

14 Quorum

- 15 1. A quorum for the WUCC for the purpose of conducting a WUCC meeting shall be
16 five (5) voting members. A quorum for the WUCC for the purpose of voting on
17 formal actions or recommendations shall be 10 voting members. Decisions of the
18 committee shall be by majority vote of those present at meetings of the committee.
19 2. In the event of a lack of a voting quorum at a regular, continued, or special meeting,
20 the Chair or acting Chair may decide to continue the meeting discussion, but no
21 formal votes on actions or recommendations may be conducted until such time a
22 quorum of voting members is present.
23

24 Meeting Participation, Discussion, and Voting Privileges

- 25 1. The WUCC meetings serve as a forum for drinking water issues in Pierce County,
26 and participation in WUCC meetings is voluntary.
27 2. Voting Members shall be entitled to participate in meeting discussions and voting,
28 when necessary, as follows:
29 a. Each voting member of the WUCC shall be entitled to one vote.
30 b. A tie or a failure to vote on any motion shall be considered a failed motion.
31 c. Failure to reach a formal recommendation shall not be cause to delay the
32 County's decision on any related legislative or quasi-judicial action being
33 reviewed, but rather, shall result in no recommendation being transmitted to
34 the County.
35 d. All votes shall be polled by a show of hands and recorded.
36 3. The nonvoting members may participate in all discussions and activities of the
37 WUCC, but shall not be entitled to participate in the voting process on formal
38 actions or recommendations.
39 4. Voting and nonvoting members and visitors at the meetings will treat each other
40 with respect, will not monopolize meeting time, and will listen to and try to
41 understand each other's views.
42 5. The Chair may reserve the right to limit the amount of time for discussion by each
43 voting and nonvoting member and visitors.
44 6. All meetings are considered open public meetings pursuant to the Open Public
45 Meetings Act of 1971.



1 7. Subcommittees of the WUCC may be established to consider specific topics as
2 assigned by the voting membership. Any subcommittee recommendation shall be
3 referred to the WUCC for final action.
4

5 Recommendations

- 6 1. In the event the WUCC conducts a public meeting regarding an issue subject to the
7 review authority of another body, any formal recommendation of the WUCC shall be
8 forwarded to that body at least 10 business days prior to the date of the public
9 hearing. Failure to do so shall not be cause to continue or delay the scheduled
10 public hearing.
11 2. The WUCC's written recommendation must contain all concerns to be considered,
12 including any minority positions. Any oral presentation by a WUCC member shall
13 only be permitted to clarify the written recommendation, and any presentation by a
14 WUCC member which goes beyond clarifying the written recommendation shall be
15 considered a personal recommendation.
16 3. All written recommendations of the WUCC must contain a summary of the WUCC's
17 action and specify the vote on said matters.
18

19 Coordination

20 The Planning and Public Works Department shall coordinate all matters relating to
21 WUCC actions, including but not limited to: administration of the meetings, providing
22 required notice for meetings, keeping records of meetings and decisions, documenting
23 the WUCC's rules of procedure, forwarding recommendations of the WUCC to the
24 County Executive and Council, processing any proposed amendments to the CWSP,
25 maintaining current service area designation maps and resolution of any service area
26 conflicts; and providing information needed to conduct its review and analysis.



**Pierce County Coordinated Water System Plan Update
Scope of Topics**

Note: This is the first major update of the Coordinated Water System Plan (CWSP) adopted by Ordinance 2003-69 on September 23, 2003 as required by WUCC.

Required Topics to be Reviewed/Updated

- Individual water system plans (relationship to CWSP)
- Retail service area designations (function and process to establish/amend/appeal boundaries)
- Assessment of the feasibility of shared source (i.e. regional water sources including Pierce County's Chambers Creek properties)
- Assessment of the feasibility of shared transmission
- Assessment of the feasibility of shared storage facilities (wholesale vs fire flow)
- Emergency interties (existing and potential opportunities/benefits)
- Design standards (review/update of minimum design standards for water systems including emergency interties and fire flow requirements)

Additional Topics to be Reviewed/Discussed/Incorporated/Updated

- Intent of CWSP (why required)
- Population growth projections/sub-area growth rates encompassing Group A systems required to plan per WAC 246-290-100
- A countywide water supply/demand analysis (compilation of existing information)
- A review/revision of the utility service review procedure
- A review/revision of policies regarding satellite management agencies
- Incorporation of provisions of the State Municipal Water Law of 2003, including the definition of municipal water supplier, required water use efficiency measures, and water loss control
- The identification and explanation of relevance of all existing water resource management efforts, including but not limited to, water resource plans, water quality plans, sewer plans, watershed restoration and enhancement plans, and water pollution control plans which have been adopted by Pierce County or regional and State government within the Critical Water Supply Service Area (CWSSA) boundaries
- Failed water system receivership policies and process
- Identify strategies to encourage regionalization of water systems/discuss potential alternatives to consolidation
- Wholesale water (i.e. establishment of service areas and expansion of water rights)
- Permitted uses within wellhead protection areas
- Timely and reasonable water service



- 1 • Relationship between RCW/WAC regulations and the Tacoma-Pierce County
- 2 Health Department associated with individual wells within designated retail
- 3 service areas
- 4 • Reference to governing structures for the different type of water
- 5 systems/purveyors
- 6 • Background information explaining why proactive water system (capital)
- 7 investments may be necessary
- 8 • Providing reclaimed water within another's retail service area
- 9 • Dispute Resolution Process

10
11 Issues Not Within the Scope of Update

- 12 • Water system charges and rates
- 13 • Modifications to retail water system service areas (note: these modifications can
- 14 be made through the individual water system plan process)
- 15 • Water system connection, system development and membership charges and
- 16 rates.

17
18 Note: In addition to RCW 70.116 – Public Water System Coordination Action of 1977,
19 water purveyors are governed by various state statutes depending on their type. These
20 statutes include:

- 21
- 22 • RCW 24.06 – Mutual Corporations
- 23 • RCW 35.92 – Municipal Utilities
- 24 • RCW 36.94 – Sewerage, Water, and Drainage Systems
- 25 • RCW 43.20 – Board of Health
- 26 • RCW 54.16 – Powers Public Utility Districts
- 27 • RCW 57.08 – Powers Water-Sewer Districts
- 28 • Title 70 RCW – Public Health and Safety
- 29 • RCW 80.28 – Gas, Electrical, and Water Companies
- 30 • RCW 90.03 – Water Code



AGREEMENT FOR WHOLESALE SUPPLY OF WATER

This Agreement (“*Agreement*”) for the wholesale supply of water between Lakewood Water District, a Washington special purpose municipal corporation (“*District*”), and the Town of Steilacoom, a Washington municipal corporation (“*Customer*” or “*Town*”), is effective as set forth in Section 2.8.11 below.

1. RECITALS.

1.1. The *District*, pursuant to Title 57 RCW, supplies potable water to customers within its boundaries through a public water system. The *District’s* public system is comprised of source of supply (wells with attendant water rights), storage, transmission, and distribution mains. The *District’s* water supply is in excess of its present and reasonably foreseeable future demand.

1.2 The *Town* is authorized to supply potable water to customers within its boundaries through a public water system. The *Town’s* public water system is comprised of source of supply (wells with attendant water rights), storage and distribution mains, provided the *Town* determined, in lieu of utilizing its wells and water rights to provide water to its customers, to purchase wholesale water supply from the *District* to serve the *Town’s* customers. To that end, the *Town* and the *District* entered into an “Agreement for Wholesale Supply of Water” with an effective date of April 15, 1997 (“*1997 Agreement*”) providing for the *District* to provide wholesale water supply to the *Town* and for the *Town* to pay the *District* for such water supply based on terms and conditions set forth in the *1997 Agreement*.

1.3 The *District* has also entered into agreements with Spanaway Water Company, a Washington nonprofit corporation (“*Spanaway*”), Summit Water & Supply Company, a Washington nonprofit corporation (“*Summit*”), Firgrove Mutual, Inc., a Washington nonprofit corporation (“*Firgrove*”), and Rainier View Water Company, Inc., a Washington corporation (“*Rainier View*”), to provide wholesale water supply to those entities (*Firgrove*, *Spanaway*, *Summit*, and *Rainier View*, collectively the “*Wholesale Customers*”).

1.4 However, disputes regarding the interpretation and application of the terms and conditions of the *1997 Agreement* arose between the *District* and the *Town* (collectively, the “*Disputes*”). The *Parties* then determined to resolve the *Disputes* by agreement with an effective date of July 25, 2019 (“*Settlement Agreement*”) to terminate the *1997 Agreement* and to enter into this Agreement, effective as of the date set forth in Section 2.8.11 below.

1.5 The *District* is willing to supply the *Town* with wholesale water on the terms and conditions provided for herein, and the *Town* is willing to purchase wholesale water from the District on such terms and conditions.

2. AGREEMENT.

The *Parties* agree to the following terms and conditions.

2.1 DEFINITIONS.

For purposes of this Agreement the capitalized and italicized terms shall mean:

2.1.1 “*Capital Improvements.*” Improvements, upgrades, and replacements constructed or installed in whole or in part by the District to provide wholesale water to *Customer* including reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment. *Capital Improvements*, when constructed, are *System Wholesale Facilities*, *Customer Wholesale Facilities*, or *Joint Facilities*. *Capital Improvements* shall be determined based on the District’s capitalization/fixed asset policy as set forth in District Resolution No. B-1431, and as such Resolution may be modified and amended by the District, and shall include any District asset with an initial individual cost of more than Five Thousand Dollars (\$5,000.00) and an estimated useful life in excess of one (1) year.

2.1.2 “*Capital Improvement Cost.*” The original cost of *Capital Improvements*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises for the *Capital Improvements*, including those costs incurred by the *District* prior to execution of this Agreement; (2) work performed under contracts for construction, installation, and inspection of the *Capital Improvements*; (3) recorded pay and expenses of employees of the *District* directly and indirectly related to the design, construction, installation, and inspection of the *Capital Improvements*, including capitalized *District G&A*, and including costs incurred prior to execution of this Agreement; (4) materials, equipment, and supplies directly related to the *Capital Improvements*; (5) acquiring and condemning land, easements, and rights-of-way for or related to the *Capital Improvements*; (6) professional services related to the financing, planning, acquisition, construction, installation, and inspection of the *Capital Improvements* or for negotiating, resolving, or litigating any disputes related thereto; (7) reasonable expenses incurred to mitigate the impact of the *Capital Improvements* upon the natural or physical environment, including but not limited to expenses for landscaping, buffering, and wetland mitigation; (8) other expenses reasonably related to the planning, design, construction, financing and financing interest expense, and construction management of the *Capital Improvements*.

2.1.3 “*Coverage.*” The number of times by which gross annual revenues less *Maintenance and Operation Cost* and *G&A* exceed annual debt service. The *District’s Coverage* shall never be less than that required by *District* bond covenants.

2.1.4 “*Customer,*” “*Wholesale Customer*”. The Town of Steilacoom, a Washington municipal corporation, which is purchasing wholesale water from the *District*, including *Customer’s* agents or designees.

2.1.5 “*Customer Meters.*” Meters owned and operated by the *District* which measure the quantity and flow of water provided to *Customer* by the *District*. The locations of *Customer Meters* are identified on **Exhibit A** attached hereto and incorporated herein by this reference.

2.1.6 “*District.*” Lakewood Water District, a special purpose municipal corporation located in Pierce County, including its agents or designees.

2.1.7 “*Existing Water Rights.*” That portion of permits, certificates, or claims of the *District* originally obtained to serve only the *District’s* retail customers that has been allocated to *Wholesale Customers*. *Existing Water Rights* are shown on **Exhibit B** attached hereto and incorporated herein by this reference.

2.1.8 “*GPM,*” “*GPD,*” “*MGD,*” “*AFY,*” Gallons per Minute; Gallons per Day; Million Gallons per Day; Acre-Feet per Year.

2.1.9 “*General and Administrative Cost,*” “*G&A.*” The *District’s* general and administrative, supervisory and other indirect costs, including financial (budgeting, accounting, bookkeeping), data processing, clerical, management and administration, personnel, non-capitalized professional services, including engineering and financial planning, insurance, and property tax, all as related to the provision of *Wholesale Water* service. State revenue related excise and B&O taxes, and any other costs not assigned to *Maintenance and Operation Cost*; but excluding any local government utility tax or franchise fee.

2.1.10 “*Internal System.*” (1) With respect to the *Customer*, all present and future reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment owned, operated, and maintained by *Customer*; and (2) With respect the *District*, all present and future reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment owned, operated, and maintained by the *District*, excluding any *Wholesale Facilities* and separate stand-alone satellite systems owned or operated by the *District*.

2.1.11 “*Joint Facilities.*” That portion of the present and future *District’s Internal System* that benefits *Wholesale Customers* or are necessary to supply wholesale water to *Customer*, including improvements, upgrades, and replacements.

2.1.12 “*Leased Water.*” Water leased or purchased by the *District* and used for the purpose of supplying *Wholesale Customers*.

2.1.13 “*Maintenance and Operation Cost.*” All direct and indirect costs and expenses incurred by the *District* in treating and supplying water, including leased or purchased water, and complying with applicable regulatory requirements, including supply, treatment, pumping, labor, utilities, equipment, tools, materials, inspection, insurance, and non-capitalized equipment leases, repair and rehabilitation, and the markup provided for herein.

2.1.14 “*Operations Advisory Committee,*” or “*Committee.*” The *Committee* composed of representatives of all *Wholesale Customers* to advise the *District* on the matters referenced in Section 2.8.2 herein and other matters as appropriate.

2.1.15 “*Party,*” “*Parties.*” The *District* and/or the *Customer*.

2.1.16 “*Supply Schedule.*” A mechanism to enable the *District* to provide the *Total Water Requirement* when it is needed by the *Customer* by accommodating both the *District’s* need to plan for and develop supply and infrastructure and the *Customer’s* need for an increasing supply. The *Supply Schedule* will identify maximum quantities of water that the *District* will supply to *Customer* during specific periods of time during the term of this Agreement.

2.1.17 *Total Annual Revenue Requirement.* The *District’s* cost of water determined according to the principles established in Section 2.6.3.C of this Agreement.

2.1.18 “*Total Water Requirement.*” Two (2) *MGD*, the daily maximum quantity of water the *District* will supply to *Customer* during the term of this Agreement; provided, the *Customer* may request the *District* increase the *Customer’s Total Water Requirement* in the future, and if the *District* determines it has *Wholesale Water* available to sell to the *Customer*, the *District* may, but shall not have the obligation, sell additional *Wholesale Water* to the *Customer* and increase the *Customer’s Total Water Requirement* by written amendment to this Agreement on terms and conditions mutually acceptable to the *Parties*. The *Total Water Requirement* is used for allocating cost under this Agreement.

2.1.19 “*Shared Water Rights.*” Water rights in the amount of six hundred seventy two (672) *AFY* made available by the *Town* to the *District* in 1998.

2.1.20 “*Water Right.*” Any water right (permit or certificate) obtained by the *District* for the purpose of acquiring water to supply *Wholesale Customers* and put to use for that purpose.

2.1.21 “*Water Right Cost.*” The original cost incurred by the *District* to secure the *Water Right*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises, including those costs incurred by the *District* prior to execution of this Agreement; (2) recorded pay and expenses of employees of the *District* directly and indirectly related to securing the *Water Right*, including capitalized *District G&A*, and including costs incurred prior to execution of this Agreement; (3) materials, equipment, and supplies directly related to securing the *Water Right*; (4) professional services related to the financing, planning, acquisition of the *Water Right*, or for participating in administrative proceedings with respect to securing the *Water Right*, or negotiating, resolving, or litigating any disputes related thereto; (5) reasonable expenses incurred to mitigate the impact of the *Water Right* upon the natural or physical environment; and (6) other expenses reasonably related to the acquisition of the *Water Right*.

2.1.22 “*Wholesale Customers.*” All water purveyors that purchase wholesale water from the *District*, under agreements identical to or substantially similar to this Agreement.

2.1.23 “*Wholesale Facilities,*” or “*Wholesale Facility.*” All water supply and transmission facilities, including, but not limited to, wells, water lines, booster stations, storage facilities, and transmission mains owned, operated, and maintained by the *District* for the sole purpose of supplying *Wholesale Customers*. *Wholesale Facilities* that serve all *Wholesale Customers* are *System Wholesale Facilities*. *Wholesale Facilities* that serve one or more but not all *Wholesale Customers* are *Customer Wholesale Facilities*. When the term *Wholesale Facilities* is used in this Agreement, that term includes both *System Wholesale Facilities* and *Customer Wholesale Facilities*.

2.1.24 “*Wholesale Water.*” The total quantity of water available from *District* for sale to current or prospective *Wholesale Customers*, including, but not limited to, water allocated by the *District* and designated for sale as *Wholesale Water* from its *Existing Water Rights* or from the *Water Right* or from *Leased Water*. Whenever the term “quantity of *Wholesale Water*” is used for the purpose of allocating cost, the term refers to *MGD*. As authorized by the *District*’s Board of Commissioners, the volume designated as *Wholesale Water* shall be ten (10) *MGD*, provided, for the purpose of allocating cost as further provided in this Agreement, the *District* shall be responsible for any unsold *Wholesale Water*.

2.2 SUPPLY AND PURCHASE OF WATER

2.2.1 So long as this Agreement is in effect, the *District* shall plan for, develop, treat, and annually supply to *Customer* potable water in an amount not to exceed

Customer's Total Water Requirement according to the *Supply Schedule* and to the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. The *District's* obligation to provide *Customer* with *Wholesale Water*, and the *Customer's* obligation to pay for such *Wholesale Water*, shall commence on 1/1/2020. Subject to the foregoing, the *District* will make *Wholesale Water* available to the *Customer* in accordance with the following *Supply Schedule*, which *Customer* expressly agrees to be bound by, unless further modified by the *Parties* by written agreement:

		<u>QA</u>	<u>QI</u>
A.	1/1/20 to 12/31/24	Quantity 2 MGD	2,000 GPM
B.	1/1/25 to 12/31/29	Quantity 2 MGD	2,000 GPM
C.	1/1/30 to 12/31/34	Quantity 2 MGD	2,000 GPM
D.	1/1/35 to 12/31/39	Quantity 2 MGD	2,000 GPM

2.2.2 *Customer* shall pay for its share of the cost of water as provided herein. *Customer* shall purchase water from the *District* and pay for the *Customer's Total Water Requirement* and water supply received by *Customer* according to the *Supply Schedule* and the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. On an annual basis in a letter of understanding between the *Wholesale Customers* and *District*, the *District* may allow for a temporary upward modification of the *Supply Schedule*. Further, the *Customer* may propose to make a portion of the *Customer's Total Water Requirement* available to the *Customer* through its *Supply Schedule* that is not needed or cannot be taken by the *Customer* available to other *Wholesale Customers* or the *District*. However, any such proposal shall be subject to the following conditions: (a) the review and approval of the *Operations Advisory Committee* and the *District*, including the proposed terms and conditions of any such proposal, (b) shall only be on a short-term basis for a period of not more than sixty (60) days, (c) the *Customer* shall continue to be obligated to pay the fixed charges related to the *Customer's Total Water Requirement*, including the fixed charge related to the portion of the *Customer's Total Water Requirement* which may be provided to another *Wholesale Customer* or the *District*, and (d) in no event shall the *Customer's Total Water Requirement* retained by the *Customer* and made available to another *Wholesale Customer* exceed the *Customer's Total Water Requirement* in accordance with the *Customer's Supply Schedule*, unless otherwise agreed to and as conditioned by the *District* in writing.

2.2.3 This *Agreement* shall remain in effect for twenty (20) years, such twenty (20) year period commencing on 1/1/2020, subject to automatic renewal for additional twenty (20)-year periods unless either *Party* notifies the other *Party* not less than five (5) years before the expiration date of any twenty (20) year period of its intent to terminate the *Agreement*. However, if the *District* is assumed or acquired by a third party, then *Customer* may terminate this *Agreement* at any time following not less than five (5) years written notice to the third party of *Customer's* intent to terminate the *Agreement*. If *Customer* chooses to exercise this right of early termination, then the party assuming or acquiring the *District* shall pay to *Customer* an amount equal to the total *Capital Improvement Cost* paid by *Customer* plus interest at the *District's* average weighted cost of debt, times the number of years remaining on the agreement

on the date the right of early termination is exercised, divided by twenty (20) years. Along with the notice of early termination, *Customer* shall submit to the third party an invoice with supporting documentation for the amount claimed. The invoice shall be due and payable within thirty (30) days of its date, and thereafter the unpaid balance shall bear interest at the rate of twelve (12) percent per annum.

2.2.4 So long as this Agreement remains in effect, the *Customer* shall not enter into any other agreements to sell water to another water purveyor without first obtaining the written consent of the *District*, which consent shall not be unreasonably withheld; provided, that in no event shall *Customer* sell water outside the place of use assigned to the *Water Right*, including water rights for *Leased Water*.

2.2.5 So long as this Agreement remains in effect, the *District* shall not enter into any other agreements to supply water to another purveyor that will impair the *District's* ability to supply *Customer's Total Water Requirement*.

2.3 CONDITIONS OF SERVICE—*District*.

2.3.1 Except as provided in paragraph 2.3.4 and 2.3.7, the *District* shall provide the normal flow identified in the *Supply Schedule* with required minimum hydraulic gradient at interties with *Customer's Internal System* of not more than two thousand (2,000) *GPM*, and emergency flow of not more than four thousand five hundred (4,500) *GPM* as measured by *Customer Meters*, provided in no event shall the *Town's Total Water Requirement* exceed two million gallons (2 *MG*) in any twenty-four (24) hour period. Flows for additional interties shall be established by separate agreement. Cost incurred to change normal flow shall be borne by the Party requesting the change.

2.3.2 Except as provided in paragraph 2.3.7, the *District* shall provide continuous service to *Customer*, to the extent feasible, in the same manner and extent that it provides service to its direct service customers.

2.3.3 Restrictions placed upon *Customer's* water use to address conservation shall be adopted and applied consistent with restrictions placed upon the *District's* direct service customers. The *District* may implement emergency or conservation measures, and *Customer* agrees to comply with such measures. The *District* and *Operations Advisory Committee* shall establish a working group to develop an emergency response plan and a water shortage plan that will identify the measures to be imposed to respond to emergencies or shortages, the mechanisms for imposing and repealing such measures, and penalties for failure to comply therewith. The *District* may impose unilateral measures until the *District* and *Customer(s)* approve such plans. The *District* or *Customer(s)* may convene the working group for the purpose of reviewing adopted plans, proposing amendments thereto, or monitoring implementation of plans; provided, that any amendments must have the concurrence of the *District*.

2.3.4 The *District* shall provide wholesale water to *Customer* at an equivalent level of service that it provides to the *District's* retail customers. In the event of a general emergency or weather-related water shortage affecting the entire District water supply system, including the *Wholesale Customers*, general restrictions placed upon water supply to the *Customer* shall be applied equally to the *District's* retail distribution system and the *Wholesale Customers*. An "emergency" for the purposes of this provision shall mean an unforeseen event including, but not limited to, water shortages, power outages, a pump system failure, well system failure, aquifer failure or diminution, or other failure in *Joint Facilities* or *Wholesale Facilities*. In the event of localized emergency problems, *Customer* acknowledges temporary, localized service interruptions may occur for the duration of the emergency. It is recognized by the *District* and the *Customer* that emergency water use curtailment measures may have to be implemented by the *District* on a regional basis in order to meet an emergency condition or regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other factors, shall be described in the *District's* water shortage response plan in effect as of the Effective Date of this Agreement, or successor contingency plans. Successor contingency plans shall be developed and implemented by the *District* in consultation with the *Operations Advisory Committee*. *Customer* shall assist with and support all emergency curtailment measures that are implemented. The *District* shall have the right to interrupt or reduce delivery of water to *Customer*, if the *District*, acting in good faith, determines that system emergencies or maintenance and repair so require. Except for emergencies, the *District* shall give *Customer* reasonable written notice of interruption or reduction, the reason therefore, and the likely duration thereof. In the event of an emergency requiring interruption of service, the *Parties* shall pursue restoration of service cooperatively and with the exercise of due diligence. *Customer* acknowledges that during an emergency situation or a planned outage, the *District* may temporarily be unable to meet all or part of its wholesale service commitment. If the *District* has a planned outage, the *District* shall give *Customer* a minimum of seven (7) days advance notice in writing of such planned outage. The *District* and *Customer* will work together to identify mutually acceptable dates for planned outages.

2.3.5 Except as provided in paragraph 2.3.7, the quality and content of water supplied to *Customer* at the *Customer Meters* under this Agreement shall comply with or exceed applicable federal, state, and local rules and regulations governing water quality applicable to the *District*, except in cases of emergency. The *District* also agrees to periodically or as required under State Department of Health guidelines monitor and test its water supply, including *Wholesale Supply*, for the presence of perfluorinated chemicals, including perfluorooctanoic acid ("*PFOA*") and perfluorooctanesulfonic acid ("*PFOS*"). If *PFOA* or *PFOS* are detected in such water supply which exceed health advisory limits established by the United States Environmental Protection Agency ("*USEPA*"), which are currently a combined concentration of 70 ppt (0.070 ppb), the *District* agrees to take whatever action is necessary to treat any such water supply to comply with *USEPA* health advisory levels after advising the *Operations Advisory Committee* of the *District's* proposed action and the approximate cost to undertake such treatment action, which may include the replacement of the water supply which exceeds *USEPA* health advisory levels. Water quality testing results shall periodically be shared with the *Operations Advisory Committee*.

2.3.6 A minimum hydraulic gradient for each intertie connection shall comply with Department of Health (DOH)-approved project report and construction document criteria. Except as provided in paragraph 2.3.7, the *District* shall use its best efforts to supply water from its system to *Customer* at the intertie connection(s) at not less than the minimum hydraulic gradient pressure identified in DOH-approved project reports and to the extent possible under emergencies or maintenance and repair periods at the inlet side of *Customer Meters* of 30 psi. The hydraulic gradient for additional *Customer Meters* shall be established by separate agreement. Cost incurred to change the hydraulic gradient shall be borne by the party requesting the change.

2.3.7 Whenever the *District* delivers water through a third party's water system, the *District's* obligations under paragraphs 2.3.1, 2.3.2, 2.3.5, and 2.3.6 are satisfied when the water supplied to that third party meets the requirements of those paragraphs. *Customer* releases *District* from any claim for damages or injury sustained as a result of the third party or its water system failing to meet the requirement of paragraphs 2.3.1, 2.3.2, 2.3.5, and 2.3.6.

2.4 CONDITIONS OF SERVICE—*Customer*.

2.4.1 *Customer's* demand upon the *District's* water supply shall not exceed the *Total Water Requirement* at the rates of flow provided for in paragraph 2.3.1, except as provided in Section 2.2.2 herein.

2.4.2 *Customer* shall limit retail sales of water to customers within its current or future service area as described in the *Customer's* water comprehensive plan; provided that, *Customer* shall not be prohibited from providing service to retail customers outside of its service area so long as *Customer* does not exceed *Customer's Total Water Requirement and Supply Schedule*.

2.4.3 *Customer* shall not interconnect any part of its *Internal System* with any other municipal or private water system without the prior written consent of the *District* (prior oral consent in an emergency), which consent shall not be unreasonably withheld. Interconnections in place as of the date of this Agreement and identified in **Exhibit A** are deemed approved as required by State Department of Health.

2.4.4 *District* shall select, install, and charge the *Customer* for the *Customer Meter* or *Customer Meters*. *Customer Meters* shall be calibrated annually in the presence of *District* and *Town* representatives and shall be maintained to be accurate within two (2) percent plus or minus. The *District* shall have free and unlimited access to *Customer Meters* for inspection and testing at the *District's* expense. The *District* shall read *Customer Meters* monthly and bill *Customer* for water supplied according to the terms of this Agreement.

2.5. CAPITAL IMPROVEMENTS.

2.5.1 The *District* agrees to construct and recover the cost of the *Capital Improvements* as provided herein.

2.5.2 The *Capital Improvement Cost* of *Wholesale Facilities* shall be borne entirely by *Wholesale Customer* through rates and/or cash payments from *Wholesale Customer*; provided that the *Capital Improvement Cost* of a *System Wholesale Facility* shall be allocated among *Wholesale Customers* according to the *Total Water Requirement* of the *Customer* divided by *Wholesale Water*, and the *Capital Improvement Cost* of a *Customer Wholesale Facility* shall be allocated only to the *Customer* that benefits from the facility, provided, that whenever more than one *Customer* benefits from the *Customer Wholesale Facility*, the costs shall be allocated between those benefited *Customers* in the same manner as for *System Wholesale Facilities*.

2.5.3 The *Capital Improvement Cost* of *Joint Facilities* shall be allocated as follows:

A. The *Capital Improvement Cost* of existing *Joint Facilities* shall be allocated between the *District* and *Wholesale Customers* according to the ratio of the quantity of *Wholesale Water* that has been designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights; provided, however, the portion of *Capital Improvement Cost* of *Joint Facilities* that are existing transmission mains to be allocated to *Wholesale Customers*, net of accumulated depreciation, shall be determined by multiplying the cost of all *District* mains recorded on the *District's* books, less the cost of all *District* mains used exclusively for *Wholesale Facilities*, times the ratio of the lineal feet of mains eight inches and greater over the total lineal feet of all *District* mains (provided, in no event shall the allocation of transmission mains of 8" diameter or larger to the *Wholesale Customers* exceed fifty-nine (59) percent), less the lineal feet of all mains used exclusively for *Wholesale Facilities*.

B. The *Capital Improvement Cost* of a planned *Joint Facility* shall be allocated between the *District* and *Wholesale Customers*, after the facility is constructed, according to the ratio of the quantity of *Wholesale Water* designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights.

C. The portion of the *Capital Improvement Cost* of *Joint Facilities* shall be allocated to the *Customer* according to the ratio of *Total Water Requirement* of *Customer* over the quantity of *Wholesale Water*.

2.5.4. The *Water Right Cost* shall be allocated to the *Customer* by subtracting the *Shared Water Rights* from the maximum annual quantity of water delivered to the *Customer* in the previous twenty (20) years or the actual annual quantity delivered, whichever is greater.

2.5.5 The *District* reserves the right to issue bonds and other obligations in accordance with applicable law.

2.5.6 If the *District* is required by growth, accident, emergency, failure, or applicable law or regulation to improve, upgrade, replace, or expand the *Water Right, Wholesale Facilities, or Joint Facilities*, or to provide a higher level of water treatment, *Customer* shall share in those future *Capital Improvement Costs* as provided in paragraphs 2.5.2, 2.5.3, or 2.5.4.

2.5.7 *Capital Improvements* shall be constructed as public works projects awarded pursuant to applicable law. The *District* shall design, construct, and maintain the *Capital Improvements* according to accepted water utility standards. The *District* shall administer the planning, design, construction, and construction management of the *Capital Improvements* to the best of its ability. Any construction change order changing the scope of a project or increasing the estimated *Capital Improvement Cost* of a project by five (5) percent or \$50,000.00, whichever is greater, shall be approved only after consultation with the *Operations Advisory Committee*.

2.6 COST OF WATER.

2.6.1 The *Capital Improvement Cost* and *Water Right Cost* shall be allocated among *Wholesale Customers* as provided in Section 2.5. The *District* shall price the water as provided in this Section 2.6.

2.6.2 In this *Agreement*, water will be priced according to the utility-basis approach of cost recovery, consisting of *General and Administrative Cost, Maintenance and Operation Cost*, depreciation expense, and a fair rate of return on rate base (*Wholesale Facilities, Joint Facilities, and Water Right Cost*). The utility-basis approach of cost recovery ("*Utility Basis*") shall be composed of two pricing components: (1) a fixed charge based on the *Customer Total Water Requirement*, and (2) a unit charge per 100 cubic feet (CCF) ("*Utility Basis*"). Water shall be priced as provided in Section 2.6.3C and *Customer's* wholesale water rate shall be composed of: (1) a fixed charge to recover depreciation, a return on Rate Base, and *G&A*; and (2) a unit charge per 100 cubic feet (CCF) of *Customer's* consumption to recover *Leased Water* cost and *Maintenance and Operation Cost*, including a markup of ten (10) percent.

2.6.3 The following shall determine the wholesale water rate to be paid to the *District* by *Customer*:

A. Subject to the provisions of Section 2.3.4 herein, the *District* will treat *Customer* as a customer separate from the *District's* direct service customers;

B. All costs of serving *Customer* will be recovered by a combination of annual fixed charges and water volume charge to the *Customer*; and

C. The cost of serving *Customer* shall include depreciation expense, Return on Rate Base, *Maintenance and Operation*, and *G&A* components determined as follows:

1. *G&A* shall be an annual cost per connection established by multiplying total *G&A* by eighty percent (80%), dividing that by the total number of water service connections, with *Customer* counted as one connection, plus twenty percent (20%) of annual *G&A* divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Customer*, multiplied by *Customer's* projected current consumption as provided by *Customer* to *District* no later than December 31 of each year.

2. Annual depreciation shall be determined dividing the original *Capital Improvement Cost* recorded on the *District's* books by the *District's* standard application of estimated life of that facility or for that class of water assets.

3. Return on Rate Base shall be determined as follows:

a. *Wholesale Facilities*. The *Capital Improvement Cost*, net of accumulated depreciation, allocable to *Customer* less any upfront cash payment made by *Customer*, multiplied by 6 percent.

b. *Joint Facilities*. The *Capital Improvement Cost* net of accumulated depreciation multiplied by six (6) percent per year from the date the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this *Agreement*.

c. *Water Right Cost*. The *Water Right Cost* per *AFY* will be the same as the Abitibi water right cost (\$600.00 per *AFY*) multiplied by nine (9) percent per year.

4. *Maintenance and Operation Cost of Joint Facilities* and *Wholesale Facilities* shall be annually determined separately, totaled, and increased by 10 percent per the *District's* fiscal year.

a. The *Maintenance and Operation Cost of Joint Facilities* shall be determined as follows:

i. Pumping, Treatment, and Storage Costs. The annual *District* pumping, storage, and treatment costs divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's total consumption as provided by *Customer* to *District* no later than December 31 of each year.

ii. Transmission Costs. The annual *District* transmission and distribution costs multiplied by the ratio of the lineal feet of mains eight inches and greater (limited to 59%), divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's consumption as provided by *Customer* to *District* no later than December 31 of each year.

b. The annual *District Maintenance and Operation Cost of Wholesale Facilities* shall be allocated among *Wholesale Customers* according to the ratio of the *Customer's* projected current year's consumption over the projected current year's consumption of all *Wholesale Customers* as provided by *Customer* to *District* no later than December 31 of each year.

5. *Leased Water Cost.* The *District's* annual cost for *Leased Water* shall equal 10 percent times the average cost per *MGD* of the Abitibi water right purchase times the quantity of *Leased Water* measured in terms of *MGD* or the actual cost of *Leased Water* per *MGD* plus a 10 percent mark-up, whichever is greater.

D. The *District* will recalculate the *G&A* costs and *Maintenance and Operation* costs annually by using the current year's total consumption and *District's* annual costs; and, in the following year, the fixed charge portion of *Customer's* wholesale water rate shall be increased or decreased accordingly.

2.6.4. A. The *District* shall install telemetry systems at the *Customer Meters* for the purpose of monitoring delivery of water to *Customer*. Such telemetry shall be operational when the *District* commences to supply *Customer* with water under this Agreement. The *District* shall advise the *Customer* whenever *Customer's* demand for water threatens to exceed the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*. The *District* shall notify *Customer* when *Customer's* demand no longer threatens to exceed the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*.

B. If, in any calendar month, the *Customer* exceeds the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement* (an "Exceedance"), the *District* shall hand deliver written notice of such Exceedance to *Customer*. If after three days from the notice such Exceedance continues, the *District* shall hand deliver a second notice of Exceedance. If after three days from the second notice the Exceedance continues, then, in addition to a 100 percent surcharge on the unit charge component of the wholesale water rate payable on all water used in excess of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*, the *Customer* shall pay to the *District* an amount equal to 75 percent of the prior year's total annual payment (which includes both the unit charge and the fixed charge) to the *District* for wholesale water, unless such surcharge is reduced or waived by the *District* in its sole discretion..

C. In any calendar year that a *Customer* exceeds the quantity limitation of the *Supply Schedule* times 365 or its *Total Water Requirement* times 365, as applicable, the *Customer's* wholesale water rates shall be subject to a surcharge on the Exceedance of one hundred (100) percent of the unit charge component of the wholesale water rate, unless such surcharge is reduced or waived by the *District* in its sole discretion.

D. *Customer* shall reimburse the *District* for any penalties imposed on the *District* for using more water than allowed by *District* water rights arising from *Customer's* use of water in excess of the use provided for herein.

2.6.5. The *District* has adopted Resolution No. B-1284 that establishes financial policies and a Rehabilitation and Repair Account, Account No. 136. The *District* agrees that it will not modify its financial policies in a manner detrimental to *Customer* nor discontinue Account No. 136 without making adequate provision for its obligation to fund its share of depreciation as provided herein. The *District* will establish in Account No. 136 a sub-account entitled "Wholesale Customer's R&R" for the purpose of recording funded depreciation and into which the *District* shall deposit, at a minimum the annual depreciation expense recovered from *Customer* through rates. Amounts deposited into the "Wholesale Customer's R&R" sub-account shall be restricted to payment for repair and rehabilitation projects for the *Wholesale* and *Joint Facilities*, and unavailable to the *District* by way of interfund transfer or loan; provided, that the *District* may invest such funds as prescribed by law. The return on such investment shall be deposited to the "Wholesale Customer's R&R" sub-account and credited against revenue

requirements for the *Wholesale* and *Joint Facilities*. Within the “Wholesale Customer’s R&R” sub-account, the District may establish additional sub-accounts for each *Customer*. Funding of the “Wholesale Customer’s R&R” account shall begin only after all other revenue requirement cost and rate of return elements are recovered in wholesale rate revenues in whole.

At the option of *Customer*, on or before the effective date of the dissolution of the *District*, its merger or consolidation with another special purpose district, or its assumption by a city, funds received from *Customer* and deposited into the “Wholesale Customer R&R” sub-account shall be deposited into an account established by *Customer* and restricted by for the duration of this *Agreement* to payment of *Customer’s* share of *Wholesale* and *Joint Facilities* rehabilitation and repair projects. Thereafter, *Customer’s* portion of rates allocated to depreciation expense shall be deposited therein and restricted for payment of *Wholesale* and *Joint Facilities* rehabilitation and repair projects. If *Customer* chooses to terminate the agreement as provided in 2.2.3, the funds in the “Wholesale Customer R&R” shall be refunded as provided in 2.2.3.

2.6.6 If the *Customer* made a cash payment(s) on the *Wholesale Facility* asset being replaced, the amount of Depreciation for the *Wholesale Facility* asset being replaced shall be credited against the cost of the new *Wholesale Facility* asset.

2.6.7 The *Customer* made a cash payment to the *District* as part of the 1997 *Agreement* of \$1,219,358 for its estimated share of the cost of *Joint Facilities* as such *Joint Facilities* are defined in the 1997 *Agreement* (“*Contribution in Aid of Construction*” or “*CIAC*”). The *CIAC* amount has been reduced annually by the amount of annual depreciation from 1997 to 2019 under the 1997 *Agreement* resulting in a beginning balance for the purposes of this *Agreement* as of January 1, 2020 of \$604,361. That amount will continue to be credited against *Customer’s* share of the total rate base of *Joint Facilities* and will be reduced by the annual depreciation for those *Joint Facilities*.

2.7 INTERNAL SYSTEMS.

2.7.1 Each *Party* shall own, maintain, and operate its *Internal System* at its sole expense, except as provided herein. Each *Internal System* shall be maintained and operated with the highest practicable standards and practices in construction, operation, and maintenance, with particular attention to cross-connection control, water quality, and efficient and economical utility operation. Either *Party* may notify the other of conditions within the other’s *Internal System* that constitute violations of law, regulation, or permit. Each *Party* shall cooperate with the other to rectify such conditions. If by reason of the *Customer’s* act or failure to act, the *District* is penalized for failure to maintain or operate the *Wholesale Facilities* as required by applicable law or regulation, *Customer* shall indemnify the *District* for the penalty and all costs, including reasonable attorney’s fees associated with investigating and defending against such penalty.

2.7.2 *Customer* shall pay the charges described in paragraph 2.6 out of the revenues of *Customer's Internal System*. *Customer's* payments to the *District* pursuant to this Agreement and payments otherwise required or provided for by this Agreement shall be maintenance and operation expenses of *Customer's Internal System*, prior to and superior to any debt or charge or lien of any revenue bond or other obligation issued by *Customer* that is payable from the revenues of its *Internal System*. *Customer* shall establish rates and collect fees and charges for water service sufficient to pay for the maintenance and operation of its *Internal System*, including payments to the *District*, and the principal and interest on any and all *Customer* debt obligations.

2.7.3 The *District* shall establish rates and collect fees and charges for water service sufficient to pay for the maintenance and operation of its *Internal System*, and the principal and interest on any and all *District* revenue obligations that constitute a charge against the revenue of the *District's Internal System*.

2.7.4 The *District* shall keep full and complete books of accounts in compliance with current standards required by the State Auditor. Either *Party* may request independent audits by a public accounting firm at that *Party's* expense.

2.8 ADMINISTRATION.

2.8.1 The *District* shall, if necessary, amend its comprehensive plan and/or water rights to authorize it to serve *Customer*. The *District*, as planning authority for the water supply requirements of this contract, shall examine and investigate water supplies suitable and adequate for its present and reasonable future needs, including any wholesale supply requirements. The *District* shall prepare and adopt a plan for acquiring and supplying such water, including provision for water and water rights, real property, and facilities required for storage and transmission and delivery of water.

2.8.2 The *District* shall establish an operations advisory committee ("*Operations Advisory Committee*" or "*Committee*") to be composed of representatives of all *Wholesale Customers*. The *Committee* shall meet quarterly and shall advise the *District* on all matters related to wholesale water supply, participate in the preparation of emergency plan(s), review and comment upon the *District's* comprehensive plan(s), review and comment upon planning for, design of, and cost of *Capital Improvements*; provided however, the *District's* decisions concerning *Capital Improvements* shall be final and not subject to arbitration.

2.8.3 Each *Party* shall purchase and maintain insurance for its *Internal System* equal to or greater than coverage in force for such system as of the date of this Agreement.

2.8.4 *Customer* grants to the *District* a right of first refusal to acquire *Customer's Internal System* in lieu of a sale to a third-party purchaser on terms and conditions acceptable to the *Parties*.

2.8.5 The *District* shall bill *Customer* for water supplied by monthly invoice due and payable within thirty (30) days of the date thereof. Delinquent and unpaid balances shall bear interest at twelve (12) percent per annum. Each monthly bill shall be composed of 1/12th of the estimated annual fixed cost plus a unit charge on volume used during the billing period. *Customer* may dispute the accuracy of a monthly invoice by providing written notice to the *District* within thirty (30) days of the date of invoice that specifies the nature of the dispute and by paying any undisputed amount. The *District* shall rule on the dispute in a timely fashion, and *Customer* shall pay the disputed amount or submit the dispute to arbitration as provided herein within thirty (30) days of the *District's* decision. Disputed amounts shall not bear interest until thirty (30) days after the *District's* decision or the arbitrator's decision.

2.8.6 Except as otherwise provided in this Agreement, a dispute arising out of the terms and conditions of this Agreement, except for a billing dispute, shall be submitted for mediation to a mediator agreed to by the *Parties*. If mediation is unsuccessful, the dispute shall be arbitrated by JAMS of Tacoma.

Arbitration, shall be conducted in accordance with Title 7.04A RCW; provided, the *Parties* may conduct discovery pursuant to the Superior Court Rules of Civil Procedure. The arbitrator's decision shall be final and shall award reasonable attorney's fees and costs of arbitration to the prevailing party. Requests for reconsideration or modification may be submitted as provided by Superior Court Rules of Civil Procedure. The arbitrator's decision shall be reduced to judgment as provided by Title 7.04A RCW. The provisions of this paragraph do not apply to arbitration of a billing dispute, which shall be conducted informally.

2.8.7 This Agreement shall inure to the benefit of and be binding upon successors of interest and assigns of the *Parties*. Neither this Agreement nor obligations to perform hereunder may be assigned voluntarily by either *Party* without the other *Party's* written consent. The *Parties* do not intend to confer rights or benefits upon any third party. This Agreement is complete and contains the entire understanding of the *Parties*, and it may be modified only by a writing executed by the *Parties*.

2.8.8 Unless otherwise provided in this Agreement, all notices relating to this Agreement shall be sent to the following addresses, certified mail, return receipt requested, unless the other *Party* is previously notified in writing:

To the *District*:
General Manager
Lakewood Water District

To *Customer*:
Town Administrator
Town of Steilacoom

**P.O. Box 99729
Lakewood, WA 98496-0729**

**1030 Roe Street
Steilacoom, WA 98388**

Billings for water supplied and payments thereof may be made by regular mail.

2.8.9 Each *Party* agrees to indemnify the other and hold it harmless from and against any loss, cost, damage, or expense of any kind and nature, including reasonable attorney's fees arising out of injury to person or damage to property in any manner caused by the negligence or omission of the *Party* in the performance of its work pursuant to or in connection with this Agreement.

2.8.10 This *Agreement* is intended to be and is a contract for the purchase and sale of a commodity, and no provision hereof shall be construed to make the *Parties* partners or joint venturers. Neither *Party* is the agent of the other nor shall either *Party* be held liable for the acts of the other on a theory of agency or any other representative capacity.

2.8.11 This *Agreement* and the Settlement Agreement constitutes the entire understanding and agreement between the *Parties* with respect to the subject matter herein, and no other agreements, written or otherwise, shall be binding upon the *Parties* upon the execution of this Agreement; provided, after its execution by both *Parties*, this *Agreement* shall be effective ("*Effective Date*") at 12:01 a.m. on January 1, 2020. This *Agreement* shall supersede, rescind and cancel the 1997 *Agreement* as of the *Effective Date* of this Agreement; provided, however, the *Parties* acknowledge and agree to complete the true-up of *Maintenance and Operation Cost* and *General and Administrative Cost* based on actual *Maintenance and Operation Cost* and actual *General and Administrative Cost* and the actual water quantity delivered under the 1997 *Agreement* to the *Town* by the *District* for the year 2019, pursuant to Exhibit C of the 1997 *Agreement*, and the *District* shall invoice or credit the *Customer* for such adjustments as appropriate. The *Customer* shall then pay any such invoice to the *District* or the *District* shall remit payment to the *Customer* for any credit owing.

2.8.12 The *District* and the *Customer* recognize there is a series of agreements entered into by and between the *District* and the *Wholesale Customers* as referenced in the Recitals herein, and to the extent such agreements provide for the sharing of costs and the performance of certain duties and obligations by the *Wholesale Customers*, individually or collectively, the *Customer* shall be a third-party beneficiary of such other agreements with the *Wholesale Customers* and the *District*.


2.8.13 The provisions of this *Agreement* are severable, and if any part is found to be unenforceable, the other provisions remain fully valid and enforceable.

LAKWOOD WATER DISTRICT

CUSTOMER

President/Commissioner

Dated: _____



By: RON LUCAS

Its: MAYOR

Dated: 7/16/19

EXHIBIT A

DEPICTION OF CUSTOMER METER LOCATIONS

8" Meter on Old Military Road



EXHIBIT A (Cont.)

DEPICTION OF CUSTOMER METER LOCATIONS

10" Meter on Steilacoom Blvd.



EXHIBIT B

**EXISTING WATER RIGHTS
SECTION 2.1.7**

**Existing Water Rights – 12.70 MGD
Abitibi Water Rights - 6.0 MGD
Total Water Rights - 18.70 MGD**

AGREEMENT FOR WHOLESALE SUPPLY OF WATER

This Agreement (“*Agreement*”) for the wholesale supply of water between Lakewood Water District, a special purpose municipal corporation (“*District*”), and Firgrove Mutual Inc., a Washington nonprofit corporation (“*Customer*” or “*Firgrove*”), is effective as set forth in Section 2.8.11 below.

1. RECITALS.

1.1. The *District*, pursuant to Title 57 RCW, supplies potable water to customers within its boundaries through a public water system. The *District’s* public system is comprised of source of supply (wells with attendant water rights), storage, transmission, and distribution mains. The *District’s* water supply is in excess of its present and reasonably foreseeable future demand.

1.2 *Customer* is organized under the laws of the State of Washington as a nonprofit corporation to supply potable water to customers within its boundaries through a public water system. The *Customer’s* public water system is comprised of source or supply (wells with attendant water rights), storage and distribution mains.

1.3 *Customer* is in need of additional supply to meet expected demand within its service area.

1.4 The *District’s* comprehensive plan allows it to serve *Customer*.

1.5 The *District* has previously entered into agreements with Spanaway Water Company, a Washington nonprofit corporation (“*Spanaway*”), Summit Water & Supply Company, a Washington nonprofit corporation (“*Summit*”), and Rainier View Water Company, Inc., a Washington corporation (“*Rainier View*”), to provide wholesale water supply to those entities (*Firgrove*, *Spanaway*, *Summit*, and *Rainier View*, collectively the “*Wholesale Customers*”). *Summit* and *Rainier View* are each now interested in purchasing additional wholesale water supply from the *District*. To facilitate the sale of additional wholesale water supply to *Summit*, the *District* must upgrade an existing booster pump station located at 1620 115th St., Tacoma, Washington (“*Booster Pump Station Upgrade*”). To facilitate the sale of additional wholesale water supply to *Rainier View* and to make wholesale water supply available to *Firgrove*, the *District* must undertake the *Booster Pump Station Upgrade*, install a new wholesale transmission main (“*Wholesale Transmission Main*”), and install a new booster pump station in the vicinity of 121st Street East, Tacoma, Washington (“*New Booster Pump Station*”), as those water facilities are described and depicted on **Exhibit A** attached hereto and incorporated herein by this reference.

1.6 The *District* is willing to supply *Customer* with wholesale water on the terms and conditions provided for herein, and *Customer* is willing to purchase wholesale water from the District on such terms and conditions.

2. AGREEMENT.

The *Parties* agree to the following terms and conditions.

2.1 DEFINITIONS.

For purposes of this Agreement the capitalized and italicized terms shall mean:

2.1.1 “*Capital Improvements.*” Improvements, upgrades, and replacements constructed or installed in whole or in part by the District to provide wholesale water to *Customer* including reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment. *Capital Improvements*, when constructed, are *System Wholesale Facilities*, *Customer Wholesale Facilities*, or *Joint Facilities*. *Capital Improvements* shall be determined based on the District’s capitalization/fixed asset policy as set forth in District Resolution No. B-1431, and as such Resolution may be modified and amended by the District, and shall include any District asset with an initial individual cost of more than Five Thousand Dollars (\$5,000.00) and an estimated useful life in excess of one (1) year.

2.1.2 “*Capital Improvement Cost.*” The original cost of *Capital Improvements*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises for the *Capital Improvements*, including those costs incurred by the *District* prior to execution of this Agreement; (2) work performed under contracts for construction, installation, and inspection of the *Capital Improvements*; (3) recorded pay and expenses of employees of the *District* directly and indirectly related to the design, construction, installation, and inspection of the *Capital Improvements*, including capitalized *District G&A*, and including costs incurred prior to execution of this Agreement; (4) materials, equipment, and supplies directly related to the *Capital Improvements*; (5) acquiring and condemning land, easements, and rights-of-way for or related to the *Capital Improvements*; (6) professional services related to the financing, planning, acquisition, construction, installation, and inspection of the *Capital Improvements* or for negotiating, resolving, or litigating any disputes related thereto; (7) reasonable expenses incurred to mitigate the impact of the *Capital Improvements* upon the natural or physical environment, including but not limited to expenses for landscaping, buffering, and wetland mitigation; (8) other expenses reasonably related to the planning, design, construction, financing and financing interest expense, and construction management of the *Capital Improvements*.

2.1.3 “*Coverage.*” The number of times by which gross annual revenues less *Maintenance and Operation Cost* and *G&A* exceed annual debt service. The *District’s Coverage* shall never be less than that required by *District* bond covenants.

2.1.4 “*Customer,*” “*Wholesale Customer*”. Firgrove Mutual Inc., a Washington nonprofit corporation, which is purchasing wholesale water from the *District*, including *Customer’s* agents or designees.

2.1.5 “*Customer Meters.*” Meters owned and operated by the *District* which measure the quantity and flow of water provided to *Customer* by the *District*. The locations of *Customer Meters* are identified on **Exhibit B** attached hereto and incorporated herein by this reference.

2.1.6 “*District.*” Lakewood Water District, a special purpose municipal corporation located in Pierce County, including its agents or designees.

2.1.7 “*Existing Water Rights.*” That portion of permits, certificates, or claims of the *District* originally obtained to serve only the *District’s* retail customers that has been allocated to *Wholesale Customers*. *Existing Water Rights* are shown on **Exhibit C** attached hereto and incorporated herein by this reference.

2.1.8 “*GPM,*” “*GPD,*” “*MGD.*” Gallons per Minute; Gallons per Day; Million Gallons per Day.

2.1.9 “*General and Administrative Cost,*” “*G&A.*” The *District’s* general and administrative, supervisory and other indirect costs, including financial (budgeting, accounting, bookkeeping), data processing, clerical, management and administration, personnel, non-capitalized professional services, including engineering and financial planning, insurance, and property tax, all as related to the provision of *Wholesale Water* service. State revenue related excise and B&O taxes, and any other costs not assigned to *Maintenance and Operation Cost*; but excluding any local government utility tax or franchise fee.

2.1.10 “*Internal System.*” (1) With respect to the *Customer*, all present and future reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment owned, operated, and maintained by *Customer*; and (2) With respect the *District*, all present and future reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment owned, operated, and maintained by the *District*, excluding any *Wholesale Facilities* and separate stand-alone satellite systems owned or operated by the *District*.

2.1.11 “*Joint Facilities.*” That portion of the present and future *District’s Internal System* that benefits *Wholesale Customers* or are necessary to supply wholesale water to *Customer*, including improvements, upgrades, and replacements.

2.1.12 “*Leased Water.*” Water leased or purchased by the *District* and used for the purpose of supplying *Wholesale Customers*.

2.1.13 “*Maintenance and Operation Cost.*” All direct and indirect costs and expenses incurred by the *District* in treating and supplying water, including leased or purchased water, and complying with applicable regulatory requirements, including supply, treatment, pumping, labor, utilities, equipment, tools, materials, inspection, insurance, and non-capitalized equipment leases, repair and rehabilitation, and the markup provided for herein.

2.1.14 “*Operations Advisory Committee,*” or “*Committee.*” The *Committee* composed of representatives of all *Wholesale Customers* to advise the *District* on the matters referenced in Section 2.8.2 herein and other matters as appropriate.

2.1.15 “*Party,*” “*Parties.*” The *District* and/or the *Customer*.

2.1.16 “*Supply Schedule.*” A mechanism to enable the *District* to provide the *Total Water Requirement* when it is needed by the *Customer* by accommodating both the *District’s* need to plan for and develop supply and infrastructure and the *Customer’s* need for an increasing supply. The *Supply Schedule* will identify maximum quantities of water that the *District* will supply to *Customer* during specific periods of time during the term of this Agreement.

2.1.17 *Total Annual Revenue Requirement.* The *District’s* cost of water determined according to the principles established in Section 2.6.3.C of this Agreement.

2.1.18 “*Total Water Requirement.*” Two (2) *MGD*, the daily maximum quantity of water the *District* will supply to *Customer* during the term of this Agreement. The *Total Water Requirement* is used for allocating cost under this Agreement.

2.1.19 “*Water Right.*” Any water right (permit or certificate) obtained by the *District* for the purpose of acquiring water to supply *Wholesale Customers* and put to use for that purpose.

2.1.20 “*Water Right Cost.*” The original cost incurred by the *District* to secure the *Water Right*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises, including those costs incurred by the *District* prior to execution of this Agreement; (2) recorded pay and expenses of employees of the *District* directly and indirectly related to securing the *Water Right*, including capitalized *District*

G&A, and including costs incurred prior to execution of this Agreement; (3) materials, equipment, and supplies directly related to securing the *Water Right*; (4) professional services related to the financing, planning, acquisition of the *Water Right*, or for participating in administrative proceedings with respect to securing the *Water Right*, or negotiating, resolving, or litigating any disputes related thereto; (5) reasonable expenses incurred to mitigate the impact of the *Water Right* upon the natural or physical environment; and (6) other expenses reasonably related to the acquisition of the *Water Right*.

2.1.21 “*Wholesale Customers.*” All water purveyors that purchase wholesale water from the *District*, excluding the Town of Steilacoom, under agreements identical to or substantially similar to this Agreement.

2.1.22 “*Wholesale Facilities,*” or “*Wholesale Facility.*” All water supply and transmission facilities, including, but not limited to, wells, water lines, booster stations, storage facilities, and transmission mains owned, operated, and maintained by the *District* for the sole purpose of supplying *Wholesale Customers*. *Wholesale Facilities* that serve all *Wholesale Customers* are *System Wholesale Facilities*. *Wholesale Facilities* that serve one or more but not all *Wholesale Customers* are *Customer Wholesale Facilities*. When the term *Wholesale Facilities* is used in this Agreement, that term includes both *System Wholesale Facilities* and *Customer Wholesale Facilities*.

2.1.23 “*Wholesale Water.*” The total quantity of water available from *District* for sale to current or prospective *Wholesale Customers*, including, but not limited to, water allocated by the *District* and designated for sale as *Wholesale Water* from its *Existing Water Rights* or from the *Water Right* or from *Leased Water*. Whenever the term “quantity of *Wholesale Water*” is used for the purpose of allocating cost, the term refers to *MGD*. As authorized by the District’s Board of Commissioners, the volume designated as *Wholesale Water* shall be ten (10) *MGD*, provided, for the purpose of allocating cost as further provided in this Agreement, the *District* shall be responsible for any unsold *Wholesale Water*.

2.2 SUPPLY AND PURCHASE OF WATER

2.2.1 So long as this Agreement is in effect, the *District* shall plan for, develop, treat, and annually supply to *Customer* potable water in an amount not to exceed *Customer’s Total Water Requirement* according to the *Supply Schedule* and to the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. The *District’s* obligation to provide *Customer* with *Wholesale Water*, and the *Customer’s* obligation to pay for such *Wholesale Water*, shall commence when the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this Agreement. Subject to the foregoing, the *District* will make *Wholesale Water* available to the *Customer* in

accordance with the following *Supply Schedule*, which *Customer* expressly agrees to be bound by, unless further modified by the *Parties* by written agreement:

	<u>QA</u>	<u>QI</u>
A. 1/1/20 to 12/31/24	2.0 MGD	1389 GPM
B. 1/1/25 to 12/31/29	2.0 MGD	1389 GPM
C. 1/1/30 to 12/31/34	2.0 MGD	1389 GPM
D. 1/1/35 to 12/31/39	2.0 MGD	1389 GPM

2.2.2 *Customer* shall pay for its share of the cost of water as provided herein. Before *Customer* begins to take water from the *District*, *Customer* shall pay only for the fixed portion of the *Customer's Total Water Requirement*. After *Customer* begins taking water from the *District* and so long as this Agreement is in effect, *Customer* shall purchase water from the *District* and pay for the *Customer's Total Water Requirement* and water supply received by *Customer* according to the *Supply Schedule* and the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. On an annual basis in a letter of understanding between the *Wholesale Customers* and *District*, the *District* may allow for a temporary upward modification of the *Supply Schedule*. Further, the *Customer* may propose to make a portion of the *Customer's Total Water Requirement* available to the *Customer* through its *Supply Schedule* that is not needed or cannot be taken by the *Customer* available to other *Wholesale Customers* or the *District*. However, any such proposal shall be subject to the following conditions: (a) the review and approval of the *Operations Advisory Committee* and the *District*, including the proposed terms and conditions of any such proposal, (b) shall only be on a short-term basis for a period of not more than sixty (60) days, (c) the *Customer* shall continue to be obligated to pay the fixed charges related to the *Customer's Total Water Requirement*, including the fixed charge related to the portion of the *Customer's Total Water Requirement* which may be provided to another *Wholesale Customer* or the *District*, and (d) in no event shall the *Customer's Total Water Requirement* retained by the *Customer* and made available to another *Wholesale Customer* exceed the *Customer's Total Water Requirement* in accordance with the *Customer's Supply Schedule*, unless otherwise agreed to and as conditioned by the *District* in writing.

2.2.3 This *Agreement* shall remain in effect for twenty (20) years, such twenty (20) year period commencing from the **Effective Date** of this *Agreement*, subject to automatic renewal for additional twenty (20)-year periods unless either *Party* notifies the other *Party* not less than five (5) years before the expiration date of any twenty (20) year period of its intent to terminate the *Agreement*. However, if the *District* is assumed or acquired by a third party, then *Customer* may terminate this *Agreement* at any time following not less than five (5) years written notice to the third party of *Customer's* intent to terminate the *Agreement*. If *Customer* chooses to exercise this right of early termination, then the party assuming or acquiring the *District* shall pay to *Customer* an amount equal to the total *Capital Improvement Cost* paid by *Customer* plus interest at the *District's* average weighted cost of debt, times the number of years remaining on the agreement on the date the right of early termination is exercised, divided by twenty (20)

years. Along with the notice of early termination, *Customer* shall submit to the third party an invoice with supporting documentation for the amount claimed. The invoice shall be due and payable within thirty (30) days of its date, and thereafter the unpaid balance shall bear interest at the rate of twelve (12) percent per annum.

2.2.4 So long as this Agreement remains in effect, the *Customer* shall not enter into any other agreements to sell water to another water purveyor without first obtaining the written consent of the *District*, which consent shall not be unreasonably withheld; provided, that in no event shall *Customer* sell water outside the place of use assigned to the *Water Right*, including water rights for *Leased Water*.

2.2.5 So long as this *Agreement* remains in effect, the *District* shall not enter into any other agreements to supply water to another purveyor that will impair the *District's* ability to supply *Customer's Total Water Requirement*.

2.3 **CONDITIONS OF SERVICE—*District*.**

2.3.1 Except as provided in paragraph 2.3.4 and 2.3.7, the *District* shall provide the normal flow identified in the *Supply Schedule* with required minimum hydraulic gradient at interties with *Customer's Internal System* of not more than one thousand, three hundred eighty nine (1,389) *GPM* and emergency flow of not more than one thousand, three hundred eighty nine (1,389) *GPM* as measured by *Customer Meters*. Flows for additional interties shall be established by separate agreement. Cost incurred to change normal flow shall be borne by the Party requesting the change.

2.3.2 Except as provided in paragraph 2.3.7, the *District* shall provide continuous service to *Customer*, to the extent feasible, in the same manner and extent that it provides service to its direct service customers.

2.3.3 Restrictions placed upon *Customer's* water use to address conservation shall be adopted and applied consistent with restrictions placed upon the *District's* direct service customers. The *District* may implement emergency or conservation measures, and *Customer* agrees to comply with such measures. The *District* and *Operations Advisory Committee* shall establish a working group to develop an emergency response plan and a water shortage plan that will identify the measures to be imposed to respond to emergencies or shortages, the mechanisms for imposing and repealing such measures, and penalties for failure to comply therewith. The *District* may impose unilateral measures until the *District* and *Customer(s)* approve such plans. The *District* or *Customer(s)* may convene the working group for the purpose of reviewing adopted plans, proposing amendments thereto, or monitoring implementation of plans; provided, that any amendments must have the concurrence of the *District*.

2.3.4 The *District* shall provide wholesale water to *Customer* at an equivalent level of service that it provides to the *District's* retail customers. In the event of a general emergency or weather-related water shortage affecting the entire District water supply system, including the *Wholesale Customers*, general restrictions placed upon water supply to the *Customer* shall be applied equally to the *District's* retail distribution system and the *Wholesale Customers*. An "emergency" for the purposes of this provision shall mean an unforeseen event including, but not limited to, water shortages, power outages, a pump system failure, well system failure, aquifer failure or diminution, or other failure in *Joint Facilities* or *Wholesale Facilities*. In the event of localized emergency problems, *Customer* acknowledges temporary, localized service interruptions may occur for the duration of the emergency. It is recognized by the *District* and the *Customer* that emergency water use curtailment measures may have to be implemented by the *District* on a regional basis in order to meet an emergency condition or regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other factors, shall be described in the *District's* water shortage response plan in effect as of the Effective Date of this Agreement, or successor contingency plans. Successor contingency plans shall be developed and implemented by the *District* in consultation with the *Operations Advisory Committee*. *Customer* shall assist with and support all emergency curtailment measures that are implemented. The *District* shall have the right to interrupt or reduce delivery of water to *Customer*, if the *District*, acting in good faith, determines that system emergencies or maintenance and repair so require. Except for emergencies, the *District* shall give *Customer* reasonable written notice of interruption or reduction, the reason therefore, and the likely duration thereof. In the event of an emergency requiring interruption of service, the *Parties* shall pursue restoration of service cooperatively and with the exercise of due diligence. *Customer* acknowledges that during an emergency situation or a planned outage, the *District* may temporarily be unable to meet all or part of its wholesale service commitment. If the *District* has a planned outage, the *District* shall give *Customer* a minimum of seven (7) days advance notice in writing of such planned outage. The *District* and *Customer* will work together to identify mutually acceptable dates for planned outages.

2.3.5 Except as provided in paragraph 2.3.7, the quality and content of water supplied to *Customer* at the *Customer Meters* under this Agreement shall comply with or exceed applicable federal, state, and local rules and regulations governing water quality applicable to the *District*, except in cases of emergency. The *District* also agrees to periodically or as required under State Department of Health guidelines monitor and test its water supply, including *Wholesale Supply*, for the presence of perfluorinated chemicals, including perfluorooctanoic acid ("PFOA") and perfluorooctanesulfonic acid ("PFOS"). If PFOA or PFOS are detected in such water supply which exceed health advisory limits established by the United States Environmental Protection Agency ("USEPA"), which are currently a combined concentration of 70 ppt (0.070 ppb), the *District* agrees to take whatever action is necessary to treat any such water supply to comply with USEPA health advisory levels after advising the *Operations Advisory Committee* of the *District's* proposed action and the approximate cost to undertake such treatment action, which may include the replacement of the water supply which exceeds USEPA health advisory levels. Water quality testing results shall periodically be shared with the *Operations Advisory Committee*.

2.3.6 A minimum hydraulic gradient for each intertie connection shall comply with Department of Health (DOH)-approved project report and construction document criteria.

Except as provided in paragraph 2.3.7, the *District* shall use its best efforts to supply water from its system to *Customer* at the intertie connection(s) at not less than the minimum hydraulic gradient pressure identified in DOH-approved project reports and to the extent possible under emergencies or maintenance and repair periods at the inlet side of *Customer Meters* of 30 psi. The hydraulic gradient for additional *Customer Meters* shall be established by separate agreement. Cost incurred to change the hydraulic gradient shall be borne by the party requesting the change.

2.3.7 Whenever the *District* delivers water through a third party's water system, the *District's* obligations under paragraphs 2.3.1, 2.3.2, 2.3.5, and 2.3.6 are satisfied when the water supplied to that third party meets the requirements of those paragraphs. *Customer* releases *District* from any claim for damages or injury sustained as a result of the third party or its water system failing to meet the requirement of paragraphs 2.3.1, 2.3.2, 2.3.5, and 2.3.6.

2.4 **CONDITIONS OF SERVICE—*Customer*.**

2.4.1 *Customer's* demand upon the *District's* water supply shall not exceed the *Total Water Requirement* at the rates of flow provided for in paragraph 2.3.1, except as provided in Section 2.2.2 herein.

2.4.2 *Customer* shall limit retail sales of water to customers within its current or future service area as described in the *Customer's* water comprehensive plan; provided that, *Customer* shall not be prohibited from providing service to retail customers outside of its service area so long as *Customer* does not exceed *Customer's Total Water Requirement and Supply Schedule*.

2.4.3 *Customer* shall not interconnect any part of its *Internal System* with any other municipal or private water system without the prior written consent of the *District* (prior oral consent in an emergency), which consent shall not be unreasonably withheld. Interconnections in place as of the date of this Agreement and identified in **Exhibit B** are deemed approved as required by State Department of Health.

2.4.4 *District* shall select, install, and charge the *Customer* for the *Customer Meter* or *Customer Meters*. *Customer Meters* shall be calibrated annually in the presence of *District* representatives and shall be maintained to be accurate within two (2) percent plus or minus. The *District* shall have free and unlimited access to *Customer Meters* for inspection and testing at the *District's* expense. The *District* shall read *Customer Meters* monthly and bill *Customer* for water supplied according to the terms of this Agreement; provided, however, that whenever the *District* delivers water through another water system, the wheeling agreement shall establish meter-reading procedures for billing for water supplied according to the terms of this Agreement.

2.5. CAPITAL IMPROVEMENTS.

2.5.1 The *District* agrees to construct and recover the cost of the *Capital Improvements* as provided herein.

2.5.2 The *Capital Improvement Cost* of *Wholesale Facilities* shall be borne entirely by *Wholesale Customer* through rates and/or cash payments from *Wholesale Customer*; provided that the *Capital Improvement Cost* of a *System Wholesale Facility* shall be allocated among *Wholesale Customers* according to the *Total Water Requirement* of the *Customer* divided by *Wholesale Water*, and the *Capital Improvement Cost* of a *Customer Wholesale Facility* shall be allocated only to the *Customer* that benefits from the facility, provided, that whenever more than one *Customer* benefits from the *Customer Wholesale Facility*, the costs shall be allocated between those benefited *Customers* in the same manner as for *System Wholesale Facilities*.

2.5.3 The *Capital Improvement Cost* of *Joint Facilities* shall be allocated as follows:

A. The *Capital Improvement Cost* of existing *Joint Facilities* shall be allocated between the *District* and *Wholesale Customers* according to the ratio of the quantity of *Wholesale Water* that has been designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights; provided, however, the portion of *Capital Improvement Cost* of *Joint Facilities* that are existing transmission mains to be allocated to *Wholesale Customers*, net of accumulated depreciation, shall be determined by multiplying the cost of all *District* mains recorded on the *District's* books, less the cost of all *District* mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, times the ratio of the lineal feet of mains eight inches and greater over the total lineal feet of all *District* mains (provided, in no event shall the allocation of transmission mains of 8" diameter or larger to the *Wholesale Customers* exceed fifty-nine (59) percent), less the lineal feet of all mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom.

B. The *Capital Improvement Cost* of a planned *Joint Facility* shall be allocated between the *District* and *Wholesale Customers*, after the facility is constructed, according to the ratio of the quantity of *Wholesale Water* designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights.

C. The portion of the *Capital Improvement Cost* of *Joint Facilities* shall be allocated to the *Customer* according to the ratio of *Total Water Requirement* of *Customer* over the quantity of *Wholesale Water*.

2.5.4. The *Water Right Cost* shall be allocated among *Wholesale Customers* according to the ratio of the *Total Water Requirement* of a *Customer* over *Wholesale Water*.

2.5.5 The *District* reserves the right to issue bonds and other obligations in accordance with applicable law.

2.5.6 If the *District* is required by growth, accident, emergency, failure, or applicable law or regulation to improve, upgrade, replace, or expand the *Water Right, Wholesale Facilities, or Joint Facilities*, or to provide a higher level of water treatment, *Customer* shall share in those future *Capital Improvement Costs* as provided in paragraphs 2.5.2, 2.5.3, or 2.5.4.

2.5.7 *Capital Improvements* shall be constructed as public works projects awarded pursuant to applicable law. The *District* shall design, construct, and maintain the *Capital Improvements* according to accepted water utility standards. The *District* shall administer the planning, design, construction, and construction management of the *Capital Improvements* to the best of its ability. Any construction change order changing the scope of a project or increasing the estimated *Capital Improvement Cost* of a project by five (5) percent or \$50,000.00, whichever is greater, shall be approved only after consultation with the *Operations Advisory Committee*.

2.5.8 The *Capital Improvement Cost* of the New Booster Pump Station, a *Wholesale Facility*, shall be allocated to the *Wholesale Customers* for the purposes of this Agreement as follows. The *Wholesale Customers* who benefit from the New Booster Pump Station, including Summit, agree for the purposes of this Agreement that Summit would have incurred the cost of Four Hundred Sixty Four Thousand Dollars (\$464,000.00) to construct Summit's own booster pump station to satisfy Summit's own needs ("Summit BPS Cost"). The Summit BPS Cost shall be the amount that Summit is allocated for its share of the cost of the New Booster Pump Station for the purposes of calculating depreciation and rate of return. The remaining amount of the New Booster Pump Station (actual constructed New Booster Pump Station cost minus the Summit BPS Cost) shall be shared by the other *Wholesale Customers* who benefit from the New Booster Pump Station based on each *Wholesale Customer's Total Water Requirement* divided by the total quantity of *Wholesale Water* for the purposes of calculating depreciation and rate of return for the *Wholesale Customers*, other than Summit, who benefit from the New Booster Pump Station

2.6 COST OF WATER.

2.6.1 The *Capital Improvement Cost* and *Water Right Cost* shall be allocated among *Wholesale Customers* as provided in Section 2.5. The *District* shall price the water as provided in this Section 2.6.

2.6.2 In this *Agreement*, water will be priced according to the utility-basis approach of cost recovery, consisting of *General and Administrative Cost, Maintenance and Operation Cost*, depreciation expense, and a fair rate of return on rate base (*Wholesale Facilities and Joint Facilities*). The utility-basis approach of cost recovery shall be composed of two pricing components: (1) a fixed charge based on the *Customer Total Water Requirement*, and (2) a unit charge per 100 cubic feet (CCF) ("*Utility Basis*"). Water shall be priced as provided in Section 2.6.3C and *Customer's* wholesale water rate shall be composed of: (1) a fixed charge to recover depreciation, a return on Rate Base, and *G&A*; and (2) a unit charge per 100 cubic feet (CCF) of *Customer's* consumption to recover *Leased Water* cost and *Maintenance and Operation Cost*, including a markup of ten (10) percent.

2.6.3 The following shall determine the wholesale water rate to be paid to the *District* by *Customer*:

A. Subject to the provisions of Section 2.3.4 herein, the *District* will treat *Customer* as a customer separate from the *District's* direct service customers;

B. All costs of serving *Customer* will be recovered by a combination of annual fixed charges and water volume charge to the *Customer*; and

C. The cost of serving *Customer* shall include depreciation expense, Return on Rate Base, *Maintenance and Operation*, and *G&A* components determined as follows:

1. *G&A* shall be an annual cost per connection established by multiplying total *G&A* by eighty percent (80%), dividing that by the total number of water service connections, with *Customer* counted as one connection, plus twenty percent (20%) of annual *G&A* divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Customer*, multiplied by *Customer's* projected current consumption as provided by *Customer* to *District* no later than December 31 of each year.

2. Annual depreciation shall be determined dividing the original *Capital Improvement Cost* recorded on the *District's* books by the *District's* standard application of estimated life of that facility or for that class of water assets.

3. Return on Rate Base shall be determined as follows:

- a. *Wholesale Facilities.* The *Capital Improvement Cost*, net of accumulated depreciation, allocable to *Customer* less any upfront cash payment made by *Customer*, multiplied by 6 percent.
- b. *Joint Facilities.* The *Capital Improvement Cost* net of accumulated depreciation multiplied by six (6) percent per year from the date the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this *Agreement*.
- c. *Water Right.* The *Water Right Cost* allocable to Wholesale Customer multiplied by 12 percent per year for 20 years after the *Agreement* date and thereafter multiplied by 9 percent per year.
- d. *Existing Water Rights.* The *Water Right Cost* per *MGD* will be the same as the Abitibi water right cost per *MGD* multiplied by six (6) percent per year.

4. *Maintenance and Operation Cost of Joint Facilities and Wholesale Facilities* shall be annually determined separately, totaled, and increased by 10 percent per the *District's* fiscal year.

- a. The *Maintenance and Operation Cost of Joint Facilities* shall be determined as follows:

- i. Pumping, Treatment, and Storage Costs. The annual *District* pumping, storage, and treatment costs divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's total consumption as provided by *Customer* to *District* no later than December 31 of each year.

- ii. Transmission Costs. The annual *District* transmission and distribution costs multiplied by the ratio of the lineal feet of mains eight inches and greater (limited to 59%), less the lineal feet of mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's consumption as

provided by *Customer* to *District* no later than December 31 of each year.

b. The annual *District Maintenance and Operation Cost of Wholesale Facilities* shall be allocated among *Wholesale Customers* according to the ratio of the *Customer's* projected current year's consumption over the projected current year's consumption of all *Wholesale Customers* as provided by *Customer* to *District* no later than December 31 of each year.

5. *Leased Water Cost.* The *District's* annual cost for *Leased Water* shall equal 10 percent times the average cost per *MGD* of the Abitibi water right purchase times the quantity of *Leased Water* measured in terms of *MGD* or the actual cost of *Leased Water* per *MGD* plus a 10 percent mark-up, whichever is greater.

D. The *District* will recalculate the *G&A* costs and *Maintenance and Operation* costs annually by using the current year's total consumption and *District's* annual costs; and, in the following year, the fixed charge portion of *Customer's* wholesale water rate shall be increased or decreased accordingly.

2.6.4. A. The *District* shall install telemetry systems at the *Customer Meters* for the purpose of monitoring delivery of water to *Customer*. Such telemetry shall be operational when the *District* commences to supply *Customer* with water under this Agreement. The *District* shall advise the *Customer* whenever *Customer's* demand for water threatens to exceed the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*. Upon receipt of such notice, the *Customer* shall operate its system so that peaking demand shall be satisfied from *Customer's* water supply and not from water supplied under this Agreement. The *District* shall notify *Customer* when *Customer's* demand no longer threatens to exceed the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*.

B. If, in any calendar month, the *Customer* exceeds the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement* (an "Exceedance"), the *District* shall hand deliver written notice of such Exceedance to *Customer*. If after three days from the notice such Exceedance continues, the *District* shall hand deliver a second notice of Exceedance. If after three days from the second notice the Exceedance continues, then, in addition to a 100 percent surcharge on the unit charge component of the wholesale water rate payable on all water used in excess of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*, the *Customer* shall pay to the *District* an amount equal to 75 percent of the prior year's total annual payment (which includes both the unit charge and the fixed charge) to the *District* for wholesale water, unless such surcharge is reduced or waived by the *District* in its sole discretion..

C. In any calendar year that a *Customer* exceeds the quantity limitation of the *Supply Schedule* times 365 or its *Total Water Requirement* times 365, as applicable, the *Customer's* wholesale water rates shall be subject to a surcharge on the Exceedance of one hundred (100) percent of the unit charge component of the wholesale water rate, unless such surcharge is reduced or waived by the *District* in its sole discretion.

D. *Customer* shall reimburse the *District* for any penalties imposed on the *District* for using more water than allowed by *District* water rights arising from *Customer's* use of water in excess of the use provided for herein.

2.6.5 The *District* has adopted Resolution No. B-1284 that establishes financial policies and a Rehabilitation and Repair Account, Account No. 136. The *District* agrees that it will not modify its financial policies in a manner detrimental to *Customer* nor discontinue Account No. 136 without making adequate provision for its obligation to fund its share of depreciation as provided herein. The *District* will establish in Account No. 136 a sub-account entitled "Wholesale Customer's R&R" for the purpose of recording funded depreciation and into which the *District* shall deposit, at a minimum the annual depreciation expense recovered from *Customer* through rates. Amounts deposited into the "Wholesale Customer's R&R" sub-account shall be restricted to payment for repair and rehabilitation projects for the *Wholesale* and *Joint Facilities*, and unavailable to the *District* by way of interfund transfer or loan; provided, that the *District* may invest such funds as prescribed by law. The return on such investment shall be deposited to the "Wholesale Customer's R&R" sub-account and credited against revenue requirements for the *Wholesale* and *Joint Facilities*. Within the "Wholesale Customer's R&R" sub-account, the *District* may establish additional sub-accounts for each *Customer*. Funding of the "Wholesale Customer's R&R" account shall begin only after all other revenue requirement cost and rate of return elements are recovered in wholesale rate revenues in whole.

At the option of *Customer*, on or before the effective date of the dissolution of the *District*, its merger or consolidation with another special purpose district, or its assumption by a city, funds received from *Customer* and deposited into the "Wholesale Customer R&R" sub-account shall be deposited into an account established by *Customer* and restricted by for the duration of this *Agreement* to payment of *Customer's* share of *Wholesale* and *Joint Facilities* rehabilitation and repair projects. Thereafter, *Customer's* portion of rates allocated to depreciation expense shall be deposited therein and restricted for payment of *Wholesale* and *Joint Facilities* rehabilitation and repair projects. If *Customer* chooses to terminate the agreement as provided in 2.2.3, the funds in the "Wholesale Customer R&R" shall be refunded as provided in 2.2.3.

2.6.6 If the *Customer* made a cash payment(s) on the *Wholesale Facility* asset being replaced, the amount of Depreciation for the *Wholesale Facility* asset being replaced shall be credited against the cost of the new *Wholesale Facility* asset.

2.6.7 The District’s cost of power incurred to operate and maintain the New Booster Pump Station shall be allocated to and paid by the *Wholesale Customers* as provided for in the table set forth below:

Wholesale Partner	5 MGD Total Wholesale Demand		8 MGD Total Wholesale Demand		10 MGD Total Wholesale Demand	
	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill
Summit	1.5	30.0%	3.0	36.8%	3.0	27.0%
Firgrove	2.0	40.0%	2.0	25.3%	2.0	20.9%
Rainier View	1.5	30.0%	3.0	37.9%	3.0	31.3%
Unallocated	0.0	0.0%	0.0	0.0%	2.0	20.9%
Total	5.0	100.0%	8.0	100.0%	10.0	100.0%

2.7 INTERNAL SYSTEMS.

2.7.1 Each *Party* shall own, maintain, and operate its *Internal System* at its sole expense, except as provided herein. Each *Internal System* shall be maintained and operated with the highest practicable standards and practices in construction, operation, and maintenance, with particular attention to cross-connection control, water quality, and efficient and economical utility operation. Either *Party* may notify the other of conditions within the other’s *Internal System* that constitute violations of law, regulation, or permit. Each *Party* shall cooperate with the other to rectify such conditions. If by reason of the *Customer’s* act or failure to act, the *District* is penalized for failure to maintain or operate the *Wholesale Facilities* as required by applicable law or regulation, *Customer* shall indemnify the *District* for the penalty and all costs, including reasonable attorney’s fees associated with investigating and defending against such penalty.

2.7.2 *Customer* shall pay the charges described in paragraph 2.6 out of the revenues of *Customer’s Internal System*. *Customer’s* payments to the *District* pursuant to this Agreement and payments otherwise required or provided for by this Agreement shall be maintenance and operation expenses of *Customer’s Internal System*, prior to and superior to any debt or charge or lien of any revenue bond or other obligation issued by *Customer* that is payable from the revenues of its *Internal System*, excepting an existing obligation/loan to the *Customer* from Columbia Bank, Loan #806003063 (“Bank Loan”), until such Bank Loan is paid in full; and excepting an existing State Revolving Fund obligation/loan to *Customer*, Loan #DP09-952-031 (“SRF Loan”), until such SRF Loan is paid in full, and any future SRF loans *Customer may obtain*. *Customer* shall establish rates and collect fees and charges for water service sufficient to pay for the maintenance and operation of its *Internal System*, including payments to the *District*, and the principal and interest on any and all *Customer* debt obligations.

2.7.3 The *District* shall establish rates and collect fees and charges for water service sufficient to pay for the maintenance and operation of its *Internal System*, and the principal and interest on any and all *District* revenue obligations that constitute a charge against the revenue of the *District's Internal System*.

2.7.4 The *District* shall keep full and complete books of accounts in compliance with current standards required by the State Auditor. Either *Party* may request independent audits by a public accounting firm at that *Party's* expense.

2.8 ADMINISTRATION.

2.8.1 The *District* shall, if necessary, amend its comprehensive plan and/or water rights to authorize it to serve *Customer*. The *District*, as planning authority for the water supply requirements of this contract, shall examine and investigate water supplies suitable and adequate for its present and reasonable future needs, including any wholesale supply requirements. The *District* shall prepare and adopt a plan for acquiring and supplying such water, including provision for water and water rights, real property, and facilities required for storage and transmission and delivery of water.

2.8.2 The *District* shall establish an operations advisory committee ("*Operations Advisory Committee*" or "*Committee*") to be composed of representatives of all *Wholesale Customers*. The *Committee* shall meet quarterly and shall advise the *District* on all matters related to wholesale water supply, participate in the preparation of emergency plan(s), review and comment upon the *District's* comprehensive plan(s), review and comment upon planning for, design of, and cost of *Capital Improvements*; provided however, the *District's* decisions concerning *Capital Improvements* shall be final and not subject to arbitration.

2.8.3 Each *Party* shall purchase and maintain insurance for its *Internal System* equal to or greater than coverage in force for such system as of the date of this Agreement.

2.8.4 *Customer* grants to the *District* a right of first refusal to acquire *Customer's Internal System* in lieu of a sale to a third-party purchaser on terms and conditions acceptable to the *Parties*.

2.8.5 The *District* shall bill *Customer* for water supplied by monthly invoice due and payable within thirty (30) days of the date thereof. Delinquent and unpaid balances shall bear interest at twelve (12) percent per annum. Each monthly bill shall be composed of 1/12th of the estimated annual fixed cost plus a unit charge on volume used during the billing period. *Customer* may dispute the accuracy of a monthly invoice by providing written notice to the *District* within thirty (30) days of the date of invoice that specifies the nature of the dispute and by paying any undisputed amount. The *District* shall rule on the dispute in a timely fashion, and *Customer* shall pay the disputed amount or submit the dispute to arbitration as provided herein

within thirty (30) days of the *District's* decision. Disputed amounts shall not bear interest until thirty (30) days after the *District's* decision or the arbitrator's decision.

2.8.6 Except as otherwise provided in this Agreement, a dispute arising out of the terms and conditions of this Agreement, except for a billing dispute, shall be submitted for mediation to a mediator agreed to by the *Parties*. If mediation is unsuccessful, the dispute shall be arbitrated by JAMS of Tacoma.

Arbitration, shall be conducted in accordance with Title 7.04A RCW; provided, the *Parties* may conduct discovery pursuant to the Superior Court Rules of Civil Procedure. The arbitrator's decision shall be final and shall award reasonable attorney's fees and costs of arbitration to the prevailing party. Requests for reconsideration or modification may be submitted as provided by Superior Court Rules of Civil Procedure. The arbitrator's decision shall be reduced to judgment as provided by Title 7.04A RCW. The provisions of this paragraph do not apply to arbitration of a billing dispute, which shall be conducted informally.

2.8.7 This Agreement shall inure to the benefit of and be binding upon successors of interest and assigns of the *Parties*. Neither this Agreement nor obligations to perform hereunder may be assigned voluntarily by either *Party* without the other *Party's* written consent. The *Parties* do not intend to confer rights or benefits upon any third party. This Agreement is complete and contains the entire understanding of the *Parties*, and it may be modified only by a writing executed by the *Parties*.

2.8.8 Unless otherwise provided in this Agreement, all notices relating to this Agreement shall be sent to the following addresses, certified mail, return receipt requested, unless the other *Party* is previously notified in writing:

To the <i>District</i>:	To <i>Customer</i>:
General Manager	General Manager
Lakewood Water District	Firgrove Mutual Inc.
P.O. Box 99729	10408 144th St E.
Lakewood, WA 98496-0729	Puyallup, WA 98374

Billings for water supplied and payments thereof may be made by regular mail.

2.8.9 Each *Party* agrees to indemnify the other and hold it harmless from and against any loss, cost, damage, or expense of any kind and nature, including reasonable attorney's fees arising out of injury to person or damage to property in any manner caused by the negligence or omission of the *Party* in the performance of its work pursuant to or in connection with this Agreement.

2.8.10 This *Agreement* is intended to be and is a contract for the purchase and sale of a commodity, and no provision hereof shall be construed to make the *Parties* partners or joint venturers. Neither *Party* is the agent of the other nor shall either *Party* be held liable for the acts of the other on a theory of agency or any other representative capacity.

2.8.11 This *Agreement* shall be effective ("*Effective Date*") on the date by which it is signed by both *Parties*.

2.8.12 The *District* and the *Customer* recognize there is a series of agreements entered into by and between the *District* and the *Wholesale Customers* as referenced in the Recitals herein, and to the extent such agreements provide for the sharing of costs and the performance of certain duties and obligations by the *Wholesale Customers*, individually or collectively, the *Customer* shall be a third-party beneficiary of such other agreements with the *Wholesale Customers* and the *District*.

LAKWOOD WATER DISTRICT



President/Commissioner



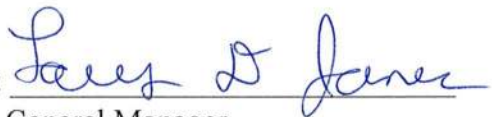
Vice President/Commissioner



Secretary/Commissioner

Dated: 4-11-19

CUSTOMER

By: 

Its: General Manager
Dated: 4-10-19

Exhibit B, Section 2.1.5

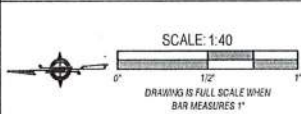
74TH AVE E (PRIVATE ROAD)

161 ST CT E

7304 160TH ST E
PUYALLUP, WA

7317 161ST ST CT E
PUYALLUP, WA

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MAIN EXTENSION

PLOT DATE: 4/9/19
FILE PATH: j:\bothell\2019\116-076\cad\line-p-firgrove.dwg

Exhibit C; Section 2.1.7 Existing Water Rights

Existing Water Rights 12.70 MGD

Abitibi Water Rights 6.0 MGD

Total Water Rights 18.70 MGD

**FIRST AMENDMENT TO AGREEMENT FOR
WHOLESALE SUPPLY OF WATER**

THIS FIRST AMENDMENT TO AGREEMENT FOR WHOLESALE SUPPLY OF WATER (“**First Amendment**”), dated as of the latter of the signature dates below (the “**Effective Date**”), is by and between Lakewood Water District, a special purpose municipal corporation (“**District**”), and Summit Water & Supply Company, a Washington nonprofit corporation (“**Customer**” or “**Summit**”) (individually a “Party” and collectively the “Parties”) for the purposes set forth below.

1. RECITALS.

1.1. The District, pursuant to Title 57 RCW, supplies potable water to customers within its boundaries through a public water system. The District’s public water system is comprised of source of supply (wells with attendant water rights), storage and distribution mains. The District’s water supply is in excess of its present and reasonably foreseeable future demand.

1.2 The Customer supplies potable water to customers within its boundaries through a public water system. The Customer’s public water system is comprised of source of supply (wells with attendant water rights), storage and distribution mains.

1.3 The Customer previously requested the District provide water supply to Customer because the District had water available to supply the Customer and the Customer could purchase water supply from the District at a cost less than the Customer would incur to develop or purchase additional sources of water supply other than from the District. Therefore, the Parties entered into an Agreement for Wholesale Supply of Water dated December 16, 2008 (“**Agreement**”), which provided for the District to provide wholesale water supply to the Customer on certain terms and conditions.

1.4 The District has also previously entered into agreements with Spanaway Water Company, a Washington nonprofit corporation (“**Spanaway**”), and Rainier View Water Company, Inc., a Washington corporation (“**Rainier View**”), to provide wholesale water supply to those entities. The District is also currently negotiating an agreement with Firgrove Mutual Inc., a Washington nonprofit corporation (“**Firgrove**”), to provide wholesale water supply to Firgrove (Spanaway, Summit, Rainier View, and Firgrove collectively the “*Wholesale Customers*”). Summit and Rainier View are each interested in purchasing additional wholesale water supply from the District, and Firgrove is interested in purchasing wholesale water supply from the District. To facilitate the sale of additional wholesale water supply to Rainier View and wholesale water supply to Firgrove, the District is required to install a new wholesale transmission main (“**Wholesale Transmission Main**”), upgrade an existing booster pump station located at 1620 115th St., Tacoma, Washington (“**Booster Pump Station Upgrade**”), and install a new booster pump station in the vicinity of 121st Street East, Tacoma, Washington (“**New Booster Pump Station**”), as those water facilities are described and depicted on **Exhibit A** attached hereto and incorporated herein by this reference.

1.5 Summit now desires to amend its Agreement with the District to (a) benefit from amendments to the Agreement the *Wholesale Customers* has negotiated with the District, (b) purchase additional wholesale water supply from the District, (c) pay its equitable share of the cost of the Booster Pump Station Upgrade and the New Booster Pump Station, as further provided herein, and (d) extend the term of the Agreement.

1.6 In Section 2.2.1 of the Agreement, the District agreed to annually supply to the Customer the Customer's *Total Water Requirement* or such portion thereof utilized by the Customer according to the terms and conditions of the Agreement. Section 2.1.18 of the Agreement defined the Customer's *Total Water Requirement* as "2.0 MGD, the daily maximum quantity of water the *District* will supply to *Customer* during the term of this Agreement." However, the *Customer* now desires to modify the *Total Water Requirement* to increase such *Total Water Requirement* to **3.0 MGD** and modify the *Supply Schedule* under which *Customer* will purchase water from the District, and the District is willing to increase such *Total Water Requirement* and adjust the *Supply Schedule* as requested by *Customer*.

1.7 In Section 2.2.3 of the Agreement, the Parties agreed the Agreement would remain in effect for twenty (20) years, subject to automatic renewals and/or termination by either of the Parties, and the Parties now desire to modify and amend the duration of the Agreement to extend such Agreement as further provided herein.

1.8 Therefore, the District and Summit now desire to amend the Agreement as provided herein.

NOW THEREFORE, in consideration of the following terms and conditions and other good and valuable consideration, the Parties agree as follows:

AGREEMENTS

- A. The recitals set forth above are incorporated herein in full by this reference.
- B. Section 2.1.1 of the Agreement is hereby modified and amended to read as follows:
 - 2.1.1 "*Capital Improvements.*" Improvements, upgrades, and replacements constructed or installed in whole or in part by the District to provide wholesale water to *Customer* including reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment. *Capital Improvements*, when constructed, are *System Wholesale Facilities*, *Customer Wholesale Facilities*, or *Joint Facilities*. *Capital Improvements* shall be determined based on the District's capitalization/fixed asset policy as set forth in District Resolution No. B-1431, and as such Resolution may be modified and amended by the District, and shall include any District asset with an initial individual cost of more than Five Thousand Dollars (\$5,000.00) and an estimated useful life in excess of one (1) year.
- C. Section 2.1.2 of the Agreement is hereby modified and amended to read as follows:
 - 2.1.2 "*Capital Improvement Cost.*" The original cost of *Capital Improvements*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises for the *Capital Improvements*, including those costs incurred by the *District* prior to execution of this Agreement; (2) work performed under contracts for construction, installation, and inspection of the *Capital Improvements*; (3) recorded pay and expenses of employees of the *District* directly and indirectly related to the design, construction, installation, and inspection of the *Capital Improvements*, including capitalized *District G&A*, and including costs incurred prior to execution of this Agreement; (4) materials, equipment, and supplies

directly related to the *Capital Improvements*; (5) acquiring and condemning land, easements, and rights-of-way for or related to the *Capital Improvements*; (6) professional services related to the financing, planning, acquisition, construction, installation, and inspection of the *Capital Improvements* or for negotiating, resolving, or litigating any disputes related thereto; (7) reasonable expenses incurred to mitigate the impact of the *Capital Improvements* upon the natural or physical environment, including but not limited to expenses for landscaping, buffering, and wetland mitigation; (8) other expenses reasonably related to the planning, design, construction, financing and financing interest expense, and construction management of the *Capital Improvements*.

D. Section 2.1.3 “*Cash Basis*” is hereby deleted in its entirety.

E. Section 2.1.5 “*Customer*” is hereby modified and amended to read as follows:

2.1.5 “*Customer*,” “*Wholesale Customer*”. Summit Water & Supply Company, a Washington nonprofit corporation which is purchasing wholesale water from the *District*, including *Customer’s* agents or designees.

F. Section 2.1.6 “*Customer Meters*” is hereby modified and amended to read as follows:

2.1.6 “*Customer Meters*.” Meters owned and operated by the *District* which measure the quantity and flow of water provided to *Customer* by the *District*. The locations of *Customer Meters* are identified on **Exhibit B**.

G. Section 2.1.10 “*General and Administrative Cost*,” “*G&A*.” is hereby modified and amended to read as follows:

2.1.10 “*General and Administrative Cost*,” “*G&A*.” The *District’s* general and administrative, supervisory and other indirect costs, including financial (budgeting, accounting, bookkeeping), data processing, clerical, management and administration, personnel, non-capitalized professional services, including engineering and financial planning, insurance, and property tax, all as related to the provision of *Wholesale Water* service.

H. Section 2.1.18 “*Total Water Requirement*” of the Agreement is hereby modified and amended to read as follows:

2.1.18 “*Total Water Requirement*.” Three (3) *MGD*, the daily maximum quantity of water the *District* will supply to *Customer* pursuant to this Agreement. The *Total Water Requirement* is used for allocating cost under this Agreement.

I. Section 2.1.22 “*Wholesale Facilities*” of the Agreement is hereby modified and amended to read as follows:

2.1.22 “*Wholesale Facilities*,” or “*Wholesale Facility*.” All water supply and transmission facilities, including, but not limited to, wells, water lines, booster stations, storage facilities, and transmission mains owned, operated, and maintained by the *District* for the sole purpose of supplying *Wholesale Customers*. *Wholesale Facilities*

that serve all *Wholesale Customers* are *System Wholesale Facilities*. *Wholesale Facilities* that serve one or more but not all *Wholesale Customers* are *Customer Wholesale Facilities*. When the term *Wholesale Facilities* is used in this Agreement, that term includes both *System Wholesale Facilities* and *Customer Wholesale Facilities*.

J. Section 2.1.23 “*Wholesale Water*” of the Agreement is hereby modified and amended to read as follows:

2.1.23 “*Wholesale Water*.” The total quantity of water available from *District* for sale to current or prospective *Wholesale Customers*, including, but not limited to, water allocated by the *District* and designated for sale as *Wholesale Water* from its *Existing Water Rights* or from the *Water Right* or from *Leased Water*. Whenever the term “quantity of *Wholesale Water*” is used for the purpose of allocating cost, the term refers to *MGD*. As authorized by the *District’s* Board of Commissioners, the volume designated as *Wholesale Water* shall be ten (10) *MGD*, provided, for the purpose of allocating cost as further provided in this Agreement, the *District* shall be responsible for any unsold *Wholesale Water*.

K. A new Section 2.1.24 “*Operations Advisory Committee*,” or “*Committee*” is hereby added to the Agreement to read as follows:

2.1.14 “*Operations Advisory Committee*,” or “*Committee*.” The *Committee* composed of representatives of all *Wholesale Customers* to advise the *District* on the matters referenced in Section 2.8.2 herein.

L. Section 2.2.1 of the Agreement is hereby modified and amended to read as follows:

2.2.1 So long as this Agreement is in effect, the *District* shall plan for, develop, treat, and annually supply to *Customer* potable water in an amount not to exceed *Customer’s Total Water Requirement* according to the *Supply Schedule* and to the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. The *District’s* obligation to provide *Customer* with *Wholesale Water*, and the *Customer’s* obligation to pay for such *Wholesale Water*, shall commence when the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this Agreement. Subject to the foregoing, the *District* will make *Wholesale Water* available to the *Customer* in accordance with the following *Supply Schedule*, which *Customer* expressly agrees to be bound by, unless further modified by the *Parties* by written agreement:

		<u>QA</u>		<u>QI</u>
A.	1/1/20 to 12/31/22	Quantity	<u>1,500,000</u> GPD	<u>1,040</u> GPM
B.	1/1/23 to 12/31/27	Quantity	<u>1,750,000</u> GPD	<u>1,215</u> GPM
C.	1/1/28 to 12/31/32	Quantity	<u>2,000,000</u> GPD	<u>1,389</u> GPM
D.	1/1/33 to 12/31/37	Quantity	<u>2,250,000</u> GPD	<u>1,563</u> GPM
E.	1/1/38 to 12/31/42	Quantity	<u>2,500,000</u> GPD	<u>1,736</u> GPM
F.	1/1/43 and thereafter	Quantity	<u>3,000,000</u> GPD	<u>2,083</u> GPM

M. 2.2.2 *Customer* shall pay for its share of the cost of water as provided herein. Before *Customer* begins to take water from the *District*, *Customer* shall pay only for the fixed portion of the *Customer's Total Water Requirement*. After *Customer* begins taking water from the *District* and so long as this Agreement is in effect, *Customer* shall purchase water from the *District* and pay for the *Customer's Total Water Requirement* and water supply received by *Customer* according to the *Supply Schedule* and the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. On an annual basis in a letter of understanding between the *Wholesale Customers* and *District*, the *District* may allow for a temporary upward modification of the *Supply Schedule*. Further, the *Customer* may propose to make a portion of the *Customer's Total Water Requirement* available to the *Customer* through its *Supply Schedule* that is not needed or cannot be taken by the *Customer* available to other *Wholesale Customers* or the *District*. However, any such proposal shall be subject to the following conditions: (a) the review and approval of the *Operations Advisory Committee* and the *District*, including the proposed terms and conditions of any such proposal, (b) shall only be on a short-term basis for a period of not more than sixty (60) days, (c) the *Customer* shall continue to be obligated to pay the fixed charges related to the *Customer's Total Water Requirement*, including the fixed charge related to the portion of the *Customer's Total Water Requirement* which may be provided to another *Wholesale Customer* or the *District*, and (d) in no event shall the *Customer's Total Water Requirement* retained by the *Customer* and made available to another *Wholesale Customer* exceed the *Customer's Total Water Requirement* in accordance with the *Customer's Supply Schedule*, unless otherwise agreed to and as conditioned by the *District* in writing.

N. Section 2.2.3 of the Agreement is hereby modified and amended to read as follows:

2.2.3 This Agreement shall remain in effect for twenty (20) years, such twenty (20) year period commencing from the **Effective Date** of this Agreement, subject to automatic renewal for additional twenty (20) year periods unless either *Party* notifies the other *Party* not less than five (5) years before the expiration date of any twenty (20) year period of its intent to terminate the Agreement. However, if the *District* is assumed or acquired by a third party, then *Customer* may terminate this Agreement no sooner than ten (10) years from the **Effective Date** of this Agreement. If *Customer* chooses to exercise this right of early termination, then the party assuming or acquiring the *District* shall pay to *Customer* an amount equal to the total *Capital Improvement Cost* paid by *Customer* plus interest at the *District's* average weighted cost of debt, times the number of years remaining on the Agreement on the date of the early termination is exercised, divided by twenty (20) years. Along with the notice of early termination, *Customer* shall submit to the third party an invoice with supporting documentation for the amount claimed. The invoices shall be due and payable within thirty (30) days of its date, and thereafter the unpaid balance shall bear interest at the rate of twelve (12) percent per annum.

O. Section 2.3.3 of the Agreement is hereby modified and amended to read as follows:

2.3.3 Restrictions placed upon *Customer's* water use to address conservation shall be adopted and applied consistent with restrictions placed upon the *District's* direct service customers. The *District* may implement emergency or conservation measures, and *Customer* agrees to comply with such measures. The *District* and the *Operations Advisory Committee* shall establish a working group to develop an emergency response plan and a water shortage plan that will identify the measures to be imposed to respond to emergencies or shortages, the mechanisms for imposing and repealing such measures, and penalties for failure to comply therewith. The *District* may impose unilateral measures until the *District* and *Customer(s)* approve such plans. The *District* or *Customer(s)* may convene the working group for the purpose of reviewing adopted plans, proposing amendments thereto, or monitoring implementation of plans; provided, that any amendments must have the concurrence of the *District*.

P. Section 2.3.4 of the Agreement is hereby modified and amended to read as follows:

2.3.4 The *District* shall provide wholesale water to *Customer* at an equivalent level of service that it provides to the *District's* retail customers. In the event of a general emergency or weather-related water shortage affecting the entire District water supply system, including the *Wholesale Customers*, general restrictions placed upon water supply to the *Customer* shall be applied equally to the *District's* retail distribution system and the *Wholesale Customers*. An "emergency" for the purposes of this provision shall mean an unforeseen event including, but not limited to, water shortages, power outages, a pump system failure, well system failure, aquifer failure or diminution, or other failure in *Joint Facilities* or *Wholesale Facilities*. In the event of localized emergency problems, *Customer* acknowledges temporary, localized service interruptions may occur for the duration of the emergency. It is recognized by the *District* and the *Customer* that emergency water use curtailment measures may have to be implemented by the *District* on a regional basis in order to meet an emergency condition or regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other factors, shall be described in the *District's* water shortage response plan in effect as of the Effective Date of this Agreement, or successor contingency plans. Successor contingency plans shall be developed and implemented by the *District* in consultation with the *Operations Advisory Committee*. *Customer* shall assist with and support all emergency curtailment measures that are implemented. The *District* shall also have the right to interrupt or reduce delivery of water to *Customer*, if the *District*, acting in good faith, determines that system emergencies or maintenance and repair so require. Except for emergencies, the *District* shall give *Customer* reasonable written notice of interruption or reduction, the reason therefore, and the likely duration thereof. In the event of an emergency requiring interruption of service, the *Parties* shall pursue restoration of service cooperatively and with the exercise of due diligence. *Customer* acknowledges that during an emergency situation or a planned outage, the *District* may temporarily be unable to meet all or part of its wholesale service commitment. If the *District* has a planned outage, the *District* shall give *Customer* a minimum of seven (7) days advance notice in writing of such planned outage. The *District* and *Customer* will work together to identify mutually acceptable dates for planned outages.

Q. Section 2.3.5 of the Agreement is hereby modified and amended to read as follows:

2.3.5 Except as provided in paragraph 2.3.7, the quality and content of water supplied to *Customer* at the *Customer Meters* under this Agreement shall comply with or exceed applicable federal, state, and local rules and regulations governing water quality applicable to the *District*, except in cases of emergency. The *District* also agrees to periodically or as required by the State Department of Health guidelines monitor and test its water supply, including *Wholesale Supply*, for the presence of perfluorinated chemicals, including perfluorooctanoic acid ("*PFOA*") and perfluorooctanesulfonic acid ("*PFOS*"). If *PFOA* or *PFOS* are detected in such water supply which exceed health advisory limits established by the United States Environmental Protection Agency ("*USEPA*"), which are currently a combined concentration of 70 ppt (0.070 ppb), the *District* agrees to take whatever action is necessary to treat any such water supply to comply with *USEPA* health advisory levels after advising the *Operations Advisory Committee* of the *District's* proposed action and the approximate cost to undertake such treatment action, which may include the replacement of the water supply which exceeds *USEPA* health advisory levels. Water quality testing results shall be shared with the *Operations Advisory Committee* on a regular basis as test results are available.

R. Section 2.4.1 of the Agreement is hereby modified and amended to read as follows:

2.4.1 *Customer's* demand upon the *District's* water supply shall not exceed the *Total Water Requirement* at the rates of flow provided for in paragraph 2.3.1, except as provided in Section 2.2.2 herein.

S. Section 2.4.2 of the Agreement is hereby modified and amended to read as follows:

2.4.2 *Customer* shall limit retail sales of water to customers within its current or future service area as described in the *Customer's* water comprehensive plan; provided that, *Customer* shall not be prohibited from providing service to retail customers outside of its service area so long as *Customer* does not exceed *Customer's Total Water Requirement* and *Supply Schedule*

T. Section 2.4.4 of the Agreement is hereby modified and amended to read as follows:

2.4.4 *District* shall select, install, and charge the *Customer* for the *Customer Meter* or *Customer Meters*. *Customer Meters* shall be calibrated annually in the presence of *District* and *Customer* representatives and shall be maintained to be accurate within two (2) percent plus or minus. The *District* shall have free and unlimited access to *Customer Meters* for inspection and testing at the *District's* expense. The *District* shall read *Customer Meters* monthly and bill *Customer* for water supplied according to the terms of this Agreement; provided, however, that whenever the *District* delivers water through

another water system, the wheeling agreement shall establish meter-reading procedures for billing for water supplied according to the terms of this Agreement.

U. Section 2.5.3.A of the Agreement is hereby modified and amended to read as follows:

2.5.3 The *Capital Improvement Cost of Joint Facilities* shall be allocated as follows:

A. The *Capital Improvement Cost* of existing *Joint Facilities* shall be allocated between the *District* and *Wholesale Customers* according to the ratio of the quantity of *Wholesale Water* that has been designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights; provided, however, the portion of *Capital Improvement Cost of Joint Facilities* that are existing transmission mains to be allocated to *Wholesale Customers*, net of accumulated depreciation, shall be determined by multiplying the cost of all *District* mains recorded on the *District's* books, less the cost of all *District* mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, times the ratio of the lineal feet of mains eight inches and greater over the total lineal feet of all *District* mains (provided, in no event shall the allocation of transmission mains of 8" diameter or larger to the *Wholesale Customers* exceed fifty-nine (59) percent), less the lineal feet of all mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom.

V. Section 2.5.7 of the Agreement is hereby modified and amended to read as follows:

2.5.7 *Capital Improvements* shall be constructed as public works projects awarded pursuant to law. The *District* shall design, construct, and maintain the *Capital Improvements* according to accepted water utility standards. The *District* shall administer the planning, design, construction, and construction management of the *Capital Improvements* to the best of its ability. Any construction change order changing the scope of a project or increasing the estimated *Capital Improvement Cost* of a project by five (5) percent or \$50,000.00, whichever is greater, shall be approved by the District only after consultation with the *Operations Advisory Committee*.

W. A new Section 2.5.8 is hereby added to the Agreement to read as follows:

2.5.8 The *Capital Improvement Cost* of the New Booster Pump Station, a *Wholesale Facility*, shall be allocated to the *Wholesale Customers* for the purposes of this Agreement as follows. The *Wholesale Customers* who benefit from the New Booster Pump Station, including Summit, agree for the purposes of this Agreement that Summit would have incurred the cost of Four Hundred Sixty Four Thousand Dollars (\$464,000.00) to construct Summit's own booster pump station to satisfy Summit's own needs ("Summit BPS Cost"). The Summit BPS Cost shall be the amount that Summit is allocated for its share of the cost of the New Booster Pump Station for the purposes of calculating depreciation and rate of return. The remaining amount of the New Booster Pump Station (actual constructed New Booster Pump Station cost minus the Summit BPS Cost) shall be shared by the other *Wholesale Customers* who benefit from the New

Booster Pump Station based on each *Wholesale Customer's Total Water Requirement* divided by the total quantity of *Wholesale Water* for the purposes of calculating depreciation and rate of return for the *Wholesale Customers*, other than Summit, who benefit from the New Booster Pump Station.

X. Section 2.6.2 of the Agreement is modified and amended to read as follows:

2.6.2 In this *Agreement*, water will be priced according to the utility-basis approach of cost recovery, consisting of *General and Administrative Cost, Maintenance and Operation Cost*, depreciation expense, and a fair rate of return on rate base (*Wholesale Facilities and Joint Facilities*). The utility-basis approach of cost recovery shall be composed of two pricing components: (1) a fixed charge based on the *Customer Total Water Requirement*, and (2) a unit charge per 100 cubic feet (CCF) ("*Utility Basis*"). Water shall be priced as provided in Section 2.6.3C and *Customer's* wholesale water rate shall be composed of: (1) a fixed charge to recover depreciation, a return on Rate Base, and *G&A*; and (2) a unit charge per 100 cubic feet (CCF) of *Customer's* consumption to recover *Leased Water* cost and *Maintenance and Operation Cost*, including a markup of 10 percent.

Y. Section 2.6.3 of the Agreement is hereby modified and amended to read as follows:

2.6.3 The following shall determine the wholesale water rate to be paid to the *District* by *Customer*:

- A. Subject to the provisions of Section 2.3.4 herein, the *District* will treat *Customer* as a customer separate from the *District's* retail service customers;
- B. All costs of serving *Customer* will be recovered by a combination of annual fixed charges and water volume charge to the *Customer*; and
- C. The cost of serving *Customer* shall include depreciation expense, Return on Rate Base, *Maintenance and Operation*, and *G&A* components determined as follows:
 1. *G&A* shall be an annual cost per connection established by multiplying total *G&A* by eighty percent (80%), dividing that by the total number of water service connections, with *Customer* counted as one connection, plus twenty percent (20%) of annual *G&A* divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Customer*, multiplied by *Customer's* projected current consumption as provided by *Customer* to *District* no later than December 31 of each year.
 2. Annual depreciation shall be determined dividing the original *Capital Improvement Cost* recorded on the *District's* books by the *District's* standard application of estimated life of that facility or for that class of water assets.

3. Return on Rate Base shall be determined as follows:
 - a. *Wholesale Facilities*. The *Capital Improvement Cost*, net of accumulated depreciation, allocable to *Customer* less any upfront cash payment made by *Customer*, multiplied by 6 percent.
 - b. *Joint Facilities*. The *Capital Improvement Cost* net of accumulated depreciation multiplied by six (6) percent per year from the date the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this Agreement.
 - c. *Water Right*. The *Water Right Cost* allocable to Wholesale Customer multiplied by 12 percent per year for 20 years after the Agreement date and thereafter multiplied by 9 percent per year.
 - d. *Existing Water Rights*. The *Water Right Cost* per *MGD* will be the same as the Abitibi water right cost per *MGD* multiplied by six (6) percent per year.
4. *Maintenance and Operation Cost* of *Joint Facilities* and *Wholesale Facilities* shall be annually determined separately, totaled, and increased by ten (10) percent per the *District's* fiscal year.
 - a. The *Maintenance and Operation Cost* of *Joint Facilities* shall be determined as follows:
 - i. Pumping, Treatment, and Storage Costs. The annual *District* pumping, storage, and treatment costs divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's total consumption as provided by *Customer* to *District* no later than December 31 of each year.
 - ii. Transmission Costs. The annual *District* transmission and distribution costs multiplied by the ratio of the lineal feet of mains eight inches and greater (limited to 59%), less the lineal feet of mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's consumption as provided by *Customer* to *District* no later than December 31 of each year.
 - b. The *District's* cost of power incurred to operate and maintain the New Booster Pump Station shall be allocated to and paid by the *Wholesale Customers* as provided for in the table set forth below:

Wholesale Partner	5 MGD Total Wholesale Demand		8 MGD Total Wholesale Demand		10 MGD Total Wholesale Demand	
	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill
Summit	1.5	30.0%	3.0	36.8%	3.0	27.0%
Firgrove	2.0	40.0%	2.0	25.3%	2.0	20.9%
Rainier View	1.5	30.0%	3.0	37.9%	3.0	31.3%
Unallocated	0.0	0.0%	0.0	0.0%	2.0	20.9%
Total	5.0	100.0%	8.0	100.0%	10.0	100.0%

5. *Leased Water Cost.* The *District's* annual cost for *Leased Water* shall equal 10 percent times the average cost per *MGD* of the *Abitibi* water right purchase times the quantity of *Leased Water* measured in terms of *MGD* or the actual cost of *Leased Water* per *MGD* plus a 10 percent mark-up, whichever is greater.

D. The *District* will recalculate the *G&A* costs and *Maintenance and Operation* costs annually by using the current year's total consumption and *District's* annual costs; and, in the following year, the fixed charge portion of *Customer's* wholesale water rate shall be increased or decreased accordingly.

Z. Section 2.6.4 of the Agreement is hereby modified and amended to read as follows:

2.6.4. A. The *District* shall install telemetry systems at the *Customer Meters* for the purpose of monitoring delivery of water to *Customer*. Such telemetry shall be operational when the *District* commences to supply *Customer* with water under this Agreement. The *District* shall advise the *Customer* whenever *Customer's* demand for water threatens to exceed the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*. Upon receipt of such notice, the *Customer* shall operate its system so that peaking demand shall be satisfied from *Customer's* water supply and not from water supplied under this Agreement. The *District* shall notify *Customer* when *Customer's* demand no longer threatens to exceed the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*.

B. If, in any calendar month, the *Customer* exceeds the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement* (an "Exceedance"), the *District* shall hand deliver written notice of such Exceedance to *Customer*. If after three days from the notice such Exceedance continues, the *District* shall hand deliver a second notice of Exceedance. If after three days from the second notice the Exceedance continues, then, in addition to a 100 percent surcharge on the unit charge component of the wholesale water rate payable on all water used in excess of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*, the *Customer* shall pay to the *District* an amount equal to 75 percent of the prior year's total annual payment (which includes both the unit charge and the fixed charge) to the *District* for wholesale water, unless such surcharge is reduced or waived by the *District* in its sole discretion..

C. In any calendar year that a *Customer* exceeds the quantity limitation of the *Supply Schedule* times 365 or its *Total Water Requirement* times 365, as applicable, the *Customer's* wholesale water rates shall be subject to a surcharge on the Exceedance of one hundred (100) percent of the unit charge component of the wholesale water rate, unless such surcharge is reduced or waived by the *District* in its sole discretion.

D. *Customer* shall reimburse the *District* for any penalties imposed on the *District* for using more water than allowed by *District* water rights arising from *Customer's* use of water in excess of the use provided for herein.

AA. Sections 2.6.6, 2.6.7, and 2.6.8 of the Agreement are hereby deleted in their entirety and replaced by a new Section 2.6.6 to read as follows:

2.6.6 If the *Customer* made a cash payment(s) on the *Wholesale Facility* asset being replaced, the amount of Depreciation for the *Wholesale Facility* asset being replaced shall be credited against the cost of the new *Wholesale Facility* asset.

BB. Section 2.8.1 of the Agreement is hereby modified and amended to read as follows:

2.8.1 The *District* shall, if necessary, amend its comprehensive plan and/or water rights to authorize it to serve *Customer*. The *District*, as planning authority for the water supply requirements of this contract, shall examine and investigate water supplies suitable and adequate for its present and reasonable future needs, including any wholesale supply requirements. The *District* shall prepare and adopt a plan for acquiring and supplying such water, including provision for water and water rights, real property, and facilities required for storage and transmission and delivery of water.

2.8.2 The *District* shall establish an operations advisory committee ("*Operations Advisory Committee*" or "*Committee*") to be composed of representatives of all *Wholesale Customers*. The *Committee* shall meet quarterly and shall advise the *District* on all matters related to wholesale water supply, participate in the preparation of emergency plan(s), review and comment upon the *District's* comprehensive plan(s), review and comment upon planning for, design of, and cost of *Capital Improvements*; provided however, the *District's* decisions concerning *Capital Improvements* shall be final and not subject to arbitration.

CC. Section 2.8.5 of the Agreement is hereby modified and amended to read as follows:

2.8.5 Except as otherwise provided in this Agreement, a dispute arising out of the terms and conditions of this Agreement, except for a billing dispute, shall be submitted for mediation to a mediator agreed to by the *Parties*. If mediation is unsuccessful, the dispute shall be arbitrated by JAMS of Tacoma.

Arbitration, shall be conducted in accordance with Title 7.04A RCW; provided, the *Parties* may conduct discovery pursuant to the Superior Court Rules of Civil Procedure. The arbitrator's decision shall be final and shall award reasonable attorney's fees and costs of arbitration to the prevailing party. Requests for reconsideration or modification may be submitted as provided by Superior Court Rules of Civil Procedure. The arbitrator's decision shall be reduced to judgment as provided by Title 7.04A RCW. The provisions of this paragraph do not apply to arbitration of a billing dispute, which shall be conducted informally.

DD. Except as expressly set forth in this First Amendment, the Agreement is otherwise unmodified and remains in full force and effect. Each reference in the Agreement to itself shall be deemed also to refer to this First Amendment.

EE. All capitalized terms used but not defined in this First Amendment shall have the same meanings as defined in the Agreement.


FF. This First Amendment to Agreement for Wholesale Supply of Water shall be effective upon the date by which both Parties have approved and executed this First Amendment.

GG. The *District* and the *Customer* recognize there is a series of agreements entered into by and between the *District* and the *Wholesale Customers* as referenced in the Recitals herein, and to the extent such agreements provide for the sharing of costs and the performance of certain duties and obligations by the *Wholesale Customers*, individually or collectively, the *Customer* shall be a third-party beneficiary of such other agreements with the *Wholesale Customers* and the *District*.

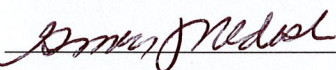
LAKESWOOD WATER DISTRICT



President/Commissioner



Vice President/Commissioner



Secretary/Commissioner

Dated: 4.25.19

SUMMIT WATER & SUPPLY COMPANY



President/Board of Directors Member



Secretary/Board of Directors Member

Dated: 4/19/19

EXHIBIT A

DEPICTION OF BOOSTER PUMP STATION UPGRADE, NEW BOOSTER

**PUMP STATION, AND
WHOLESALE TRANSMISSION MAIN LOCATION**

EXHIBIT B
DEPICTION OF CUSTOMER METER(S) LOCATION

FIRST AMENDMENT TO AGREEMENT FOR WHOLESALE SUPPLY OF WATER

THIS FIRST AMENDMENT TO AGREEMENT FOR WHOLESALE SUPPLY OF WATER (“**First Amendment**”), dated as of the latter of the signature dates below (the “**Effective Date**”), is by and between Lakewood Water District, a special purpose municipal corporation (“**District**”), and Rainier View Water Company, Inc., a Washington corporation (“**Customer**” or “**Rainier View**”) (individually a “Party” and collectively the “Parties”) for the purposes set forth below.

1. RECITALS.

1.1. The District, pursuant to Title 57 RCW, supplies potable water to customers within its boundaries through a public water system. The District’s public water system is comprised of source of supply (wells with attendant water rights), storage and distribution mains. The District’s water supply is in excess of its present and reasonably foreseeable future demand.

1.2. The Customer supplies potable water to customers within its boundaries through a public water system. The Customer’s public water system is comprised of source of supply (wells with attendant water rights), storage and distribution mains.

1.3. The Customer previously requested the District provide water supply to Customer because the District had water available to supply the Customer and the Customer could purchase water supply from the District at a cost less than the Customer would incur to develop or purchase additional sources of water supply other than from the District. Therefore, the Parties entered into an Agreement for Wholesale Supply of Water dated July 29, 2009 (“**Agreement**”), which provided for the District to provide wholesale water supply to the Customer on certain terms and conditions.

1.4. The District has also previously entered into agreements with Spanaway Water Company, a Washington nonprofit corporation (“**Spanaway**”), and Summit Water & Supply Company, a Washington nonprofit corporation (“**Summit**”), to provide wholesale water supply to those entities. The District is also currently negotiating an agreement with Firgrove Mutual Inc., a Washington nonprofit corporation (“**Firgrove**”), to provide wholesale water supply to Firgrove (Spanaway, Summit, Rainier View, and Firgrove collectively the “*Wholesale Customers*”). Summit and Rainier View are each interested in purchasing additional wholesale water supply from the District, and Firgrove is interested in purchasing wholesale water supply from the District. To facilitate the sale of additional water supply to Rainier View and wholesale water supply to Firgrove, the District is required to install a new wholesale transmission main (“**Wholesale Transmission Main**”), upgrade an existing booster pump station located at 1620 115th St., Tacoma, Washington (“**Booster Pump Station Upgrade**”), and install a new booster pump station in the vicinity of 121st St., Tacoma, Washington (“**New Booster Pump Station**”), as those water facilities are described and depicted on **Exhibit A** attached hereto and incorporated herein by this reference.

1.5. Rainier View desires to amend its Agreement with the District to (a) benefit from amendments to the Agreement the *Wholesale Customers* have negotiated with the District, (b) purchase additional wholesale water supply from the District, and (c) pay its equitable share of the cost of the Wholesale Transmission Main, the Booster Pump Station Upgrade, and the New Booster Pump.

1.6. In Section 2.2.1 of the Agreement, the District agreed to annually supply to the Customer the Customer’s *Total Water Requirement* or such portion thereof utilized by the Customer according to the terms and conditions of the Agreement. Section 2.1.18 of the Agreement defined the Customer’s *Total Water Requirement* as “2,000,000 [*sic.*] MGD, the daily maximum quantity of water the *District* will supply to *Customer* during the term of this Agreement.” The Parties’ intent was that the *Total Water Requirement*

pursuant to the Agreement was “Two (2) *MGD*”. However, the *Customer* now desires to modify the *Total Water Requirement* to increase such *Total Water Requirement* to “Three (3) *MGD* and modify the *Supply Schedule* under which *Customer* will purchase water from the District, and the District is willing to increase such *Total Water Requirement* and adjust the *Supply Schedule* as requested by *Customer*.

1.7 Therefore, the District and Rainier View now desire to amend the Agreement as provided herein.

NOW THEREFORE, in consideration of the following terms and conditions and other good and valuable consideration, the Parties agree as follows:

AGREEMENT

- A. The recitals set forth above are incorporated herein in full by this reference.
- B. Section 2.1.1 of the Agreement is hereby modified and amended to read as follows:
 - 2.1.1 “*Capital Improvements.*” Improvements, upgrades, and replacements constructed or installed in whole or in part by the District to provide wholesale water to *Customer* including reservoirs, primary and secondary transmission mains, interties, controls and communication equipment, wells, well pumps, booster pumps, and water treatment. *Capital Improvements*, when constructed, are *System Wholesale Facilities*, *Customer Wholesale Facilities*, or *Joint Facilities*. *Capital Improvements* shall be determined based on the District’s capitalization/fixed asset policy as set forth in District Resolution No. B-1431, and as such Resolution may be modified and amended by the District, and shall include any District asset with an initial individual cost of more than Five Thousand Dollars (\$5,000.00) and an estimated useful life in excess of one (1) year.
- C. Section 2.1.2 of the Agreement is hereby modified and amended to read as follows:
 - 2.1.2 “*Capital Improvement Cost.*” The original cost of *Capital Improvements*, including amounts paid for: (1) preparing planning studies, engineering plans and specifications, and acquiring permits and franchises for the *Capital Improvements*, including those costs incurred by the *District* prior to execution of this Agreement; (2) work performed under contracts for construction, installation, and inspection of the *Capital Improvements*; (3) recorded pay and expenses of employees of the *District* directly and indirectly related to the design, construction, installation, and inspection of the *Capital Improvements*, including capitalized *District G&A*, and including costs incurred prior to execution of this Agreement; (4) materials, equipment, and supplies directly related to the *Capital Improvements*; (5) acquiring and condemning land, easements, and rights-of-way for or related to the *Capital Improvements*; (6) professional services related to the financing, planning, acquisition, construction, installation, and inspection of the *Capital Improvements* or for negotiating, resolving, or litigating any disputes related thereto; (7) reasonable expenses incurred to mitigate the impact of the *Capital Improvements* upon the natural or physical environment, including but not limited to expenses for landscaping, buffering, and wetland mitigation; (8) other expenses reasonably related to the planning, design, construction, financing and financing interest expense, and construction management of the *Capital Improvements*.
- D. Section 2.1.3 “*Cash Basis*” is hereby deleted in its entirety.

- E. Section 2.1.5 “*Customer*” is hereby modified and amended to read as follows:
- 2.1.5 “*Customer,*” “*Wholesale Customer*”. Rainier View Water Company, Inc., a Washington corporation which is purchasing wholesale water from the *District*, including *Customer’s* agents or designees.
- F. Section 2.1.6 “*Customer Meters*” is hereby modified and amended to read as follows:
- 2.1.6 “*Customer Meter*” or “*Customer Meters.*” Meters owned and operated by the *District* which measure the quantity and flow of water provided to *Customer* by the *District*. The locations of *Customer Meters* are identified on **Exhibit B**. Whenever the *District* delivers water through a third party, the *Customer Meters* may be a combination of a *District* meter located at an intertie with a third party and a *Customer Meter* located at an intertie with a third party.
- G. Section 2.1.10 “*General and Administrative Cost,*” “*G&A.*” is hereby modified and amended to read as follows:
- 2.1.10 “*General and Administrative Cost,*” “*G&A.*” The *District’s* general and administrative, supervisory and other indirect costs, including financial (budgeting, accounting, bookkeeping), data processing, clerical, management and administration, personnel, non-capitalized professional services, including engineering and financial planning, insurance, and property tax, all as related to the provision of *Wholesale Water* service.
- H. Section 2.1.18 “*Total Water Requirement*” of the Agreement is hereby modified and amended to read as follows:
- 2.1.18 “*Total Water Requirement.*” Three (3) *MGD*, the daily maximum quantity of water the *District* will supply to *Customer* pursuant to this Agreement. The *Total Water Requirement* is used for allocating cost under this Agreement.
- I. Section 2.1.22 “*Wholesale Facilities*” of the Agreement is hereby modified and amended to read as follows:
- 2.1.22 “*Wholesale Facilities,*” or “*Wholesale Facility.*” All water supply and transmission facilities, including, but not limited to, wells, water lines, booster stations, storage facilities, and transmission mains owned, operated, and maintained by the *District* for the sole purpose of supplying *Wholesale Customers*. *Wholesale Facilities* that serve all *Wholesale Customers* are *System Wholesale Facilities*. *Wholesale Facilities* that serve one or more but not all *Wholesale Customers* are *Customer Wholesale Facilities*. When the term *Wholesale Facilities* is used in this Agreement, that term includes both *System Wholesale Facilities* and *Customer Wholesale Facilities*.
- J. Section 2.1.23 “*Wholesale Water*” of the Agreement is hereby modified and amended to read as follows:

2.1.23 “*Wholesale Water.*” The total quantity of water available from *District* for sale to current or prospective *Wholesale Customers*, including, but not limited to, water allocated by the *District* and designated for sale as *Wholesale Water* from its *Existing Water Rights* or from the *Water Right* or from *Leased Water*. Whenever the term “quantity of *Wholesale Water*” is used for the purpose of allocating cost, the term refers to *MGD*. As authorized by the *District’s* Board of Commissioners, the volume designated as *Wholesale Water* shall be ten (10) *MGD*, provided, for the purpose of allocating cost as further provided in this Agreement, the *District* shall be responsible for any unsold *Wholesale Water*.

K. A new Section 2.1.24 “*Operations Advisory Committee,*” or “*Committee*” is hereby added to the Agreement to read as follows:

2.1.14 “*Operations Advisory Committee,*” or “*Committee.*” The *Committee* composed of representatives of all *Wholesale Customers* to advise the *District* on the matters referenced in Section 2.8.2 herein and other matters as appropriate.

L. Section 2.2.1 of the Agreement is hereby modified and amended to read as follows:

2.2.1 So long as this Agreement is in effect, the *District* shall plan for, develop, treat, and annually supply to *Customer* potable water in an amount not to exceed *Customer’s* *Total Water Requirement* according to the *Supply Schedule* and to the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. The *District’s* obligation to provide *Customer* with *Wholesale Water*, and the *Customer’s* obligation to pay for such *Wholesale Water*, shall commence when the *District* establishes that *Wholesale Water* is available to the *Customer* pursuant to this Agreement. Subject to the foregoing, the *District* will make *Wholesale Water* available to the *Customer* in accordance with the following *Supply Schedule*, which *Customer* which *Customer* expressly agrees to be bound by, unless further modified by the *Parties* by written agreement:

	<u>QA</u>	<u>QI</u>	
A. 1/1/20 to 12/31/24	Quantity <u>1.5 mil</u>	GPD <u>1040</u>	GPM
B. 1/1/25 to 12/31/29	Quantity <u>2.5 mil</u>	GPD <u>1736</u>	GPM
C. 1/1/30 to 12/31/34	Quantity <u>3.0 mil</u>	GPD <u>2080</u>	GPM
D. 1/1/35 to 12/31/39	Quantity <u>“</u>	GPD <u>“</u>	GPM
E. 1/1/40 to 12/31/44	Quantity <u>“</u>	GPD <u>“</u>	GPM
F. 1/1/45 to 12/31/49	Quantity <u>“</u>	GPD <u>“</u>	GPM
G. 1/1/50 to 12/31/54	Quantity <u>“</u>	GPD <u>“</u>	GPM
H. 1/1/55 and thereafter	Quantity <u>“</u>	GPD <u>“</u>	GPM

M. Section 2.2.2 is hereby modified and amended to read as follows:

2.2.2 *Customer* shall pay for its share of the cost of water as provided herein. Before *Customer* begins to take water from the *District*, *Customer* shall pay only for the fixed portion of the *Customer’s* *Total Water Requirement*. After *Customer* begins taking water from the *District* and so long as this Agreement is in effect, *Customer* shall purchase water

from the *District* and pay for the *Customer's Total Water Requirement* and water supply received by *Customer* according to the *Supply Schedule* and the terms and conditions herein, subject to acts of God or other events beyond the reasonable control of the *District* or *Customer*. On an annual basis in a letter of understanding between the *Wholesale Customers* and *District*, the *District* may allow for a temporary upward modification of the *Supply Schedule*. Further, the *Customer* may propose to make a portion of the *Customer's Total Water Requirement* available to the *Customer* through its *Supply Schedule* that is not needed or cannot be taken by the *Customer* available to other *Wholesale Customers* or the *District*. However, any such proposal shall be subject to the following conditions: (a) the review and approval of the *Operations Advisory Committee* and the *District*, including the proposed terms and conditions of any such proposal, (b) shall only be on a short-term basis for a period of not more than sixty (60) days, (c) the *Customer* shall continue to be obligated to pay the fixed charges related to the *Customer's Total Water Requirement*, including the fixed charge related to the portion of the *Customer's Total Water Requirement* which may be provided to another *Wholesale Customer* or the *District*, and (d) in no event shall the *Customer's Total Water Requirement* retained by the *Customer* and made available to another *Wholesale Customer* exceed the *Customer's Total Water Requirement* in accordance with the *Customer's Supply Schedule*, unless otherwise agreed to and as conditioned by the *District* in writing.

N. Section 2.2.3 is hereby modified and amended to read as follows:

2.2.3 This Agreement shall remain in effect for fifty (50) years, subject to automatic renewal for additional twenty (20)-year periods unless either *Party* notifies the other *Party* not less than five (5) years before the expiration date of any twenty (20) year period of its intent to terminate the *Agreement*. However, if the *District* is assumed or acquired by a third party, then *Customer* may terminate this *Agreement* at any time following not less than five (5) years written notice to the third party of *Customer's* intent to terminate the *Agreement*. If *Customer* chooses to exercise this right of early termination, then the party assuming or acquiring the *District* shall pay to *Customer* an amount equal to the total *Capital Improvement Cost* paid by *Customer* plus interest at the *District's* average weighted cost of debt, times the number of years remaining on the agreement on the date the right of early termination is exercised, divided by twenty (20) years. Along with the notice of early termination, *Customer* shall submit to the third party an invoice with supporting documentation for the amount claimed. The invoice shall be due and payable within thirty (30) days of its date, and thereafter the unpaid balance shall bear interest at the rate of twelve (12) percent per annum.

O. Section 2.3.3 of the Agreement is hereby modified and amended to read as follows:

2.3.3 Restrictions placed upon *Customer's* water use to address conservation shall be adopted and applied consistent with restrictions placed upon the *District's* direct service customers unless the Washington Utilities and Transportation Commission (or successor agency) must approve such action as part of the *Customer's* tariff. The *District* may implement emergency or conservation measures, and *Customer* agrees to comply with such measures. The *District* and the *Operations Advisory Committee* shall establish a

working group to develop an emergency response plan and a water shortage plan that will identify the measures to be imposed to respond to emergencies or shortages, the mechanisms for imposing and repealing such measures, and penalties for failure to comply therewith. The *District* may impose unilateral measures until the *District* and *Customer(s)* approve such plans, subject to *Customer's* need for approval by the Washington Utilities and Transportation Commission. The *District* or *Customer(s)* may convene the working group for the purpose of reviewing adopted plans, proposing amendments thereto, or monitoring implementation of plans; provided, that any amendments must have the concurrence of the *District*.

P. Section 2.3.4 of the Agreement is hereby modified and amended to read as follows:

2.3.4 The *District* shall provide wholesale water to *Customer* at an equivalent level of service that it provides to the *District's* retail customers. In the event of a general emergency or weather-related water shortage affecting the entire *District* water supply system, including the *Wholesale Customers*, general restrictions placed upon water supply to the *Customer* shall be applied equally to the *District's* retail distribution system and the *Wholesale Customers*. An "emergency" for the purposes of this provision shall mean an unforeseen event including, but not limited to, water shortages, power outages, a pump system failure, well system failure, aquifer failure or diminution, or other failure in *Joint Facilities* or *Wholesale Facilities*. In the event of localized emergency problems, *Customer* acknowledges temporary, localized service interruptions may occur for the duration of the emergency. It is recognized by the *District* and the *Customer* that emergency water use curtailment measures may have to be implemented by the *District* on a regional basis in order to meet an emergency condition or regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other factors, shall be described in the *District's* water shortage response plan in effect as of the Effective Date of this Agreement, or successor contingency plans. Successor contingency plans shall be developed and implemented by the *District* in consultation with the *Operations Advisory Committee*. *Customer* shall assist with and support all emergency curtailment measures that are implemented. The *District* shall also have the right to interrupt or reduce delivery of water to *Customer*, if the *District*, acting in good faith, determines that system maintenance and repair so require. Except for emergencies, the *District* shall give *Customer* reasonable written notice of interruption or reduction, the reason therefore, and the likely duration thereof. In the event of an emergency or maintenance and repair requiring interruption of service, the *Parties* shall pursue restoration of service cooperatively and with the exercise of due diligence. *Customer* acknowledges that during an emergency situation or a planned outage, the *District* may temporarily be unable to meet all or part of its wholesale service commitment. If the *District* has a planned outage, the *District* shall give *Customer* a minimum of seven (7) days advance notice in writing of such planned outage. The *District* and *Customer* will work together to identify mutually acceptable dates for planned outages.

Q. Section 2.3.5 of the Agreement is hereby modified and amended to read as follows:

2.3.5 Except as provided in paragraph 2.3.7, the quality and content of water supplied to *Customer* at the *Customer Meters* under this Agreement shall comply with or exceed applicable federal, state, and local rules and regulations governing water quality applicable to the *District*, except in cases of emergency. In the case of an emergency that affects the

quality of water delivered to *Customer*, *District* shall notify *Customer* as soon as possible with as much information as is available to the *District*. Further, *District* shall use its best possible efforts to remedy the cause of the emergency as soon as possible and shall make every effort to deliver water to *Customer* that complies with or exceeds applicable federal, state and local rules and regulations governing water quality applicable to the *District*. The *District* also agrees to periodically or as required by the State Department of Health guidelines monitor and test its water supply, including *Wholesale Supply*, for the presence of perfluorinated chemicals, including perfluorooctanoic acid (“*PFOA*”) and perfluorooctanesulfonic acid (“*PFOS*”). If *PFOA* or *PFOS* are detected in such water supply which exceed health advisory limits established by the United States Environmental Protection Agency (“*USEPA*”), which are currently a combined concentration of 70 ppt (0.070 ppb), the *District* agrees to take whatever action is necessary to treat any such water supply to comply with *USEPA* health advisory levels after advising the *Operations Advisory Committee* of the *District’s* proposed action and the approximate cost to undertake such treatment action, which may include the replacement of the water supply which exceeds *USEPA* health advisory levels. Water quality testing results shall be shared with the *Operations Advisory Committee* on a regular basis as test results are available.

R. Section 2.4.1 of the Agreement is hereby modified and amended to read as follows:

2.4.1 *Customer’s* demand upon the *District’s* water supply shall not exceed the *Total Water Requirement* at the rates of flow provided for in paragraph 2.3.1, except as provided in Section 2.2.2 herein.

S. Section 2.4.2 of the Agreement is hereby modified and amended to read as follows:

2.4.2 *Customer* shall limit retail sales of water to customers within its current or future service area as described in the *Customer’s* water comprehensive plan; provided that, *Customer* shall not be prohibited from providing service to retail customers outside of its service area so long as *Customer* does not exceed *Customer’s Total Water Requirement* and *Supply Schedule*.

T. Section 2.4.4 of the Agreement is hereby modified and amended to read as follows:

2.4.4 *District* shall select, install, and charge the *Customer* for the *Customer Meter* or *Customer Meters*. *Customer Meters* shall be calibrated annually in the presence of *District* and *Customer* representatives and shall be maintained to be accurate within two (2) percent plus or minus. The *District* shall have free and unlimited access to *Customer Meters* for inspection and testing at the *District’s* expense. The *District* shall read *Customer Meters* monthly and bill *Customer* for water supplied according to the terms of this Agreement; provided, however, that whenever the *District* delivers water through another water system, the wheeling agreement shall establish meter-reading procedures for billing for water supplied according to the terms of this Agreement.

U. Section 2.5.3.A of the Agreement is hereby modified and amended to read as follows:

2.5.3 The *Capital Improvement Cost* of *Joint Facilities* shall be allocated as follows:

A. The *Capital Improvement Cost* of existing *Joint Facilities* shall be allocated between the *District* and *Wholesale Customers* according to the ratio of the quantity of *Wholesale Water* that has been designated to *Wholesale Customers* over the maximum quantity of water authorized by all *District* water rights; provided, however, the portion of *Capital Improvement Cost* of *Joint Facilities* that are existing transmission mains to be allocated to *Wholesale Customers*, net of accumulated depreciation, shall be determined by multiplying the cost of all *District* mains recorded on the *District's* books, less the cost of all *District* mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, times the ratio of the lineal feet of mains eight inches and greater over the total lineal feet of all *District* mains (provided, in no event shall the allocation of transmission mains of 8" diameter or larger to the *Wholesale Customers* exceed fifty-nine (59) percent), less the lineal feet of all mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom.

V. Section 2.5.7 of the Agreement is hereby modified and amended to read as follows:

2.5.7 *Capital Improvements* shall be constructed as public works projects awarded pursuant to applicable law. The *District* shall design, construct, and maintain the *Capital Improvements* according to accepted water utility standards. The *District* shall administer the planning, design, construction, and construction management of the *Capital Improvements* to the best of its ability. Any construction change order changing the scope of a project or increasing the estimated *Capital Improvement Cost* of a project by five (5) percent or \$50,000.00, whichever is greater, shall be approved only after consultation with the *Operations Advisory Committee*.

W. A new Section 2.5.8 is hereby added to the Agreement to read as follows:

2.5.8 The *Capital Improvement Cost* of the New Booster Pump Station, a *Wholesale Facility*, shall be allocated to the *Wholesale Customers* for the purposes of this Agreement as follows. The *Wholesale Customers* who benefit from the New Booster Pump Station, including the *Customer*, agree for the purposes of this Agreement that Summit would have incurred the cost of Four Hundred Sixty Four Thousand Dollars (\$464,000.00) to construct Summit's own booster pump station to satisfy Summit's own needs ("Summit BPS Cost"). The Summit BPS Cost shall be the amount that Summit is allocated for its share of the cost of the New Booster Pump Station for the purposes of calculating depreciation and rate of return. The remaining amount of the New Booster Pump Station (actual constructed New Booster Pump Station cost minus the Summit BPS Cost) shall be shared by the other *Wholesale Customers* who benefit from the New Booster Pump Station based on each *Wholesale Customer's Total Water Requirement* divided by the total quantity of *Wholesale Water* for the purposes of calculating depreciation and rate of return for the *Wholesale Customers*, other than Summit, who benefit from the New Booster Pump Station.

X. Section 2.6.2 of the Agreement is modified and amended to read as follows:

2.6.2 In this *Agreement*, water will be priced according to the utility-basis approach of cost recovery, consisting of *General and Administrative Cost, Maintenance and Operation Cost*, depreciation expense, and a fair rate of return on rate base (*Wholesale Facilities and Joint Facilities*). The utility-basis approach of cost recovery shall be composed of two pricing components: (1) a fixed charge based on the *Customer Total Water Requirement*, and (2) a unit charge per 100 cubic feet (CCF) ("*Utility Basis*"). Water shall be priced as provided in Section 2.6.3C and *Customer's* wholesale water rate shall be composed of: (1) a fixed charge to recover depreciation, a return on Rate Base, and *G&A*; and (2) a unit charge per 100 cubic feet (CCF) of *Customer's* consumption to recover *Leased Water* cost and *Maintenance and Operation Cost*, including a markup of ten (10) percent.

Y. Section 2.6.3 of the *Agreement* is hereby modified and amended to read as follows:

2.6.3 The following shall determine the wholesale water rate to be paid to the *District* by *Customer*:

- A. Subject to the provisions of Section 2.3.4 herein, the *District* will treat *Customer* as a customer separate from the *District's* retail service customers;
- B. All costs of serving *Customer* will be recovered by a combination of annual fixed charges and water volume charge to the *Customer*; and
- C. The cost of serving *Customer* shall include depreciation expense, Return on Rate Base, *Maintenance and Operation*, and *G&A* components determined as follows:
 1. *G&A* shall be an annual cost per connection established by multiplying total *G&A* by eighty percent (80%), dividing that by the total number of water service connections, with *Customer* counted as one connection, plus twenty percent (20%) of annual *G&A* divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Customer*, multiplied by *Customer's* projected current consumption as provided by *Customer* to *District* no later than December 31 of each year.
 2. Annual depreciation shall be determined dividing the original *Capital Improvement Cost* recorded on the *District's* books by the *District's* standard application of estimated life of that facility or for that class of water assets.
 3. Return on Rate Base shall be determined as follows:
 - a. *Wholesale Facilities*. The *Capital Improvement Cost*, net of accumulated depreciation, allocable to *Customer* less any upfront cash payment made by *Customer*, multiplied by 6 percent.
 - b. *Joint Facilities*. The *Capital Improvement Cost* net of accumulated depreciation multiplied by six (6) percent per year from the date the

District establishes that *Wholesale Water* is available to the *Customer* pursuant to this Agreement.

c. *Water Right*. The *Water Right Cost* allocable to Wholesale Customer multiplied by 12 percent per year for 20 years after the Agreement date and thereafter multiplied by 9 percent per year.

d. *Existing Water Rights*. The *Water Right Cost* per MGD will be the same as the Abitibi water right cost per MGD multiplied by six (6) percent per year.

4. *Maintenance and Operation Cost of Joint Facilities and Wholesale Facilities* shall be annually determined separately, totaled, and increased by nine (9) percent per the *District's* fiscal year.

a. The *Maintenance and Operation Cost of Joint Facilities* shall be determined as follows:

i. Pumping, Treatment, and Storage Costs. The annual *District* pumping, storage, and treatment costs divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's total consumption as provided by *Customer* to *District* no later than December 31 of each year.

ii. Transmission Costs. The annual *District* transmission and distribution costs multiplied by the ratio of the lineal feet of mains eight inches and greater (limited to 59%), less the lineal feet of mains used exclusively for *Wholesale Facilities* or shared with Town of Steilacoom, divided by the prior year's total *District Internal System* consumption, plus the projected increase in current year's total consumption for *Wholesale Customers*, multiplied by *Customer's* projected current year's consumption as provided by *Customer* to *District* no later than December 31 of each year.

b. The annual *District Maintenance and Operation Cost of Wholesale Facilities* shall be allocated among *Wholesale Customers* according to the ratio of the *Customer's* projected current year's consumption over the projected current year's consumption of all *Wholesale Customers* as provided by *Customer* to *District* no later than December 31 of each year.

5. *Leased Water Cost*. The *District's* annual cost for *Leased Water* shall equal 10 percent times the average cost per MGD of the Abitibi water right purchase

times the quantity of *Leased Water* measured in terms of *MGD* or the actual cost of *Leased Water* per *MGD* plus a 10 percent mark-up, whichever is greater.

6. The *District* will recalculate the *G&A* costs and *Maintenance and Operation* costs annually by using the current year's total consumption and *District's* annual costs; and, in the following year, the fixed charge portion of *Customer's* wholesale water rate shall be increased or decreased accordingly.

Z. Section 2.6.4 of the Agreement is hereby modified and amended to read as follows:

2.6.4. A. The *District* shall install telemetry systems at the *Customer Meters* for the purpose of monitoring delivery of water to *Customer*. Such telemetry shall be operational when the *District* commences to supply *Customer* with water under this Agreement. The *District* shall advise the *Customer* whenever *Customer's* demand for water threatens to exceed the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*. Upon receipt of such notice, the *Customer* shall operate its system so that peaking demand shall be satisfied from *Customer's* water supply and not from water supplied under this Agreement. The *District* shall notify *Customer* when *Customer's* demand no longer threatens to exceed the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*.

B. If, in any calendar month, the *Customer* exceeds the limits of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement* (an "Exceedance"), the *District* shall hand deliver written notice of such Exceedance to *Customer*. If after three days from the notice such Exceedance continues, the *District* shall hand deliver a second notice of Exceedance. If after three days from the second notice the Exceedance continues, then, in addition to a 100 percent surcharge on the unit charge component of the wholesale water rate payable on all water used in excess of the quantity limitation in the *Supply Schedule* or *Customer's Total Water Requirement*, the *Customer* shall pay to the *District* an amount equal to 75 percent of the prior year's total annual payment (which includes both the unit charge and the fixed charge) to the *District* for wholesale water, unless such surcharge is reduced or waived by the *District* in its sole discretion..

C. In any calendar year that a *Customer* exceeds the quantity limitation of the *Supply Schedule* times 365 or its *Total Water Requirement* times 365, as applicable, the *Customer's* wholesale water rates shall be subject to a surcharge on the Exceedance of one hundred (100) percent of the unit charge component of the wholesale water rate, unless such surcharge is reduced or waived by the *District* in its sole discretion.

D. *Customer* shall reimburse the *District* for any penalties imposed on the *District* for using more water than allowed by *District* water rights arising from *Customer's* use of water in excess of the use provided for herein.

AA. Sections 2.6.6, 2.6.7, and 2.6.8 of the Agreement are hereby deleted in their entirety and replaced by a new Section 2.6.6 to read as follows:

2.6.6 If the *Customer* made a cash payment(s) on the *Wholesale Facility* asset being replaced, the amount of Depreciation for the *Wholesale Facility* asset being replaced shall be credited against the cost of the new *Wholesale Facility* asset.

BB. A new Section 2.6.7 is hereby added to the Agreement to read as follows:

2.6.7 The District's cost of power incurred to operate and maintain the New Booster Pump Station shall be allocated to and paid by the *Wholesale Customers* as provided for in the table set forth below:

Wholesale Partner	5 MGD Total Wholesale Demand		8 MGD Total Wholesale Demand		10 MGD Total Wholesale Demand	
	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill	Average Annual Demand (MGD)	Percent of Annual Power Bill
Summit	1.5	30.0%	3.0	36.8%	3.0	27.0%
Firgrove	2.0	40.0%	2.0	25.3%	2.0	20.9%
Rainier View	1.5	30.0%	3.0	37.9%	3.0	31.3%
Unallocated	0.0	0.0%	0.0	0.0%	2.0	20.9%
Total	5.0	100.0%	8.0	100.0%	10.0	100.0%

CC. Section 2.8.1 of the Agreement is hereby modified and amended to read as follows:

2.8.1 The *District* shall, if necessary, amend its comprehensive plan and/or water rights to authorize it to serve *Customer*. The *District*, as planning authority for the water supply requirements of this contract, shall examine and investigate water supplies suitable and adequate for its present and reasonable future needs, including any wholesale supply requirements. The *District* shall prepare and adopt a plan for acquiring and supplying such water, including provision for water and water rights, real property, and facilities required for storage and transmission and delivery of water.

2.8.2 The *District* shall establish an operations advisory committee ("*Operations Advisory Committee*" or "*Committee*") to be composed of representatives of all *Wholesale Customers*. The *Committee* shall meet quarterly and shall advise the *District* on all matters related to wholesale water supply, participate in the preparation of emergency plan(s), review and comment upon the *District's* comprehensive plan(s), review and comment upon planning for, design of, and cost of *Capital Improvements*; provided however, the *District's* decisions concerning *Capital Improvements* shall be final and not subject to arbitration.

DD. Section 2.8.6 of the Agreement is hereby modified and amended to read as follows:

2.8.6 Unless otherwise provided in this Agreement, all notices relating to this Agreement shall be sent to the following addresses, certified mail, return receipt requested, unless the other *Party* is previously notified in writing:

To the *District*:

General Manager
Lakewood Water District
P.O. Box 99729
Lakewood, WA 98496-0729

11900 Gravelly Lake Dr. SW
Lakewood, WA 98499

With a copy to (which alone shall not constitute notice):

John W. Milne
Inslee Best
Skyline Tower, Suite 1500
10900 NE 4th Street
Bellevue, WA 98004

To *Customer*:
Rainier View Water Company
P.O. Box 44427
Tacoma, WA 98448
Attn: Operations Manager

5410 189th Street E
Puyallup, WA 98375

With a copy to (which alone shall not constitute notice):

Richard Finnigan
2112 Black Lake Blvd SW
Olympia, WA 98512

Billings for water supplied and payments thereof may be made by regular mail.

- EE. Except as expressly set forth in this First Amendment, the Agreement is otherwise unmodified and remains in full force and effect. Each reference in the Agreement to itself shall be deemed also to refer to this First Amendment.
- FF. All capitalized terms used but not defined in this First Amendment shall have the same meanings as defined in the Agreement.
- GG. The *District* and the *Customer* recognize there is a series of agreements entered into by and between the *District* and the *Wholesale Customers* as referenced in the Recitals herein, and to the extent such agreements provide for the sharing of costs and the performance of certain duties and obligations by the *Wholesale Customers*, individually or collectively, the *Customer* shall be a third-party beneficiary of such other agreements with the *Wholesale Customers* and the *District*.

LAKWOOD WATER DISTRICT

[Signature]

President/Commissioner

[Signature]

Vice President/Commissioner

[Signature]

Secretary/Commissioner

Dated: 4/23/19

RAINIER VIEW WATER COMPANY

[Signature]

By: Douglas R. Fisher

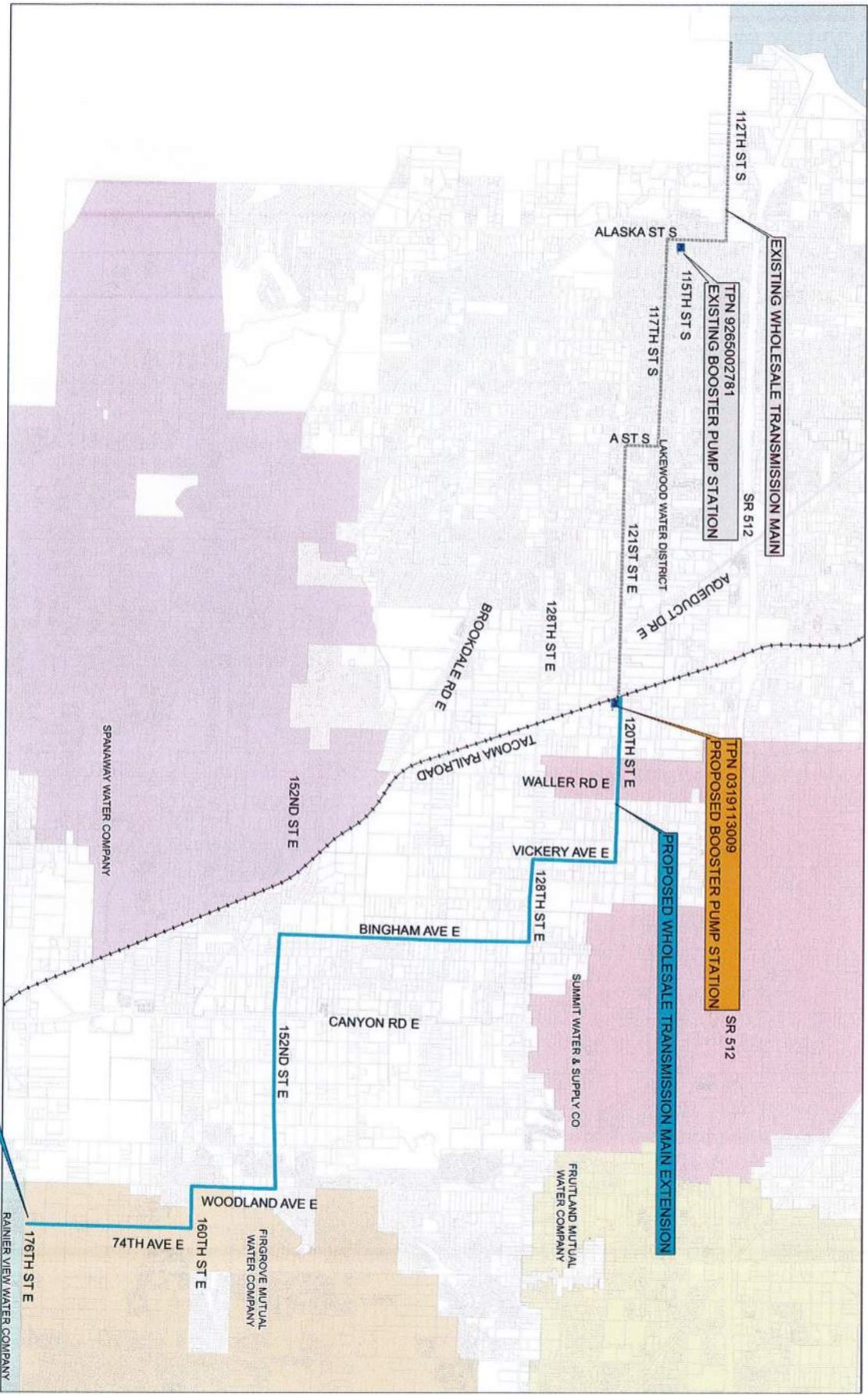
Its: SECRETARY

Attest: *[Signature]*

Dated: 4/15/19

EXHIBIT A
DEPICTION OF BOOSTER PUMP STATION UPGRADE, NEW BOOSTER
PUMP STATION, AND
WHOLESALE TRANSMISSION MAIN LOCATION

EXHIBIT B
DEPICTION OF CUSTOMER METER(S) LOCATION



J:\DATA\AK116-076\GIS\MAPS\LAK_BASEMAP - EXISTING WTM AND PROPOSED BPS LOCATIONS-RV.MXD BY: KPIETZSCH PLOT DATE: APR 8, 2019 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

RH2
 ENGINEERING
 ARCHITECTURE
 NORTH

1 inch = 1,500 feet
 0 750 1500 3000
 DRAWING IS FULL SCALE
 UNLESS NOTED OTHERWISE

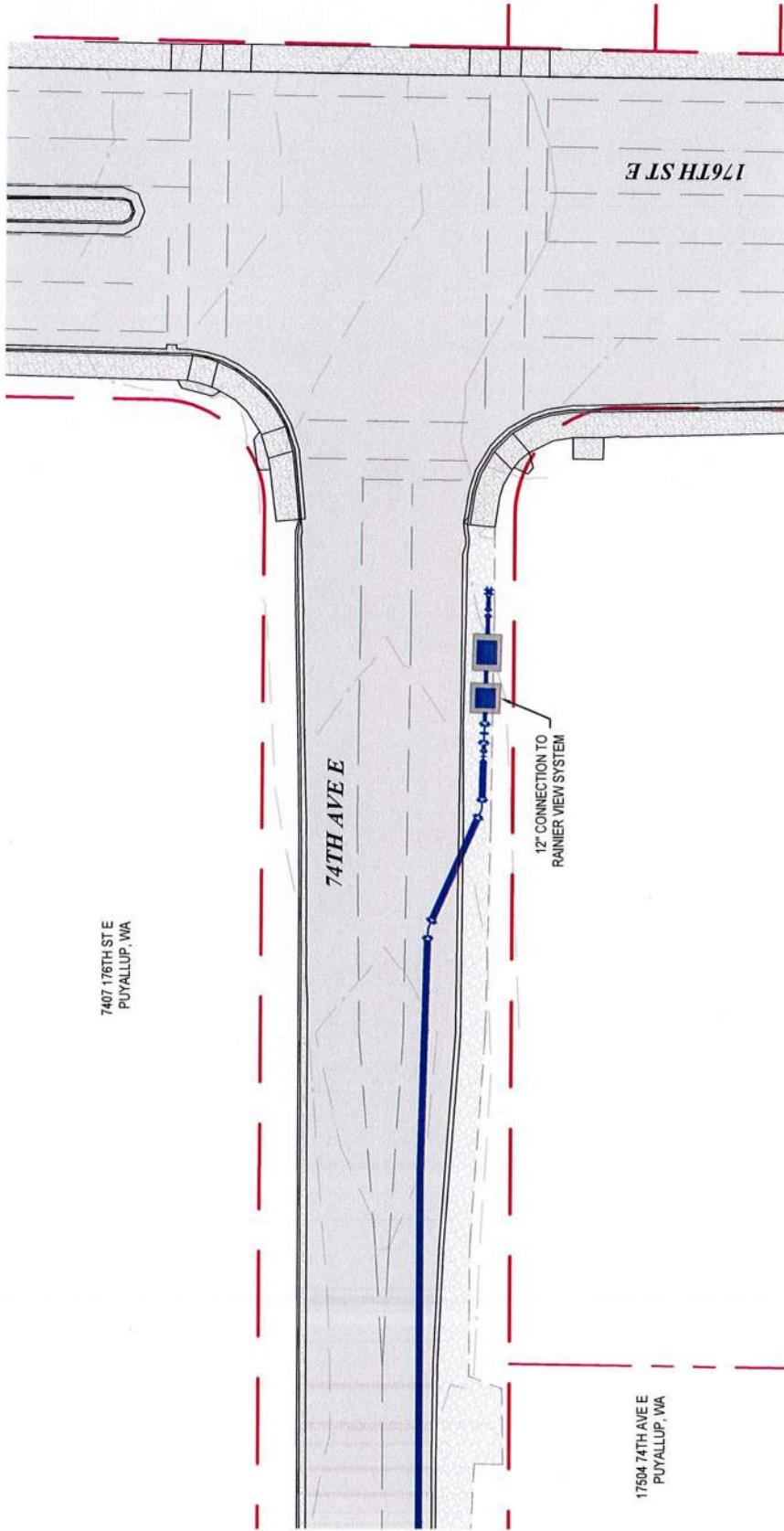


Existing and Proposed Alignment to Rainier View Connection Lakewood Water District Wholesale Transmission Water Main



This map is a graphic representation of the project location and is not intended to be used for any other purpose. It was prepared and printed using the best available data and is not guaranteed to be 100% accurate. This map is based on the best information available at the time of printing. Any reproduction or use of this map or portion thereof, in published or unpublished form, without the written authorization of the engineer is prohibited. This material is owned and copyrighted by L&K.

Exhibit B, Section 2.1.5



7407 176TH STE
PUYALLUP, WA

74TH AVE E

176TH STE

12" CONNECTION TO
RAINIER VIEW SYSTEM

17504 74TH AVE E
PUYALLUP, WA

RAINIER VIEW CONNECTION

**LAKEWOOD WHOLESALE TRANSMISSION
MAIN EXTENSION**

SCALE: 1"=40'
DRAWING IS FULL SCALE UNLESS
SPECIFICALLY NOTED
BM MEASURES FT



PLOT DATE: 4/20/19
FILE PATH: J:\bothell\data\BAM114-2713\rdm-2019-rainier-view.dwg

2019 WATER SYSTEM PLAN DATA UPDATE

BOOSTER PUMP STATIONS											
STATION NAME	LOCATION	NUMBER OF PUMPS	PUMP TYPE/MAKE	PUMP HP	GPM OUTPUT	OPERATION/FLOW MODULATION TECHNIQUE	NORMALLY ASSIGNED TANK OR PSI ZONE	NORMAL TANK ELEVATION CONTROL SETPOINTS On/Off	PUMP CURVE Y/N	SITE PLANS Y/N AS BUILTS	OPERATIONAL ZONE
114TH	114th and Old Military	1	Jacuzzi EM 6-1 End Suction	75	800	Unrestricted Flow	Farwest elevation	15'/25'	n	n	404→490
104TH	104th and Butte Dr	1	Peerless Split case Berkeley B4EPBMS Type B Centrifugal	75	800-1000	Oriface Plate	Philip Tank elevation	47'/54'	n	n	404→516 or 404→404
PHILIP	101st and Hemlock	2	Peerless C818 Close Coupled End Suction	50	850-900	Unrestricted Flow	Hemlock Tank II elevation	17'/25'	n	y	
NYANZA (Jockey Pump)	127th and Rebecca	1	Peerless C1040 AM Close Coupled End Suction	10	250-280	Unrestricted Flow	Nyanza psi zone	Maintain 60 psi	n	y	404→435
NYANZA Fire flow Pumps	127th and Rebecca	2	Cornell 6H-125-4 Close Coupled End Suction	25	850-950	Unrestricted Flow	Nyanza psi zone	Maintain 60 psi	n	y	404→435
HEMLOCK 490	10121 Hemlock St	3	Cornell 4RB-50-a Close Coupled End Suction	125	1000-1800	12" ClaVal PRV	Farwest elevation	15'/25'	y	y	404→490
HEMLOCK 516	10121 Hemlock St	1	Peerless C830A End Suction	50	1000	Unrestricted Flow	Hemlock Tank II elevation	17'/25'	y	y	404→516
DEEPWOOD	8501 112th ST SW	1	Peerless 5 stage Short Coupled Vertical Turbine	40	650	Unrestricted Flow	Hemlock Tank II elevation	17'/25'	n	y	404→516
FORSTER	6325 72nd St Ct SW	2	Cornell 6H Close Coupled End Suction	60	1000	Unrestricted Flow	Philip or Oakbrook elevation (seasonal)	Oakbrook 17'/26'	n	n	295→404
PARKLAND INTERTIE	3500 112th ST	1		100	400-1200	12" ClaVal FCV*	Parkland request		y	n	404→524

2019 WATER SYSTEM PLAN DATA UPDATE

BOOSTER PUMP STATIONS											
STATION NAME	LOCATION	NUMBER OF PUMPS	PUMP TYPE/MAKE	PUMP HP	GPM OUTPUT	OPERATION/FLOW MODULATION TECHNIQUE	NORMALLY ASSIGNED TANK OR PSI ZONE	NORMAL TANK ELEVATION CONTROL SETPOINTS On/Off	PUMP CURVE Y/N	SITE PLANS Y/N	OPERATIONAL ZONES
STEILACOOM 455	5000 Steilacoom Blvd	2	Cornell 6H-60-4 Close Coupled End Suction	125	400-1800	Variable Frequency Drive	455 zone psi		y	y	404→455
88TH AND PINE #1	3003 88th St	1	PACO VL 6095-7 Inline	25	800	Unrestricted Flow	455 zone psi			y	404→455
88TH AND PINE #2	3003 88th St	1	Peerless C1440 AMBF Centifugal	40	180-1000	Variable Frequency Drive	455 zone psi		y	y	404→455
WHOLESALE #1	1622 115th St S	2	Peerless 14 MD Short Coupled Vertical Turbine	250	600-1800	Variable Frequency Drive	Summit elevation		y	y	404→590
WHOLESALE #2	XXX 120th St. E		TBD	TBD	TBD	TBD	TBD				TBD
*Flow Control Valve											
TBD: To be determined											4/22/2019

2019 WATER SYSTEM PLAN DATA UPDATE

WELLS																	
WELL	S0 #	AQUIFER	LOCATION (TOWNSHIP, RANGE)	MAKE	MODEL SUMERSIBLE OR VERTICAL TURBINE	H.P.	GROUND ELEVATION (MSL)	GPM (AVERAGE)	CONSTRUCTION DATE	CONSTRUCTION DEPTH (IN FEET)	CASING DIAMETER	AVERAGE FLOW RATE GPM	WATER RIGHT NUMBER	INSTANTANEOUS WITHDRAWL (GPM)	ANNUAL WATER RIGHTS (ACRE FT/YR)	SUPPLEMENTAL RIGHT (ACRE FT/YR)	PUMP CURVE Y/N
A-3	S01	E	19N/02E-16R	BJ	SUB	100	265	1000	6/8/1965	481.0	16	1049	G2-GWC5573	0	0	2,400	Y
D-2	S02	E	19N/02E-10L	BJ	SUB	150	270.8	1300	4/2/1959	497.0	16	1185	G2-GWC601	2,000	706	0	N
D-3	S03	C	19N/02E-10L	HYD	V-T	100	270.5	800	12/24/1959	228.0	16	795	G2-GWC149	1,000	1,252	0	Y
E-2	S04	E	19N/02E-10E	FL/US	V-T	100	275.8	950	3/18/1963	490.0	16	960	G2-GWC4485	1,200	0	1,920	Y
E-3	S05	C	19N/02E-10E	FL/US	V-T	100	275.5	900	7/1/1977	271.0	16	730	G2-GWC148	0	0	0	N
F-2	S06	E	19N/02E-02J	BJ	SUB	125	260.8	1000	4/7/1965	535.0	16	1050	G2-GWC5574	1,000	0	1,600	N
H-1	S30	A	19N/02E-14B	PR/VHS	V-T	150	270	1400	3/15/1951	106.5	24	1220	G2-GWC1289	2,000	0	2,500	N
H-2	S31	A	19N/02E-14B	FL/US	V-T	100	270.4	1200	8/24/1959	105.0	16	1080	G2-GWC3831	800	0	1,280	Y
K-1	S34	E	19N/02E-02N	BJ	SUB	100	260.8	800	7/25/1958	571.0	12	640	G2-GWC5541A	2,600	0	4,160	N
K-2	S35	E	19N/02E-02N	FL/US	V-T	125	261.5	1200	12/3/1958	572.0	16	1275	G2-GWC5541A	0	0	0	N
G-1	S28	A	19N/02E-01K	BJ	SUB	150	277	1350	6/15/1950	173.0	24	1470	G2-GWC717	3,000	3,000	0	Y
G-2	S29	A	19N/02E-01K	BJ/W	SUB	100	270.6	1995	11/15/1960	180.0	16	1080	G2-GWC717	0	0	0	Y
G-3		EorG	19N/02E-01K	Currently being drilled													
N-1	S15	G	19N/02E-32K	BJ	SUB	250	240	1100	7/19/1962	1,064.0	16	890	G2-GWC4447	3,000	0	4,800	Y
N-2	S16	E	19N/02E-32K	BJ	SUB	200	240	1100	9/21/1962	566.0	16		G2-GWC4447	0	0	0	Y
N-3		E	19N/02E-32K	Drilled & testing			240										
L-2	S37	A	19N/02E-04G	BJ	SUB	60	400	850	5/15/1961	213.0	20	805	G2-GWC4183	1,500	0	2,400	N
L-3	S38	A	19N/02E-04G	BJ	SUB	60	400	750	12/9/1969	245.5	20	730	G2-GWC7319	900	720	0	N
Q-1	S19	E	19N/02E-04R	BJ	SUB	150	250	1200	1/1/1973	540.0	16	1040	G2-21391	1,500	2,000	0	N
I-1	S32	C	20N/02E-34E	BJ	SUB	150	243	550	2/14/1952	267.0	18	410	G2-GWC1370	1,500	0	1,193	N
I-3	S33	C	20N/02E-34E	FL/US	V-T	125	240.6	600	1/1/1970	266.0	16	585	G2-GWC7320	1,200	0	160	N
R-1	S21	E	19N/02E-11C	PR/VHS	V-T	200	260	1500	10/12/1985	564.6	16	1435	G2-26833C	1,500	812	388	N
O-1	S26	C	20N-02E-28R	BJ/US	V-T	100	240	?	12/10/1964	255.0	16		G2-GWC5194	800	1,280	417	N
O-2	S17	C	20N-02E-28R	BJ	SUB	125	240.1	900	5/8/1966	311.0	20	790	G2-GWC5540	1,100	0	1,760	Y
O-3	S20	C	20N-02E-28R	BJ	SUB	125	240	1000	4/11/1983	296.7	20	990	G2-26246C	1,000	490	310	Y

2019 WATER SYSTEM PLAN DATA UPDATE

WELLS																	
WELL	S0 #	AQUIFER	LOCATION (TOWNSHIP, RANGE)	MAKE	MODEL SUMERSIBLE OR VERTICAL TURBINE	H.P.	GROUND ELEVATION (MSL)	GPM (AVERAGE)	CONSTRUCTION DATE	CONSTRUCTION DEPTH (IN FEET)	CASING DIAMETER	AVERAGE FLOW RATE GPM	WATER RIGHT NUMBER	INSTANTANEOUS WITHDRAWL (GPM)	ANNUAL WATER RIGHTS (ACRE FT/YR)	SUPPLEMENTAL RIGHT (ACRE FT/YR)	PUMP CURVE Y/N
J-1	S11	A	20N-02E-31E	BJ	V-T	100	311.5	950	2/25/1952	156.0	24	1030	G2-GWC1305	1,500	700	1,300	Y
J-2	S12	E	20N-02E-31E	BJ	SUB	100	310	750	10/31/1961	618.0	16	750	G2-GWC4184	1,500	0	2,400	Y
J-3	S41	A	20N-02E-31E	BJ	SUB	100	308	850	4/20/2008	180.0	16	880	G2-GWC4184	1,500	0	0	Y
S-1	S22	C	19N/02E-33H	P/H	SUB	100	240	850	2/1/1987	355.1	12	630	G2-27158C	0	0	1,480	Y
S-2	S23	E	19N/02E-33H	BJ	SUB	100	240	950	5/14/1987	541.0	20	795	G2-27158C	0	0	0	Y
P-1R	S39	E	20N/02E/36M	BJ	SUB	75	265	750	4/1/1986	506.0	20	765	G2-GWC6840	3,000	0	2,400	Y
P-2	S40	E	20N/02E/36M	BJ	SUB	200	265	1600	3/5/1969	490.0	16	1490	G2-GWC6840	0	0	0	N
U-1	S27	C	20N/02E-26R	BJ	SUB	100	240	850	2/1/1993	302.0	16	860	G2-GWC28431	0	0	0	N
				BJ=BYRON JACKSON										PR/VHS=PEERLESS VHS USEM			
				HYD=HYDROFLO													
				FL/US=FLOWSERVE US MOTOR													
				PR/US=PEERLESS US MOTOR													
				HT/W=HAYWARD TYLER WORTHINGTON													
				P/H=PEERLESS HITACHI													

2019 WATER SYSTEM PLAN DATA UPDATE

TANKS AND RESERVOIRS												
RESERVOIR	LOCATION	YEAR CONSTRUCTED	CAPACITY	TANK HEIGHT	TANK DIAMETER	CONSTRUCTION TYPE	GROUND/FLOOR ELEVATION (MSL)	OVERFLOW ELEVATION	OVERFLOW PIPE DIAMETER	INLET/OUTLET PIPE DIAMETER	ALTITUDE VALVE MODEL	ALTITUDE VALVE SIZE
WASHINGTON BLVD	19N/02E-10E	1986	3,720,000	78'	90'	STEEL STANDPIPE	326'	404'	8"	10"	210-BN/610-BN	10"
AMERICAN LAKE GARDENS	19N/02E-23E	1987	3,540,000	74"	90'	STEEL STANDPIPE	330'	404'	8"	16" WITH 8" BYPASS	16" CHECK 81-02	8" BYPASS 210-01/610-01
STEILACOOM BLVD	20N/02E-36M	1986	3,500,000	139.0	65'	STEEL STANDPIPE	265'	404"	8"	12"	210-27/610-27	12"
104TH AND BRIDGEPORT	19N/02E-02J	1972	500,000	137.6	27.75'	STEEL HYDROPILLAR	261'	404'	8"	12"	210-16AB	12"
OAKBROOK	20N-02E-28R	1968	500,000	179'	30'	STEEL MULTICOLUMN	225'	404'	8"	12"	210-16AB	12"
FARWEST DRIVE	19N/02E-5	1969	500,000	165'	30'	STEEL MULTICOLUMN	326.8'	490'	8"	12"	210-5HHB	12"
88TH AND PINE	20N/02E-31E	1953	500,000	95'	30'	STEEL STANDPIPE	314.5'	409'	8"	12"/12"	N/A	
NYANZA	19N/02E-11	1952	440,000	85'	30'	STEEL STANDPIPE	322'	404'	8"	12"	210-27/610-27	
FORSTER	20N/02E-26	1990	3,500,000	30'	140'	PRE-STRESSED CONCRETE	209'	239.13	8"	12"	210FG-17	12"

2019 WATER SYSTEM PLAN DATA UPDATE

TANKS AND RESERVOIRS												
RESERVOIR	LOCATION	YEAR CONSTRUCTED	CAPACITY	TANK HEIGHT	TANK DIAMETER	CONSTRUCTION TYPE	GROUND/FLOOR ELEVATION (MSL)	OVERFLOW ELEVATION	OVERFLOW PIPE DIAMETER	INLET/OUTLET PIPE DIAMETER	ALTITUDE VALVE SERIAL #	ALTITUDE VALVE SIZE
PHILIP	19N/02E-04	1996	8,000,000	67' 9 1/2"	145'	PRE-STRESSED CONCRETE	340'	411'		12"/12"	210-047-AB	12"
DUNBAR RESERVIOR	19N/02E-04	1981	1,300,000	28'	90'	PRE-STRESSED CONCRETE	370'	404'	8"	12"	210-27/610-27	12"
HEMLOCK #1	19N/02E-04	1956	100,000	130'	24'	STEEL MULIT-COLUMN	390'	513'	6"	8"	210-27/610-27	8"
HALL (HEMLOCK #2)	19N/02E-04	2006	500,000	140'	57'	STEEL HYDROPILLAR	382.5	513'	12"	12"	210-27/610-27	12"
2016 FEMA SEISMIC UPGRADES												
SEISMIC ADAPTORS												
Washington BLvd, Farwest, Oakbrook, Philip booster station, 104th and Bridgeport, Forster,												
COLUMN STIFFENERS, GUSSETS												
Farwest, Oakbrook												
INCREASED FOUNDATION REBAR/CONCRETE												
Oakbrook												
												4/22/2019

2019 Water System Plan Data Update

CHECK VALVES

LOCATION	SIZE	UPSTREAM ZONE	DOWNSTREAM ZONE
104TH AND BUTTE PRV STATION	10"	516'	404'
112TH AND NORTHSTAR WAY	8"	516'	404'
DEEPWOOD AND 112TH ST	8"	516'	404'
HILCREST AND EDGEMERE	8"	425'	404'
FARWEST DR AND 116TH ST	6"	490'	404'
SCOTTS WELL SITE	8'	455'	404'
RAINIER AND IRENE	8"	455'	404'
88TH AND PINE TANK SITE	10"	455'	404'

4/22/2019

2019 WATER SYSTEM PLAN DATA UPDATE

LOCATION	VALVE NUMBER	SIZE	UPSTRE AM ZONE	DOWNST REAM ZONE
HOLDEN ROAD AND LAKE LOUISE	32V24	8"	490'	404'
HOLDEN ROAD AND LAKE LOUISE	32V78	8"	490'	404'
112TH ST	31V3	8"	490'	404'
100TH AND HEMLOCK	29V21	8"	490'	404'
114TH AND OLD MILITARY	73V14	8"	490'	404'
VIEW ROAD	11V11	12"	490'	404'
BUTTE AND 112TH	48V40	8"	516'	404'
104TH AND HIPKINS	33V42	10"	516'	404'
104TH AND LAKE LOUISE	32V2	10"	516'	404'
10815 S TACOMA WAY	39V41	16"	455'	404'
108TH AND HALCYON	39V9	12"	455'	404'
108TH AND MONTGROVE	39V31	6"	455'	404'
STEILACOOM BLVD	18V5	12"	455'	404'
109TH AND DEAN COURT	32V68	6"	425'	516'
LUNDSTROM AND DEAN CT	32V33	6"	425'	516'

4/22/2019

2019 WATER SYSTEM PLAN DATA UPDATE

TELEMETRY							
LOCATION	CPU	TYPE (SCADA OR DCS)	INSTALL DATE	COMM LINK	SIERRA WIRELESS MODEM	SOFTWARE	WELLSAVER (AQUIFER PROTECTION)
Main Office	Siemens Simatic S7-300	DCS	2015	Verizon VPN	CA1196309661005 CA13353052810	WinCC	N/A
Tillicum A-3 Well	Siemens IM151-8	DCS	2014	Verizon VPN	CA13353071610	WinCC	Yes
Yard Well D-2 and D-3	Siemens 6ES7 PLC	DCS	2003	Profibus to Master		WinCC	Yes
Washington Blvd Tank and E-2, E-3 Wells	Siemens IM151-8	DCS	2014	Verizon VPN	CA13353089810	WinCC	Yes
Ponders H-1 and H-2	Siemens 545-1101 PLC	DCS	1995	Verizon VPN	CA1236309901005	WinCC	No
104th and Bridgeport Tank and F-2 Well	Siemens IM151-8	DCS	2015	Verizon VPN	n/a	WinCC	Yes
Lake St K-1, K-2 Wells	KOYO DL 505	DCS	2000	Verizon VPN	n/a	WinCC	Yes
Scotts G-1, G-2 Wells	KOYO DL 505	DCS	1996	Verizon VPN	n/a	WinCC	Yes
View Rd N-, N-2 Wells and Treatment Plant	Siemens 545-1104 PLC	DCS	1997	Verizon VPN	CA1236304011005	WinCC	Yes
Hemlock Tanks, L-2, L-3 Wells, Booster Station	Siemens 6ES7 PLC	DCS	2006	Verizon VPN	CA1236310081005	WinCC	Yes
Deepwood Q-1 Well, Treatment Plant, Booster Station	Siemens 545-1105 PLC	DCS	2000	Verizon VPN	CA1219310451005	WinCC	Yes
Hipkins I-1, I-3 Wells	Siemens IM151-8	DCS	2013	Verizon VPN	n/a	WinCC	Yes
112th R-1 Well	Siemens IM151-8	DCS	2015	Verizon VPN	n/a	WinCC	Yes
Oakbrook Tank, O-2, O-3 Wells	Siemens IM151-8	DCS	2014	Verizon VPN	n/a	WinCC	Yes
88th and Pine Tank, J-1, J-2, J-3 Wells and Booster Station	Siemens IM-151-8 PLC	DCS	2010	DSL Line	n/a	WinCC	Yes

2019 WATER SYSTEM PLAN DATA UPDATE

TELEMETRY							
LOCATION	CPU	TYPE (SCADA OR DCS)	INSTALL DATE	COMM LINK	SIERRA WIRELESS MODEM	SOFTWARE	WELLSAVER (AQUIFER PROTECTION)
Angle Lane S-1, S-2 Wells and Treatment Plant	Siemens 545-1105 PLC	DCS	2000	Verizon VPN	CA1236309371005	WinCC	Yes
Steilacoom Tank, P-1, P-2 Wells and Booster Station	Siemens IM-151-8 PLC	DCS	2010	DSL Line	n/a	WinCC	Yes
Country Place U-1 Well	Siemens 545-1105 PLC	DCS	2004	Verizon VPN	CA1196309591005	WinCC	Yes
Farwest Tank	Siemens IM151-8	DCS	2014	Verizon VPN	CA13433024910	WinCC	N/A
American Lake Gardens Tank	Siemens IM151-8	DCS	2015	Verizon VPN	CA1236305441005	WinCC	N/A
104th St Booster	Siemens IM151-8	DCS	2015	Verizon VPN		WinCC	N/A
114th St Booster	Siemens IM151-8	DCS	2014	Verizon VPN	CA13353053010	WinCC	N/A
Parkland Intertie	Siemens IM151-8	DCS	2015	Verizon VPN	CA1196309591005	WinCC	N/A
Nyanza Tank and Booster Station	Siemens IM151-8	DCS	2015	Verizon VPN	CA13293016210	WinCC	N/A
Forster Reservoir and Booster Station	Siemens IM151-8	DCS	2013	Verizon VPN	CA13433051110	WinCC	N/A
Philip Tank and Booster Station	Siemens IM151-8	DCS	2013	Verizon VPN	CA1199308331005	WinCC	N/A
Wholesale Booster Pump Station	Siemens IM151-8	DCS	2011	DSL Line	n/a	WinCC	N/A
Summit Intertie	Siemens IM151-8	DCS	2011	DSL Line	n/a	WinCC	N/A



2017 TANK ANALYSES REPORT

Prepared for Lakewood Water District

November 2017

LAK 117.104



Prepared by:
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Lakewood Water District
2017 Tank Analyses Report
November 2017

Prepared by RH2 Engineering, Inc.

Prepared for Lakewood Water District

Note: This Report was completed under the direct supervision of the following Licensed Professional Engineers registered in the State of Washington.

Sincerely,

RH2 ENGINEERING, INC.



Signed:
11/22/2017



Signed:
11/22/2017

Lakewood Water District

2017 Tank Analyses Report

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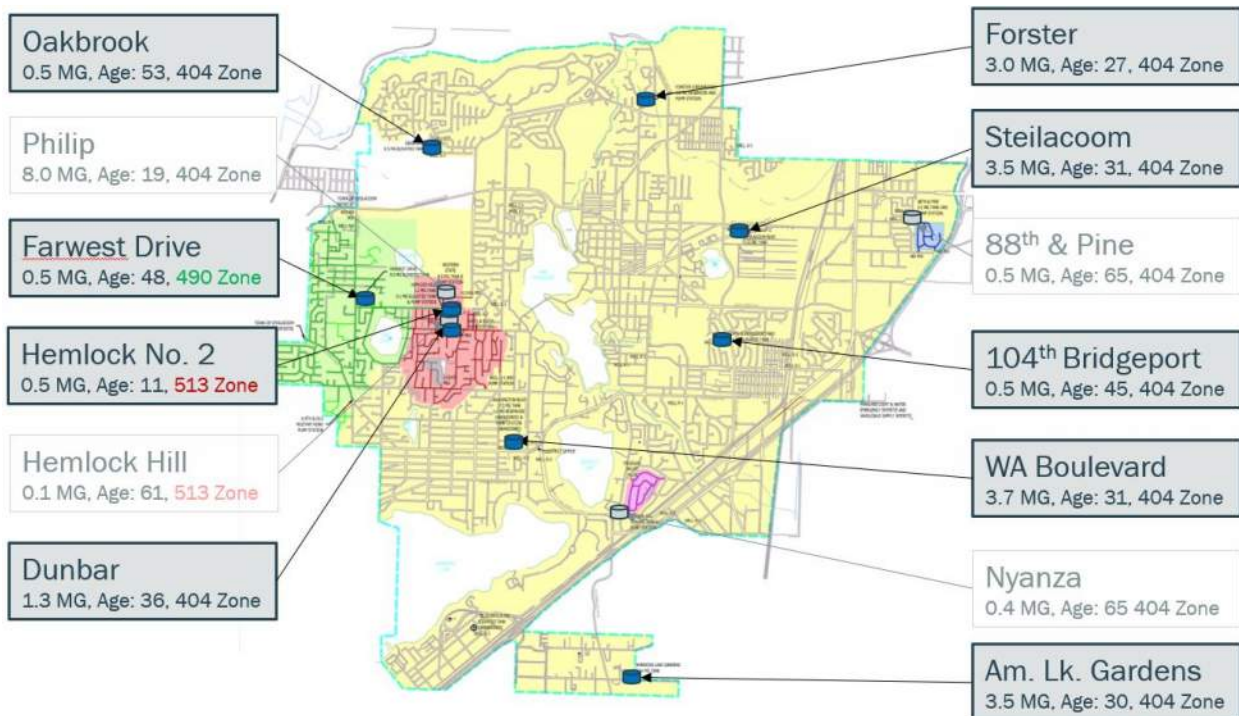
- Appendix A – Capital Improvement and Maintenance Planning
- Appendix B – *Forster and Dunbar Reservoirs Geologic Investigation*, RH2 Engineering, Inc., November 2017
- Appendix C – Seismic Analysis Structural Calculations from Sargent Engineers and RH2 Engineering, Inc., November 2017
- Appendix D – *Lakewood Water District Earthquake Evaluation of Water Tanks*, Chalker Putnam Collins & Scott, July 1995
- Appendix E – *Structural Evaluation Report (Draft), Evaluation of Four Water Tanks for Lakewood Water District*, EQE International, Inc., May 29, 2001
- Appendix F – *Seismic Evaluation of Steel Standpipes*, RH2 Engineering, Inc., October 2012
- Appendix G – Photos from Tank Inspections

Lakewood Water District 2017 Tank Analyses Report

EXECUTIVE SUMMARY

This report summarizes the condition of 9 of Lakewood Water District's (District) 13 potable water tanks, recommends improvements and maintenance to increase the lives of those tanks, identifies the estimated costs associated with the recommended improvements, and outlines a schedule and financing plan for implementing the improvements. The District's 13 tanks are shown in **Figure 1**, with the 9 tanks assessed by RH2 Engineering, Inc., (RH2) shown in gray. In addition to this report, RH2 is providing the District with an interactive Tank Improvements and Replacement Calculator tool, which calculates planning-level cost estimates, a projected construction timeline, and future account balances based on the timing of selected improvements.

**Figure 1
Tanks Analyzed**

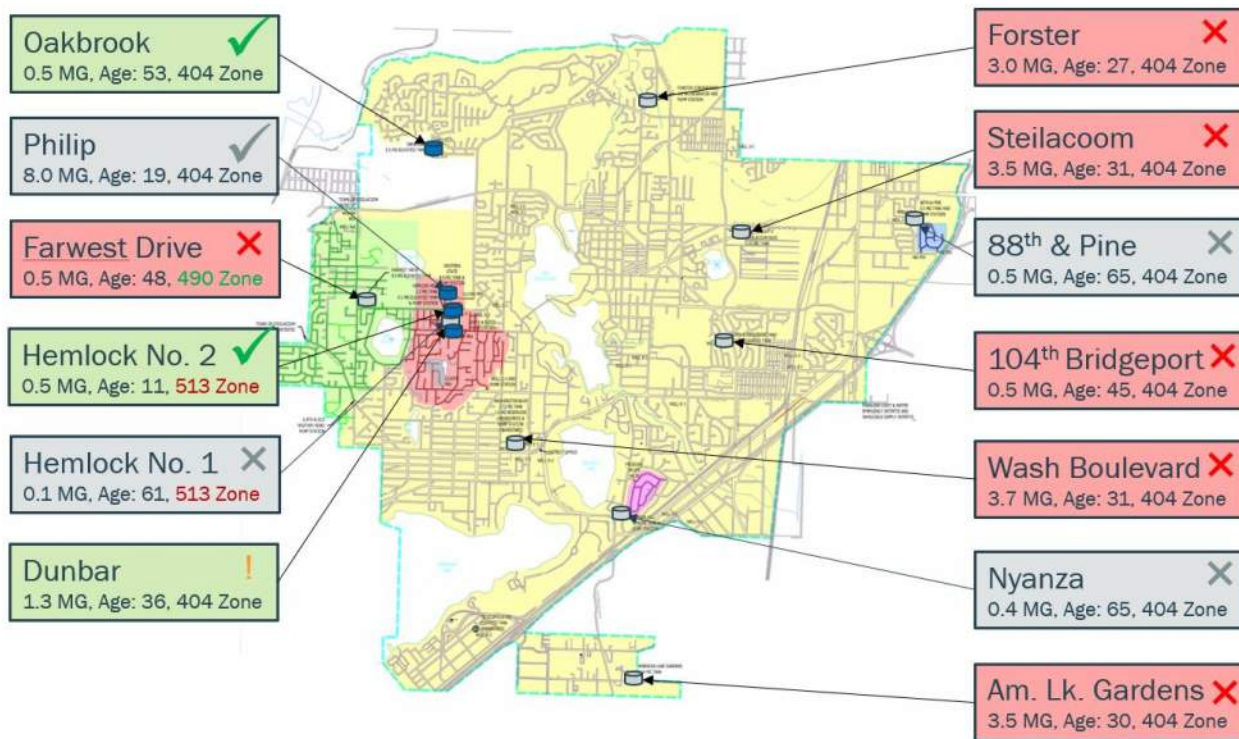


SEISMIC ANALYSIS

One primary focus of this study was to evaluate each tank's ability to meet current code-required seismic loads. Safe structures and reliable water storage, particularly following an emergency, are vital for the health and welfare of the District's residents and those employed within District boundaries. If a code-level earthquake should occur, reliable water will be needed for medical care and fire suppression; drinking, cooking, and basic hygiene; and to allow people to return to their normal routines and work so they may continue to financially support themselves. The seismic analysis indicated that only three of the nine tanks analyzed, the Oakbrook, Hemlock No. 2, and Dunbar tanks, have the structural capacity to withstand current code-established

seismic loads. The Dunbar tank is anticipated to survive a code-level earthquake, but with significant damage. Though the Philip tank was not part of this study, it is our understanding based on information provided by the District, that it has the capacity to withstand current expected earthquake loads. The Farwest, Forster, Steilacoom, 104th & Bridgeport, Washington Boulevard, and American Lake Gardens tanks do not have the structural capacity to withstand code-required seismic loads. The Hemlock No. 1, 88th & Pine, and Nyanza tanks are not anticipated to survive a current code-level seismic event based on information provided by the District. The results of the seismic analyses are summarized in **Figure 2**.

Figure 2
Results of Seismic Analysis



RECOATING AND MAINTENANCE

A secondary objective of the study was to identify other recommended improvements to extend each tank’s service life. Tank recoating and coating maintenance are the focus, because of their ability to inhibit corrosion. Without regular recoating and coating maintenance, corrosion attacks and breaks down steel shells and other structural components of the tanks, including the steel reinforcing of concrete tanks, thereby reducing their thickness and strength. Regular recoating and tank maintenance maintains steel integrity, thereby not only extending a tank’s service life but also preserving the tank’s ability to withstand a seismic event.

REHABILITATION RECOMMENDATIONS SUMMARY

Table 1 identifies the rehabilitation recommendations for each tank. In all, approximately \$8.3 million in seismic improvements and replacement (2017 dollars) are needed to bring the six

tanks scheduled for retrofit up to current seismic code, address current coating deficiencies, and replace the Nyanza tank (studied previously but included in this report at the request of the District). A summary of each tank’s analysis and options for implementing the rehabilitation are detailed later in this report.

**Table 1
Recommended Rehabilitation**

Tank	Recoating		Maintenance	Seismic Retrofit	Replacement	Reservoir Total Cost
	Interior	Interior & Exterior				
Farwest Drive			\$13,000	\$720,000		\$ 733,000
104th & Bridgeport	\$300,000		\$13,000	\$500,000		\$ 813,000
Nyanza					\$2,210,000	\$ 2,210,000
Steilacoom Boulevard	\$646,000		\$13,000	\$1,380,000		\$ 2,039,000
Washington Boulevard			\$13,000	\$690,000		\$ 703,000
American Lake Gardens			\$13,000	\$620,000		\$ 633,000
Forster			\$61,000	\$510,000		\$ 571,000
Oakbrook		\$529,000	\$13,000	\$0		\$ 542,000
Hemlock No. 2			\$13,000	\$0		\$ 13,000
Dunbar			\$61,000	\$0		\$ 61,000
Subtotal	\$1,475,000		\$213,000	\$4,420,000	\$2,210,000	
Total (2017 dollars)						\$ 8,318,000

BACKGROUND

The District selected RH2 to provide an assessment of 9 of its 13 tanks, identified in **Table 2**. This evaluation will be used by the District to develop a program to rehabilitate or replace tanks, and implement financial plan to pay for the improvements when needed. For the nine tanks included in this project, RH2 was tasked with evaluating each tank’s structural condition and estimated useful life, identifying improvements that could extend tank life, and providing an estimated replacement and/or repair schedule. The Nyanza tank, not evaluated as part of this study, but analyzed previously and scheduled for replacement, is included in the improvement schedule given that it was already planned for replacement soon.

Table 2
Tanks Evaluated

Tank	Address	Size (MG)	Tank Material
Farwest Drive	10001 Farwest Dr. SW	0.5	Steel
104th & Bridgeport	10424 Bridgeport Way SW	0.5	Steel
Steilacoom Boulevard	5000 Steilacoom Blvd SW	3.5	Steel
Washington Boulevard	8019 Washington Blvd SW	3.7	Steel
American Lake Gardens	6415 150th St SW	3.5	Steel
Forster	6325 72nd St Ct SW	3.0	Concrete
Oakbrook	9305 Golf Course Rd SW	0.5	Steel
Hemlock No. 2	10001 Farwest Dr. SW	0.5	Steel
Dunbar	10001 Farwest Dr. SW	1.3	Concrete

MG = Million gallons

In addition to a seismic analysis of each tank under currently expected design loads, RH2 performed a visual inspection of each tank to evaluate the condition of coatings, welds, access, antenna impacts, connections, and concrete. RH2 also reviewed and utilized information from the following previous reports and segments of reports that were prepared for the District, including:

- *Earthquake Evaluation of Water Tanks*, Chalker Putnam Collins & Scott, July 1995 (**Appendix D**);
- *Evaluation of Four Water Tanks*, EQE International, May 2001 (**Appendix E**); and
- *Seismic Evaluation of Steel Standpipes*, RH2 Engineering, Inc., October 2012 (**Appendix F**). This 2012 report includes seismic evaluation of the following five tanks.
 - Steilacoom Boulevard
 - Washington Boulevard
 - American Lake Gardens
 - 88th and Pine
 - Nyanza

The design of the seismic improvements for each of these tanks were developed in 2015, with then current code-required seismic loads.

Federal Emergency Management Agency (FEMA) funding was awarded to the District in 2015. The District prioritized and proceeded with the following improvements based on the available funding.

- **Farwest:** Bracing rehabilitated and flexible piping added.
- **Oakbrook:** Bracing rehabilitated, flexible piping added, and foundation rehabilitated.
- **Philip** (previously known as Western State), **American Lake Gardens, Washington Boulevard,** and **Bridgeport:** Flexible piping added.
- **88th & Pine:** Analyzed, but no improvements were made with FEMA funding.

The FEMA funding facilitated some, but not all, of the needed seismic improvements; some improvements still need to be completed.

The Philip tank is the District's largest tank at 8.0 million gallons (MG), and was constructed in 2006. It is a concrete tank approximately 120 feet in diameter and 30 feet tall. The 2015 seismic improvements constructed with FEMA funding included adding flexible piping connections at the Philip tank inlet and outlet. While it is not included in this study, it is assumed to meet current seismic codes.

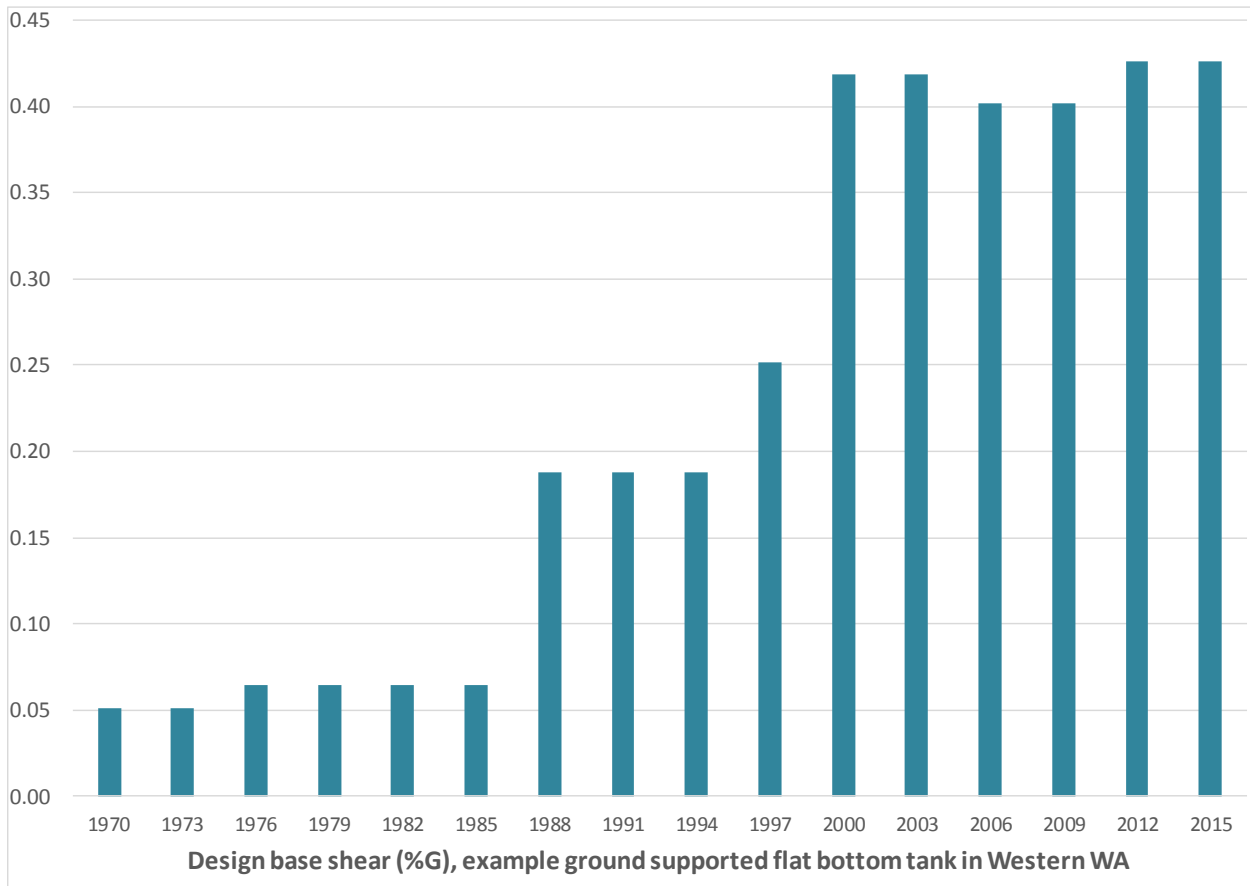
The Hemlock No. 1 tank, a 100,000-gallon elevated tank, was not included in this study or the 2012 study. It is assumed to be seismically deficient as it is a 61-year-old tank serving the 513 Zone in conjunction with the Hemlock No. 2 tank (included in this study).

SEISMIC TECHNICAL BACKGROUND

A much larger earthquake is expected in our region than was expected years ago. Code-required seismic loads in western Washington have increased significantly in the last three decades, approximately doubling since 1996, and increasing by approximately seven-fold since 1987, as shown in **Figure 3**. The code-required increases were implemented as new information was discovered, including new geologic and soils information, and observations of how other tanks performed in recent earthquakes¹. Expected loads have increased so significantly that a tank built before 2000, even if in excellent physical condition, is likely under-designed for current earthquake loads. Most recently, in 2015, the United States Geological Survey (USGS) updated its seismic parameter calculation tool based on new geologic and other information. As a result, seismic loads in the District are increasing further with the adoption of the 2018 International Building Code.

¹ The basis for increases include: 1974: Adoption of the Uniform Building Code (UBC) in Washington; 1976: Drift Limits and a 1.25 Importance Factor added to the UBC; 1988: Tanks specifically addressed in the UBC; 1997: Change in the Response Coefficient, R, in the UBC, based on tank performance; and 2000: International Building Code (IBC) adopted in Washington, including a 1.5 Importance Factor for essential facilities, with the maximum earthquake now determined on a site-specific basis utilizing USGS information.

Figure 3
Historical Changes in Washington Seismic Loads

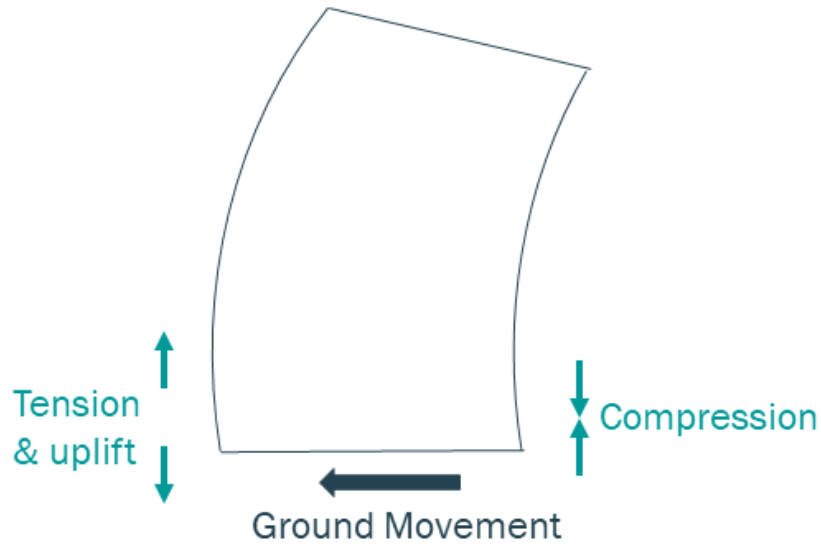


Seismic loads are lateral loads. The ground moves, and the tank mass at rest resists movement, resulting in tension and compression on opposite sides of the tank, as shown in **Figure 4**. If the tension or compression loads exceed the capacity of the tank or its foundation, it can result in the failure of various tank elements, including:

1. Anchor failure;
2. Soil failure;
3. Shell buckling; and/or
4. Piping/connection failure.

Those failure modes, and solutions to remedy them, are shown in **Figures 5** through **8**.

Figure 4
Seismic Loads

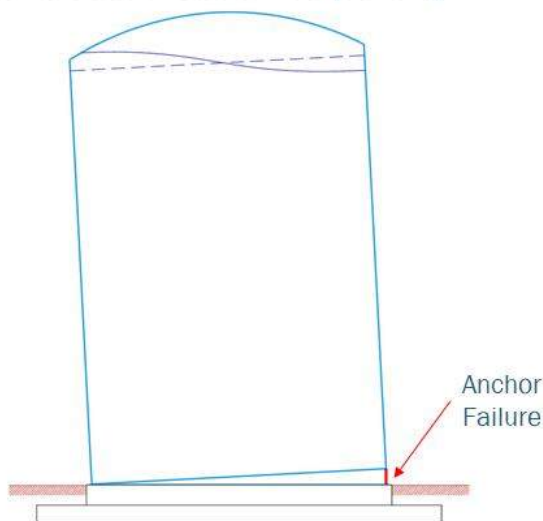


FAILURE MODE 1: ANCHOR FAILURE

If tension exceeds the anchor capacity, it can cause the tank anchors to fail, as shown in **Figure 5**. Existing anchors can be proactively replaced to accommodate expected loads.

Figure 5
Anchor Failure

Problem: Tension exceeds steel capacity



Solution: More/larger anchors

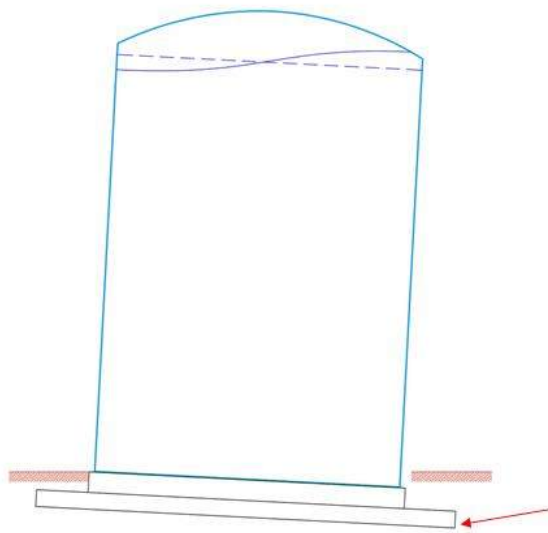


FAILURE MODE 2: SOIL FAILURE

If compressive forces exceed the soil bearing capacity, it can cause the soil below the foundation to compress causing the ground under the foundation to settle, as shown in **Figure 6**. To remedy this potential failure, the foundation can be enlarged to distribute the soil compression loads over a larger area so as to not exceed the soil bearing capacity.

Figure 6
Soil Failure

Problem: Loads exceed soil bearing capacity



Solution: enlarge foundation



FAILURE MODE 3: SHELL BUCKLING

If the compression within the steel plates exceeds its capacity, it can result in shell buckling, as shown in **Figure 7**. This occurs most often at the tank base; however, because tanks are usually thicker at their base (to accommodate higher hydrostatic loads with depth), buckling can occur higher up the wall. Buckling can be prevented by stiffening the shell.

Figure 7
Shell Buckling

Problem: Compression exceeds steel capacity



Solution: Stiffen shell



FAILURE MODE 4: PIPING/CONNECTION FAILURE

Tank uplift or settlement as well as tank sliding, can result in the failure of the adjacent piping, as shown in **Figure 8**, often causing the tank's contents to be lost. Current code requires that movement be accommodated for at the tank's piping connections, even if the tank has adequate anchorage and soil support. One (1) inch of flexibility must be provided if the tank is anchored, and 4 inches of flexibility is required if the tank is unanchored. In addition, adding seismic activated isolation valves near the tank and elsewhere within the system can help preserve the loss of the water following an earthquake.

Figure 8
Piping/Connection Failure

Problem: Tank sliding or uplift damages piping

Piping failure



Solution:

- Add flexible connections
- Add valves to isolate failed elements



ESTIMATED TANK LIFE

As part of this study, the District requested RH2 evaluate the condition and expected life of each tank. No one knows when the next code level earthquake will occur; therefore, the following is limited to tank condition and is exclusive of seismic capacity.

WELDED STEEL TANKS

The American Water Works Association (AWWA) cites a steel tank service life expectancy of 100 years or more if the tank is well maintained² and states:

More than 100,000 steel water-storage tanks have been constructed within the last 100 years, a value that far exceeds the number of large water-storage vessels of any other type of construction material. Many steel water tanks have service histories in excess of a century and are still in service today.

The Steel Tank Institute (STI/SPFA) also cites a steel tank life expectancy of 100 years with proper maintenance³. STI/SPFA is a trade association representing fabricators of steel construction products and their suppliers. It represents the merger of two internationally respected organizations in the steel fabrication industry – the Steel Tank Institute (1916) and the Steel Plate Fabricators Association (1933).

PRESTRESSED CONCRETE TANKS

It is more difficult to establish a basis for the expected service life of a prestressed concrete tank, because this type of tank has not existed as long and there are not as many of them in service. Prestressed concrete tanks have existed since the 1930s and are currently built in accordance with AWWA D110, first published in 1966. There are tens of thousands of prestressed tanks in the US, most built since the mid-1950s. Significant improvements have been made in design and construction techniques in recent years.

Per DYK (now DN Tanks) “DYK’s current prestressing technology has evolved to such a high level of maturity that a 100 year life span for a tank is considered conservative.”

ANTICIPATED TANK LIFE

While industry standards claim the useful life of a welded steel tank is 100 or more years if well maintained, RH2 cautions that welded steel tanks have only existed since the 1920s; therefore, there is not a proven basis to demonstrate 100-plus year lifespans for welded steel tanks. In addition, many environmental and other factors affect tank life. The same can be said for the theoretical 100-year life expectancy of newly constructed prestressed concrete tanks. Prestressed concrete tanks have existed since the 1930s, and the technology that is anticipated to allow them to reach a 100-year lifespan has evolved within the last two decades. RH2 recommends that a more conservative 75-year anticipated lifespan be utilized for both steel and concrete tanks, assuming industry standard inspection and maintenance schedules are followed reasonably closely, and assuming any tank with a seismic deficiency is seismically retrofitted prior to the occurrence of the next significant seismic event. Because a seismic event could occur at any

² AWWA *Manual of Water Supply Practices*, M42, Steel Water-Storage Tanks, Revised 2013.

³ STI/SPFA Total Cost of Ownership, STI/SPFA Steel Water Storage Tank Seminar, October 4, 2012.

time, there is no identifiable service life for a seismically deficient tank. Tank maintenance is highly correlated with service life. For example, corrosion reduces material thickness and therefore strength. RH2 recommends that the remaining expected tank life is reduced by one-third for tank coatings that are not rigorously maintained.

Table 3 identifies the expected tank life of each of the nine tanks included in this study.

**Table 3
Anticipated Tank Life**

Tank	Year Constructed	Tank Age (yrs)	Tank Material	Theoretical Remaining Life w/ Regular 5-yr Maintenance Schedule, No Earthquake	Improvements Required for Tank to Remain Operational after a Code-level Earthquake	Adjustment to Life Expectancy Based on Current Condition	Replacement Year Based on Adjustment
Farwest Drive	1969	48	Steel	27	Yes	-8	2036
104th & Bridgeport	1972	45	Steel	30	Yes	-10	2037
Steilacoom Boulevard	1986	31	Steel	44	Yes	-15	2046
Washington Boulevard	1986	31	Steel	44	Yes	-12	2049
American Lake Gardens	1987	30	Steel	45	Yes	0	2062
Forster	1990	27	PT Concrete	48	Yes	0	2065
Oakbrook	1964	53	Steel	22	No	0	2039
Hemlock No. 2	2006	11	Steel	64	No	0	2081
Dunbar	1981	36	PT Concrete	39	No	0	2056

RECOMMENDED IMPROVEMENTS TO EXTEND TANK LIFE

A reliable, resilient tank is a tank that is expected to withstand a current code-level earthquake. RH2 recommends a full seismic retrofit to significantly increase the probability that the tank will remain in service after a code-level seismic event. Routine inspection and preventive maintenance are also recommended to extend tank life. Preventive maintenance includes both recoating and an ongoing routine inspection and maintenance program, described in the following sections.

SEISMIC RETROFIT

Since a code-level earthquake could occur at any time, any delay in seismic retrofit comes with the risk of tank damage or failure. RH2 recognizes that phasing of seismic improvements will be required to work within the District’s planning and budgeting needs and recommends prioritizing seismic retrofits (or replacement if retrofit is not feasible) based upon each tank’s overall importance to the water system. Recommended seismic retrofits are shown in **Table 4**.

**Table 4
Recommended Seismic Retrofits**

Tank	Size (MG)	Year Constructed	Tank Age (yrs)	Tank Material	Tank Style	Required Retrofit To Meet Current Design Seismic Loads
Farwest Drive	0.5	1969	48	Steel	Elevated-multi column	Foundation extension and column anchor bolts
104th & Bridgeport	0.5	1972	45	Steel	Hydropillar	Additional bracing
Nyanza	0.4	1952	65	Steel		To be replaced
Steilacoom Boulevard	3.5	1986	31	Steel	Standpipe	New foundation and anchor bolts
Washington Boulevard	3.7	1986	31	Steel	Standpipe	Footing extension and anchor bolts
American Lake Gardens	3.5	1987	30	Steel	Standpipe	Footing extension and anchor bolts
Forster	3.0	1990	27	Concrete	Pre-stressed	Exterior prestressing
Oakbrook	0.5	1964	53	Steel	Elevated-multi column	None
Hemlock No. 2	0.5	2006	11	Steel	Hydropillar	None
Dunbar	1.3	1981	36	Concrete	Pre-stressed	None

RECOATING AND PREVENTIVE MAINTENANCE

Steel Tank Recoating

According to the National Association of Corrosion Engineers (NACE), typical tank coatings have exhibited lifespans of 15 to 32 years, depending on exposure⁴. Also, as reported by NACE, a coating's practical life is considered to be reached when 5- to 10-percent coating breakdown occurs (**Figure 9**), and active rusting of the substrate is present.

Figure 9
Society for Protective Coatings (SSPC)-Vis 2 Rust Grade 4 (End of Useful Coating Life)



Coatings routinely undergo a life cycle of original painting, spot touch-up, and repair (this is assumed to occur with comprehensive tank inspection); maintenance repainting (spot prime and full coat, also known as top coating); and full repainting (total coating removal and replacement).

There are several factors that affect coating and tank longevity, including water corrosivity⁵, the presence of dissimilar metals within the tank, atmospheric conditions (including temperature, rainfall, humidity, salt spray, urban/industrial pollution, sun/shade), corrosivity of soils supporting the tank, and stray current, which can promote galvanic corrosion. Microbiologically induced corrosion can also be an issue, particularly if sediment can accumulate in or on the tank.

In RH2's experience, interior coatings, particularly those at the interior of the roof, are often the shortest lived. Adhesion testing can often identify coatings that are weakening or breaking down, even if little visible rust is present. Other vulnerable areas include weld seams at the shell (both vertical and horizontal seams, because they are not completely smooth and are difficult to paint), hard corners, and surfaces that are inaccessible, such as those inside bolted connections, and between the roof plate and roof structural members if they are not fully seal welded. Stripe coating of welds and other challenging areas is recommended to make holidays or thin coatings more visible and increase the coating thickness in vulnerable areas.

RH2 recommends allocating budget for full tank recoating (blasting to bare steel and recoating) at 30-year intervals and full tank topcoating (blasting to intact primer, or bare steel in areas of corrosion and topcoating) at the 15-year intervals between full recoatings. Although exterior coatings often survive 5 years or so longer than interior coatings, there is economy of scale in performing interior and exterior recoating or topcoating at the same time; therefore, RH2 recommends budgeting for recoating and topcoating on this schedule, governed by the need for

⁴ NACE Corrosion Expo Paper 08279, 40 contributing authors. This cited range is based on an epoxy zinc/polyurethane/polyurethane system of total dry film thickness (DFT) 11 mils, resulting in a lifespan ranging from 15 years (severe exposure) to 32 years (mild exposure).

⁵ *The Effect of Chlorine on Corrosion in Drinking Water Systems Study* by Abigail F. Cantor, P.E., Jae K. Park, Ph.D., and Prasit Vaiyavatjamai, University of Illinois at Urbana-Champaign, November 2000. Research indicates a pH below 7.0 creates highly corrosive water. However, a pH above approximately 7.8 to 8.8 greatly diminishes chlorine's disinfectant efficacy.

interior coatings. Recoating or topcoating may be accelerated or delayed if inspection and testing indicate it is warranted.

Concrete Tank Maintenance and Coatings

Prestressed concrete tanks are often advertised as being maintenance free. However, if the interior of a tank should be painted or equipped with a lining because it is not constructed of NSF/American National Standards Institute (ANSI) 61 certified materials or is leaking, its costs will be higher than expected. Further, since even NSF certified concrete materials deteriorate during the life of the tank, maintenance is anticipated. In RH2's experience, leaks and cracks occur and require repair even in relatively new tanks.

ROUTINE TANK INSPECTION AND MAINTENANCE

Regular tank maintenance, including cleaning and limited spot recoating as needed, is also instrumental in extending tank life.

AWWA Manual M42 – Steel Water Storage Tanks, and AWWA G200 – Distribution Systems Operation and Management recommend best management practices for tank inspections and maintenance.

Interior and exterior inspections are employed to help ensure the tank's physical integrity, security, and high-water quality. Inspection type and frequency are driven by many factors specific to each storage facility, including its type (i.e., standpipe, ground level tank, etc.), vandalism potential, age, condition, cleaning program or maintenance history, water quality history, funding, staffing, and other utility criteria.

- **Steel Tanks**

AWWA Manual M42 – Steel Water Storage Tanks provides information regarding inspection during tank construction and periodic operator inspection of existing steel tanks.

- **Concrete Tanks**

Specific guidance on the inspection of concrete tanks is not addressed in current AWWA literature. However, the former AWWA D101 document may be used as a guide in inspecting appurtenances on concrete tanks. Concrete condition assessments should be performed with guidance from the American Concrete Institute (ACI) Manual of Concrete Inspection. Soft, low alkalinity, low pH waters may dissolve the cementitious materials in a concrete reservoir, causing a rough surface and exposing the sand and gravel. Sand may collect on the bottom of the storage facility during this process. An additional concern is that in extreme cases, the integrity of reinforcing bars may be compromised.

Recommended Tank Inspection Frequency⁶

- **Routine Tank Inspection: Daily to Weekly**

“Routine Tank Inspection” is a visual (ground level) storage tank inspection to identify sanitary defects that cover the exterior conditions of the storage tank including, but not limited to, sanitary and structural conditions, as well as security and safety concerns that can be assessed visually without entering or climbing the storage tank. Routine inspections typically monitor the exterior of the storage facility and tank site for evidence of intrusion, vandalism, coating failures, security, and operational readiness. Based on a literature review and project surveys, Kirmeyer et al. (1999)⁷ suggested that routine inspections be conducted on a daily to weekly basis. Where supervisory control and data acquisition (SCADA) systems include electronic surveillance systems, the resulting alarm conditions may substitute for certain physical inspections.

- **Periodic Tank Inspection: Every 1 to 4 Months**

“Periodic Tank Inspection” is a storage tank inspection of areas not visible from the ground to identify sanitary defects that impact the exterior sections of the storage tank including, but not limited to, sanitary and structural conditions, as well as security and safety concerns. Periodic inspections are designed to review areas of the storage facility not normally accessible from the ground and are not addressed by the routine inspections. These inspections usually require climbing the tank. Periodic inspections, like routine inspections, are principally a visual inspection of tank integrity and operational readiness. Based on a literature review and project surveys, Kirmeyer et al. (1999) suggested that periodic inspections be conducted every 1 to 4 months.

- **Comprehensive Tank Inspection: Every 3 to 5 Years**

“Comprehensive Tank Inspection” is storage tank inspection to identify sanitary defects that cover the external and internal conditions of the storage tank including, but not limited to, sanitary, structural, and coating system conditions, as well as security and safety concerns. Kirmeyer et al. (1999) recommend that comprehensive inspections be conducted every 3 to 5 years and possibly more often for water quality purposes.

The most common problems reported by commercial inspectors in survey responses are: no bug screens on vents and overflows, cathodic protection systems not operating or not adjusted properly, unlocked access hatches, presence of lead paint (interior and exterior), and the presence of paints not approved by NSF International (Kirmeyer et al. 1999). The most common coating problems reported by commercial tank inspectors that relate to water quality (Kirmeyer et al. 1999) are: chemical leaching from incompletely cured coating; corrosion product buildup from

⁶ American Water Works Association, with assistance from Economic and Engineering Services, Inc. August 15, 2002. *Finished Water Storage Facilities*. Prepared for U.S. Environmental Protection Agency, Office of Ground Water and Drinking Water. Distribution System Issue Paper, White Paper 4601M.

⁷ Kirmeyer, G.J., L. Kirby, B.M. Murphy, P.F. Noran, K.D. Martel, T.W. Lund, J.L. Anderson, and R. Medhurst. 1999. *Maintaining and Operating Finished Water Storage Facilities*. Denver, Colo.: AWWA and AWWARF.

excessive interior corrosion; turbidity events during tank filling due to excessive bottom sediment; unknown chemical leaching due to non NSF 61 coatings; and lead leaching from lead based interior coatings.⁸

Many states also publish guidelines for inspection and maintenance intervals; Washington does not. States that do have recommendations are Alabama (5 years), Arkansas (2 years), Missouri (5 years), New Hampshire (5 years), Ohio (5 years), Rhode Island (external once per year; internal every 5 years), Texas (annually), and Wisconsin (5 years).

When it is not feasible to empty the tank for the Comprehensive Tank Inspection, owners routinely retain commercial divers to perform this inspection and maintenance without taking the tank out of service. Even some spot coating repairs can be performed by divers. However, RH2 recommends inspecting the tank while empty to more thoroughly identify and address maintenance issues. RH2 recommends that problems be remedied during these inspections, or as soon as reasonably possible thereafter.

Based on historical coating life information and recommended inspection and maintenance schedules, RH2 recommends budgeting for full recoating for steel tanks at 30-year intervals, with top coating at the 15-year midspan between each recoating, and inspection/cleaning/maintenance, including spot touch up, at 5-year intervals between recoating or top coating, as shown in **Table 5**. Per the schedule, each steel tank would undergo initial coating (year 0), inspection/cleaning/spot touchup in years 5 and 10, top coating in year 15, inspection/cleaning/spot touchup in years 20 and 25, and full recoating in year 30. That schedule may be repeated for the full life of the tank. RH2 recommends concrete tank maintenance/repair at 30-year intervals with inspection/cleaning/maintenance at 5-year intervals between those repair events.

Table 5
Tank Maintenance Tasks and Frequency

Tank Material	Maintenance Element	Period (yrs)
Steel	Interior Top Coating	15
	Exterior Top Coating	15
	Interior Full Recoating	30
	Exterior Full Recoating	30
	Cleaning and Spot Repair	5
Concrete	Epoxy Injection	30
	Concrete Surface Repair	30

⁸ American Water Works Association, with assistance from Economic and Engineering Services, Inc. August 15, 2002. *Finished Water Storage Facilities*. Prepared for U.S. Environmental Protection Agency, Office of Ground Water and Drinking Water. Distribution System Issue Paper, White Paper 4601M.

RESULTS OF TANK ANALYSES

Sargent Engineers, as a subconsultant to RH2, performed a structural evaluation of three of the District's elevated tanks.

- Farwest
- Oakbrook
- Bridgeport

RH2 performed a structural evaluation of six of the District's reservoirs.

- American Lake Gardens
- Washington Boulevard
- Steilacoom
- Hemlock No. 2
- Dunbar
- Forster

The scope of the seismic investigation was limited to an evaluation of the tanks as they relate to current codes as described in this report. The analysis of each reservoir is based on information provided by the District and stated assumptions made by RH2. During the predesign phase of any retrofit or rehabilitation, RH2 recommends a comprehensive visual inspection and testing to verify the condition of the tank foundations, steel, and welding, as well as an analysis of other items, including adequate ventilation to prevent damage to the tank should a seismic event cause rapid loss of tank contents. Predesign phase investigation may reveal additional factors that impact the results of the evaluation, such as cracked concrete, shell corrosion, or deficient welds. Results of the predesign inspection would be addressed during final design of the improvements selected for construction.

ANALYSIS PROCEDURE

The analysis was performed using the American Society of Civil Engineers (ASCE) Standard 7 (2016) seismic loads, which are scheduled for adoption with the 2018 International Building Code (IBC) and, in the District, exceed the lateral loads in the 2015 IBC, which utilizes ASCE 7 (2010) loads. Per ASCE 7, Section 15.7, Tanks and Vessels, tanks must also be designed and detailed in accordance with the requirements of AWWA D100. ASCE 7-16 loads were identified in the 2015 National Earthquake Hazards Reduction Program (NEHRP) in a cooperative effort with the USGS. ASCE 7-16 loads reflect site-specific seismic hazards based on known geological, historical, and soils information and are presented via a companion software program. The results from the USGS companion software are included with the calculations for each tank in **Appendix C** and are unique to each tank based on its location.

AWWA D100-11 was used as the basis of design for the welded steel tanks. AWWA D115-16 was used as the basis of analysis for the post-tensioned concrete tanks. The design seismic accelerations are based on a maximum considered earthquake, defined as the motion caused by an event with a 2 percent probability of occurrence within a 50-year period. Maximum seismic acceleration values were taken from ASCE 7-16 based on each tank's latitude and longitude. The maximum short-period (high frequency) response was determined to be 136 percent of the acceleration due to gravity. The maximum long-period response was determined to be 48 percent of the acceleration due to gravity. The seismic accelerations were then factored based on the

geotechnical characteristics of each site. RH2 performed geotechnical evaluations for the Forster and Dunbar tanks to determine soil parameters used in the analyses. The geotechnical memorandum is included as **Appendix B**. Other geotechnical information was provided by the District from previous reports. Seismic overturning moments and base shear forces were calculated using AWWA D100-11 design equations and used to determine the maximum soil bearing pressure under each reservoir footing.

STEEL TANKS

The shell of each welded steel tank was checked for adequacy regarding hydrostatic pressures due to water in the tank. The seismic analyses examined the adequacy of five specific areas that, if inadequate, could result in catastrophic failure of the tank during a seismic event:

1) overturning stability of the tank; 2) resistance to uplift of the tank; 3) soil bearing pressure; 4) compressive stress in the shell (buckling); and 5) tensile stress in the shell. The provided information did not include the grade of steel used for the anchor bolts/straps at each tank. For the purposes of this analysis, the anchor bolts and straps have been conservatively assumed to be American Society of Testing and Materials (ASTM) A36. In most cases, the grade of steel used for the reservoir shell construction also was unavailable. When unavailable, RH2 assumed the lowest grade of steel required by the code at the time of construction based on the provided shell thickness and the tank hydrostatic pressures.

This first phase analysis does not address other secondary structural or functionality issues, such as the integrity of roof joists and their connections or center column supports. These secondary structural issues should be investigated during predesign and addressed in the final design of the selected construction alternatives.

PRESTRESSED TANKS

The two prestressed concrete tanks were analyzed for adequacy under hydrostatic water pressures within the tank. The seismic analysis examined four critical structural design elements that, if inadequate, could result in catastrophic failure should the maximum considered earthquake occur: 1) shell horizontal prestressing; 2) shell vertical prestressing; 3) shear transfer from the shell to the foundation; and 4) shear transfer from the roof to the shell.

For the purposes of this analysis it was assumed that the gravity support structures, including roof deck, columns, and floor system, are adequate as originally designed since the gravity loads have remained consistent since the tanks were constructed.

Farwest Drive 490 Zone 0.5 MG Elevated Tank

The Farwest Drive Tank is located on a fenced site off a paved residential road and is the only facility on the site. The 50-foot diameter, 139-foot tall elevated steel tank was constructed in 1969, and provides 500,000 gallons of storage for the 490 Zone. A single 12-inch-diameter water main serves as the tank's common inlet/outlet pipe. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment is located at the site in a separate building. The Farwest Drive Tank controls the 114th Street and Old Military Road Pump Station and one pump at the Hemlock Hill Pump Station. In 2016, the Farwest Drive Tank was retrofitted to strengthen the structural bracing members. Flexible seismic expansion joints were also added to the tank piping.

RH2 performed a visual inspection of the tank on September 25, 2017, and found some areas of coating failure, particularly at the elevated portions of the tank. Coatings have delaminated and flaked off in multiple places. The cellular antennae at the roof of the tank are supported from magnetic plates, which provide adequate support without imposing significant loads onto the tank roof. However, the presence of magnetic plates will require phased recoating of the tank and associated additional cost, time, and administrative effort/coordination when the tank is recoated. The tank interior appears to be in overall good condition. The interior coatings show some staining above the water line and slight corrosion at the plate joints. RH2 recommends that the tank exterior be spot cleaned and repaired. A full exterior recoat is recommended following the seismic improvements. See the **Capital Improvement and Maintenance Planning** section of this report for more details on the recommended timing of maintenance and estimated costs.

Farwest Drive Tank



Tank Exterior Coatings



Magnetic Cellular Supports



Brace Connection Corrosion



Interior Coatings



Corrosion at Interior Ladder

Sargent Engineers analyzed the Farwest tank based on the upcoming 2018 code level seismic forces and found that the tank columns, cross bracing, and struts are all adequate under the pending code changes. However, the column anchorage and foundation sizes are inadequate and will require modifications to meet the upcoming code level seismic forces.

It is estimated that the following design modifications will be required to bring the reservoir into compliance with the upcoming seismic code based on the latest analysis.

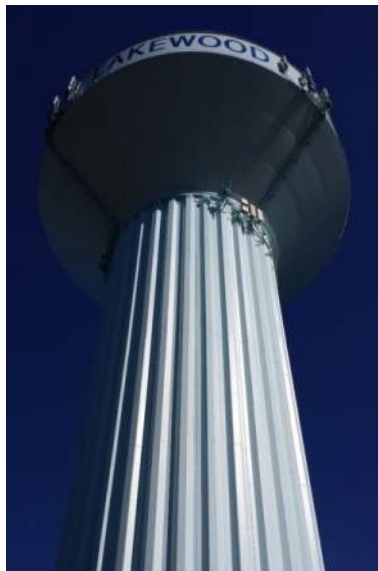
- Add anchor bolts to the base of each column.
- Expand the concrete foundations to reduce the soil bearing pressures.

The above modifications will cost approximately \$720,000 to construct. Additional miscellaneous spot repairs and maintenance will cost approximately \$13,000. See the **Capital Improvement and Maintenance Planning** section of this report for more detailed information regarding the improvement costs. Interior and exterior recoating is recommended soon but is not needed with the seismic improvements; the recommended recoating date is included in the improvement schedule.

104th and Bridgeport Way 404 Zone 0.5 MG Tank

The 104th and Bridgeport Way Tank is located on a fenced site off a paved urban road. The hydropillar style tank shares the site with the F-2 Well. The tank's site is large with ample open space. The 64-foot diameter, 140-foot tall steel tank was constructed in 1972, and provides 500,000 gallons of storage for the 404 Zone. A single 12-inch-diameter water main serves as the tank's common inlet/outlet pipe. The tank is anchored for seismic events per 1972 standards. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment is located at the site in a separate building with the F-2 Well. The space below the elevated storage area is used for storing supplies. There is no exterior ladder for this tank.

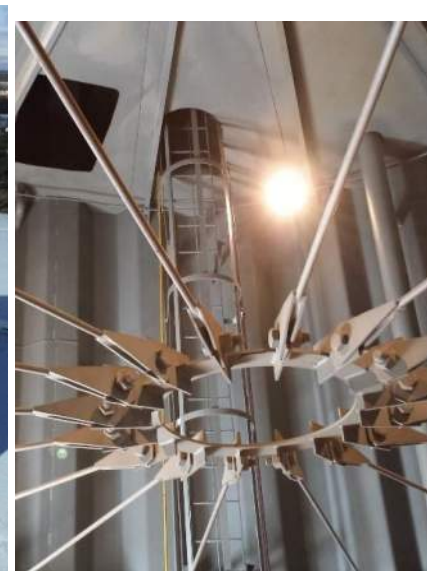
104th and Bridgeport Way Tank



Exterior Hydropillar



Corrosion at Access



Spider Rod Bracing

The tank underwent water quality improvements in 2002 that included separation of the inlet and outlet piping within the tank. Improvements also included installation of a real-time chlorine analyzer and sampling lines for measuring chlorine residual at different heights within the tank. The analyzer is connected to the District's telemetry system, enabling chlorine levels to be monitored remotely at the District office. The tank's interior and exterior coatings were last inspected in 1999. The interior coating was in good condition at that time, and it was recommended that the interior coating be inspected again in 2004. The exterior was last recoated in approximately 2004. The 104th and Bridgeport Way Tank occasionally controls the F-2 Well.

In 2016, seismic adapters were added to the mechanical piping at the base of the tank.

RH2 visually inspected the tank exterior to confirm the conditions had not changed since previous retrofit work. The exterior coatings appear to remain in excellent condition. The interior of the hydropillar base also appears to be in overall excellent condition. The tank interior was not inspected due to it not being accessible. According to the District's recent inspections, the interior of the tank is showing significant areas of corrosion and should be recoated soon. RH2 recommends that the tank interior be recoated as part of the seismic rehabilitation.

Sargent Engineers analyzed the tank for the upcoming 2018 code level seismic forces and found that the pedestal anchorage and foundation size appear to be adequate. However, the fluted pedestal is inadequate in its current configuration.

It is estimated that the following design modifications will be required to bring the hydropillar into compliance with the upcoming seismic code based on the latest analysis.

- Add spider rod bracing to the interior of the pedestal to strengthen the compressive capacity of the fluted pedestal.

The above retrofit items will cost approximately \$500,000 to construct.

Based on the reported condition of the tank interior, it is recommended it be recoated within the next 5 years. It is estimated that an interior recoat and cleaning will cost approximately \$313,000. The tank's exterior recoating is recommended soon but is not needed with the seismic improvements; the recommended exterior recoating date is included in the improvement schedule.

Nyanza Tank

The Nyanza Tank was evaluated in 2012. It was constructed in 1952, is seismically vulnerable, and undersized for the current need in the area it serves. The District has scheduled its replacement rather than retrofit it. This tank is critical to the operation of the District's water system: it controls operation of seven of the District's wells.

Nyanza Tank



Exterior

Steilacoom Boulevard Reservoir

The Steilacoom Boulevard Reservoir is a 3.45 MG standpipe reservoir that was constructed in 1986. The documents provided indicate that the reservoir was designed to Section 14 (formally Appendix C) of AWWA D100. The tank is 65 feet in diameter and 139 feet 6 inches tall, with a dome roof. It rests on a solid mat foundation that is 73 feet in diameter and 4 feet thick. The reservoir is anchored to the foundation with 3-inch-diameter bolts spaced at 1 foot 8 inches on center.

Steilacoom Boulevard Reservoir



Exterior Access



Exterior Anchors and Piping

RH2 inspected the tank in 2012 and 2017. RH2 recommends the tank interior be recoated with the seismic improvements. The exterior of the tank has some staining and moss in areas near the bottom of the shell, however it appears to be in overall good condition. Exterior cleaning and spot repairs are recommended as part of the improvements as well.

In 2015, RH2 designed a retrofit solution for the Steilacoom tank based on the 2012 seismic analysis (**Appendix F**). The design included a new, above-grade slab foundation 88 feet in diameter and 6 feet thick to reduce soil bearing pressures below allowable stresses. To address the tank uplift issues, the design included one hundred and ten (110) 3-inch-diameter anchor bolts embedded in the proposed foundation. The design also included access, site, and mechanical modifications.

The updated seismic analysis shows that the proposed 2015 reservoir design has a factor of safety of 1.9 against overturning with the current design. The proposed 3-inch anchor bolts would take a tensile load of approximately 265,000 pounds under code-prescribed seismic

forces. The seismic overturning forces produce a maximum soil bearing pressure of approximately 14,468 pounds per square foot (psf), which exceeds the allowable bearing pressures by less than 4 percent. The compressive stresses in the shell due to seismic forces reach 12,227 pounds per square inch (psi), which exceeds the allowable buckling stress by about 37 percent. The maximum hoop tensile stress in the reservoir shell is 29,283 psi at the eleventh shell course, which is approximately 14 percent over the allowable tensile stress, although still well below shell yield stress.

The sloshing wave height during a seismic event is expected to reach over 4.9 feet. This size of wave would likely damage the roof plate of the tank and possibly tear the weld at the roof-shell connection. Although some water may be lost out of the top of the tank, this would not be considered a catastrophic failure of the tank.

RH2 estimates that the following design modifications will be required to bring the reservoir into compliance with the upcoming seismic code based on the latest analysis.

- Increase the designed anchor bolt size from 3-inch to 3½-inch diameter.
- Add vertical shell stiffeners at the bottom seven courses to address shell buckling.
- Extend the proposed foundation diameter from 88 feet to 90 feet to reduce soil bearing pressures.

It is estimated that the above retrofit will cost approximately \$1,380,000 and it is recommended the interior recoating be accomplished at the same time at an estimated cost of \$659,000. In 2016 the District applied for \$1.2 million in FEMA funding for seismic improvements for this tank. That application is currently going through the FEMA review and ranking process. FEMA has communicated to the District that the project will likely be funded but has been unable to identify when.

The Steilacoom tank's exterior recoating is recommended to be done soon but is not needed with the seismic improvements; its recommended recoating date is included in the improvement schedule. Some exterior spot recoating associated with the seismic improvements is included in the cost estimate.

Washington Boulevard Reservoir

The Washington Boulevard Reservoir is a 3.7 MG standpipe constructed in 1986. The plate thicknesses provided by the District indicate that an increased allowable stress was used for the shell, and the reservoir was designed to Section 14 (formally Appendix C) of AWWA D100. The reservoir is 90 feet in diameter and 80 feet tall. It rests on a ringwall foundation 4 feet wide and 6 feet deep. The shell thicknesses provided by the District vary from 7/8 inch at the base to 1/4 inch at the top. The reservoir is anchored to the foundation with 3-inch wide by 7/8-inch thick anchor straps spaced 4.7 feet apart.

RH2 inspected the tank exterior and a portion of the interior in September of 2017. The exterior of the tank shows significant staining and organic growth in many areas around the tank due to the proximity of trees on the site. The interior of the tank also shows staining above the water line and minor areas of corrosion at the roof plate and support joints. Despite the staining, both the interior and exterior coatings are in overall fair condition and show minimal signs of failure and corrosion. RH2 recommends that the tank be cleaned and pressure washed as soon as feasible and then proceed with a full recoat following the seismic retrofit. See the **Capital**

Improvement and Maintenance Planning section of this report for more details on the recommended timing of maintenance and estimated costs.

Washington Boulevard Reservoir



Exterior Coatings



Interior Coatings

The analysis shows that the reservoir has a factor of safety of 5.3 against overturning with the current configuration. The existing anchor straps take a tensile load of approximately 167,000 pounds under code-prescribed seismic forces. Based on the assumed grade of steel used, the tensile load on the straps would exceed the yield stress by approximately 77 percent during a code-level seismic event. The seismic overturning forces create a maximum soil bearing pressure of approximately 13,727 psf, which exceeds the allowable bearing pressures by 60 percent. The compressive stress in the shell due to seismic forces reaches only 3,740 psi, which is below the critical buckling stress. The maximum hoop tensile stress in the reservoir shell is 29,900 psi, which is below the allowable tensile stress of the shell.

The sloshing wave height during a seismic event is expected to reach over 5.8 feet. This size of wave would likely damage the roof plate of the tank and possibly tear the weld at the roof-shell connection. Although some water may be lost out of the top of the tank, this would not be considered a catastrophic failure of the tank.

RH2 estimates that the following modifications will be required to bring the reservoir into compliance with the current code based on the preceding assumptions.

- Install 108 anchor bolts approximately 2 inches in diameter to resist uplift.
- Extend the foundation ringwall outer diameter by 6 feet to reduce soil bearing pressures.

It is estimated that the above retrofit will cost approximately \$690,000. Additional maintenance cleaning is estimated to cost approximately \$13,000. Interior and exterior recoating is

recommended soon but is not needed with the seismic improvements; its recommended recoating date is included in the improvement schedule.

American Lake Gardens Reservoir

The American Lake Gardens Reservoir is a 3.5 MG standpipe constructed in 1987. The plate thicknesses provided by the District indicate that an increased allowable stress was used for the shell, and the reservoir was designed to Section 14 (formally Appendix C) of AWWA D100. The reservoir is 90 feet in diameter and 76 feet tall. It rests on a ringwall foundation 4 feet wide and 4 feet deep. The shell thicknesses vary from $\frac{3}{4}$ inch at the base to $\frac{1}{4}$ inch at the top. The reservoir is anchored to the foundation with 3-inch wide by $\frac{3}{4}$ -inch thick anchor straps spaced 3.9 feet on center. The tank's interior and exterior were re-coated in 2016, and the overall condition of the tank appears to be excellent.

American Lake Gardens Reservoir



Exterior

The analysis shows that the reservoir has a factor of safety of 6.0 against overturning with the current configuration. The existing anchor straps receive a tensile load of approximately 118,000 pounds under code-prescribed seismic forces. Based on the assumed grade of steel used, the tensile load on the straps would exceed the yield stress by approximately 46 percent during a code-level seismic event. The seismic overturning forces create a maximum soil bearing pressure of approximately 11,270 psf, which exceeds the allowable bearing pressures by 88 percent. The compressive stress at the base of the shell due to seismic forces reaches 3,760 psi, which is slightly above the critical buckling stress of 3,552 psi. The maximum hoop tensile stress in the reservoir shell is 28,600 psi, which is below the allowable tensile stress.

The sloshing wave height during a seismic event is expected to reach over 5.5 feet. This size of wave would likely damage the roof plate of the tank and possibly tear the weld at the roof-shell connection. Although some water may be lost out of the top of the tank, this would not be considered a catastrophic failure of the tank.

RH2 estimates that the following modifications will be required to bring the reservoir into compliance with the current code. Since the compressive stresses are only 6 percent over allowable stresses at the base of the shell, RH2 recommends that the new anchor bolt chairs be used to remedy the shell buckling concerns.

- Install 92 anchor bolts that are 2 inches in diameter to resist uplift.
- Extend the foundation ringwall outer diameter by 3 feet (from an outside diameter of 94 feet to an outside diameter of 97 feet) to reduce soil bearing pressures.

It is estimated that the cost of the seismic retrofit would be approximately \$620,000. Additional maintenance is estimated to cost approximately \$13,000. A more detailed explanation of the costs is presented in the **Capital Improvement and Maintenance Planning** section of this report. The tank also is scheduled for regular cleaning and maintenance.

Forster Reservoir

The Forster Reservoir is located in a residential area within the north portion of the District's system. The 3.5 MG reservoir shares the large fenced site with the Forster Pump Station. The reservoir has an overflow elevation of 240 feet and provides pumped storage to the 404 Zone using the Forster Pump Station. The 140-foot diameter, 30-foot tall, post-tensioned concrete reservoir was constructed in 1990. A single 12-inch-diameter water main serves as the reservoir's common inlet/outlet pipe. The reservoir's altitude valve is located within a below-grade concrete vault. Telemetry equipment is located at the site in the Forster Pump Station building. The pump station is activated by the level of the Oakbrook or Philips tanks (previously known as Western State). The pumps shut off upon reaching a low water level setpoint in the Forster Reservoir.

Forster Reservoir



Exterior Dampness



Exterior Staining and Dampness

RH2 inspected the Forster reservoir on September 6, 2017 and found that the concrete roof and shell appear to be in overall good condition with only minor signs of cracking and efflorescence. Some staining was observed at the base of the tank near the ground level. The roof had a considerable amount of moss near the vent and conduit. Four areas showed signs of dampness on the exterior of the concrete panels near the top of the wall panels, indicating minimal migration of water through the prestressed panels.

The tank was constructed using 8-inch thick precast concrete panels set radially around the tank and separated by precast concrete pilasters. The panels contained 19 horizontal prestressing ducts, each containing 7 prestressing strands. Each panel was prestressed vertically at casting with 22 strands. The panels interlock with the foundation using a shear key cast with each panel. Each pilaster was anchored to the foundation with two No. 8 steel reinforcing bars.

The seismic analysis found that the horizontal prestressing strands were inadequate to resist code-level seismic forces in 4 of the 19 ducts (1, 3, 4, and 6). This results in the strands of duct No. 1 being stressed beyond allowable by approximately 34 percent. The strands in duct No. 1 could be stressed to the point of failure during a code-level earthquake. The remaining ducts have sufficient capacity to avoid failure, although some of the lower strands would be stressed beyond the allowable code stresses. If duct No. 1 were to fail, it is anticipated that the remaining ducts would take the additional load, which would likely cause cracking and spalling at the base.

The vertical prestressing strands were found to be adequate. The shear key at the base of the wall was found to be stressed beyond its capacity by approximately 34 percent. The roof shear connectors were also found to be stressed beyond allowable stresses by approximately 71 percent; however, the shear stress is less than the yield strength of the posts and would likely not fail during a code-level earthquake.

It is estimated that the following design modifications will be required to bring the reservoir into compliance with the upcoming seismic code based on the latest analysis.

- Place a concrete curb around the interior of the reservoir to transfer the shear loads from the walls to the foundation.

It is also recommended that the tank be cleaned via pressure washing, and the more prominent cracks be epoxy injected.

The above retrofit is estimated to cost approximately \$510,000 to construct. The cleaning and epoxy injections are estimated to cost \$61,000. See the **Capital Improvement and Maintenance Planning** section of this report for more details on the recommended timing of maintenance and estimated costs.

It is important to note that there is no way to retrofit the horizontal prestressing ducts with additional prestressing strands or the shear connectors from the roof to the walls. These items are expected to be damaged during a code-level earthquake.

The other retrofits mentioned should be constructed to assist in making the water inside the tank available following an earthquake, and to replace the tank at a later date, as identified in the replacement schedule.

Oakbrook Reservoir

The Oakbrook Reservoir is located in a residential area near the northwest corner of the District's system. The elevated tank is surrounded by trees on a large fenced site with the

O-2 and O-3 Wells. The 50-foot diameter, 179-foot tall steel tank was constructed in 1964 and provides 500,000 gallons of storage for the 404 Zone. A single 12-inch-diameter water main serves as the tank's common inlet/outlet pipe. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment is located at the site in a separate building with the O-2 Well and chlorine generation equipment. The Oakbrook Reservoir controls the O-2, O-3, I-1, N-1, and N-2 Wells, and the Forster Pump Station.

Oakbrook Reservoir



Exterior

Structural damage repairs and seismic improvements were completed in 2002 following the Nisqually Earthquake.

In 2016, the Oakbrook tank was retrofitted to strengthen the structural bracing and increase the size of the foundation below the column support legs. Vertical stiffeners were also added to the center column to reduce compressive buckling stresses.

RH2 inspected the tank exterior in September 2017. The Oakbrook tank has the original lead-based coatings on the interior and exterior and shows signs of coating delamination in multiple locations. It is recommended that the tank interior and exterior be recoated at an estimated cost of approximately \$529,000, including lead abatement and tenting. Additional maintenance is estimated to cost approximately \$13,000.

Sargent Engineers analyzed the Oakbrook tank for the upcoming 2018 code level seismic forces and found that no additional structural modifications are required to meet the current and pending codes.

Hemlock No. 2

The Hemlock No. 2 513 Zone 0.5 MG Elevated Tank was constructed in 2006. The tank is located on the site with the two other Hemlock tanks, the L-2 and L-3 Wells, and the Hemlock Hill Pump Station. The tank is a 57-foot diameter, 140-foot tall hydropillar style elevated steel

tank containing 500,000 gallons of water storage for the 513 Zone. It operates in conjunction with the Hemlock No. 1 100,000-gallon elevated tank.

Hemlock No. 2



Hydropillar Exterior

RH2 analyzed the hydropillar and found that the existing foundation and anchorage configuration are adequate for the upcoming code-level seismic forces. Based on these findings, no structural modifications are recommended at this time. It is estimated that miscellaneous spot cleanings may be warranted and would cost approximately \$13,000 to complete.

Dunbar Reservoir

The Dunbar Reservoir is located on a large fenced site on Hemlock Hill, near the intersection of Crestwood Drive and Hemlock Road. The tank shares the site with the Hemlock No. 1 Elevated Tank (100,000 gallons), the Hemlock No. 2 Tank (500,000 gallons), the L-2 and L-3 Wells, and the Hemlock Hill Pump Station. The tank provides 1.3 MG of water storage for the 404 Zone. The 90-foot diameter, 28-foot tall concrete tank was constructed in 1981 and provides approximately 56,522 gallons of storage per foot height. A single 12-inch-diameter water main serves as the tank's common inlet/outlet pipe. The tank is not anchored for seismic events. The tank's altitude valve is located within a below-grade concrete vault. Telemetry equipment is

located in a separate building on the site. There is no exterior ladder for this tank. The Dunbar tank controls the L-2 Well.

RH2 inspected the reservoir in September 2017 and found the tank to be in overall good condition. Some signs of efflorescence and minor staining was observed around the tank exterior. A few small cracks were noted, but very minimal signs of dampness that would indicate water migrating through the wall. The roof had considerable moss growth particularly around the electrical conduit. Large cracks were noticed running throughout the roof slab that appear to have been ground out and epoxy injected some time in the past. It is recommended that the tank be cleaned and pressure washed. Some crack injection will likely be warranted in the future.

Dunbar Reservoir



Exterior Staining



Moss on Roof

The tank was constructed using 8-inch-thick precast concrete panels set radially around the tank and separated by precast concrete pilasters. The panels contained 12 horizontal prestressing ducts, each containing 8 prestressing strands. Each panel was prestressed vertically at casting with 22 strands. The panels interlock with the foundation using a shear key cast with each panel. Each pilaster was anchored to the foundation with two No. 8 steel reinforcing bars.

The seismic analysis found that the existing horizontal prestressing strands are adequate to resist the hydrostatic and seismic forces. The eight strands in each duct are well below the allowable stresses as prescribed in the pending code update. The vertical prestressing strands in each panel were found to be adequate to maintain the code-required compressive concrete stresses. The shear key at the base of the wall was found to be inadequate to transfer the seismic forces into the foundation. However, the No. 8 reinforcing anchors at each precast pilaster are adequate to transfer the full base shear. The roof shear connectors are estimated to reach a shear stress of

approximately 26,000 psi, which exceeds allowable stresses by approximately 56 percent; however, the shear stress is well below the yield strength of the posts and would likely not fail during a code-level earthquake.

It is important to note that there is no way to retrofit the shear connectors from the roof to the walls. The posts are expected to be damaged during a code-level earthquake but not to fail.

Based on the findings of the seismic analysis, it is recommended that no structural modifications be implemented at this time.

Future maintenance for the Dunbar tank will likely include some epoxy injection and cleaning. at a cost of approximately \$61,000 to complete.

CELLULAR IMPACT ANALYSIS

Cellular communications equipment was not found to be posing any undue loads on the tanks or their accessories; however, cellular equipment will have an impact on the cost and scheduling of tank recoating. It is recommended that the District allow extra time and administrative effort for coordination with the cellular companies, and additional time and construction costs for phased exterior recoating, as recoating will likely need to occur with the cellular equipment in operation with a series of temporary relocations as painting proceeds. See the **Farwest Drive 490 Zone 0.5 MG Elevated Tank** analysis results for further information on the magnetically attached cellular equipment on that tank.

RECOMMENDED TANK REHABILITATION SUMMARY

Table 6 summarizes the recommended rehabilitation for the tanks and their associated estimated costs⁹.

Table 6
Recommended Tank Rehabilitation

Tank	Recoating		Maintenance	Seismic Retrofit	Replacement	Reservoir Total Cost
	Interior	Interior & Exterior				
Farwest Drive			\$13,000	\$720,000		\$ 733,000
104th & Bridgeport	\$300,000		\$13,000	\$500,000		\$ 813,000
Nyanza					\$2,210,000	\$ 2,210,000
Steilacoom Boulevard	\$646,000		\$13,000	\$1,380,000		\$ 2,039,000
Washington Boulevard			\$13,000	\$690,000		\$ 703,000
American Lake Gardens			\$13,000	\$620,000		\$ 633,000
Forster			\$61,000	\$510,000		\$ 571,000
Oakbrook		\$529,000	\$13,000	\$0		\$ 542,000
Hemlock No. 2			\$13,000	\$0		\$ 13,000
Dunbar			\$61,000	\$0		\$ 61,000
Subtotal	\$1,475,000		\$213,000	\$4,420,000	\$2,210,000	
Total (2017 dollars)						\$ 8,318,000

⁹ Maintenance and seismic retrofit include spot recoating only unless otherwise indicated. Estimated cost for one regular maintenance included in table. Maintenance costs will vary.

CAPITAL IMPROVEMENT AND MAINTENANCE PLANNING

RH2 has provided two options to accomplish the \$8.3 million in proposed seismic improvements. Option A, the more aggressive option, shows all seismic improvements being scheduled over the 6-year period from 2019 through 2025. Option B shows the improvements scheduled in phases over the 10 years from 2019 through 2029. Some non-seismic improvements for both options are scheduled beyond those dates. **Table 7** shows the year each tank improvement occurs for both options. The improvements in the orange section of the table are for proposed non-seismic improvements.

Table 7
Tank Improvements – Options A and B

Reservoir	Task	Year	
		Option A	Option B
Farwest Drive	Seismic Improvements	2019	2019
	Spot Cleaning		
104th & Bridgeport	Seismic Improvements	2020	2020
	Interior Recoat		
	Spot Cleaning		
Nyanza	Replacement	2021	2021
Steilacoom Boulevard	Seismic Improvements	2022	2024
	Interior Recoat		
	Spot Cleaning		
Washington Boulevard	Seismic Improvements	2023	2027
	Spot Cleaning		
American Lake Gardens	Seismic Improvements	2024	2028
	Spot Cleaning		
Forster	Seismic Improvements	2025	2029
	Concrete Maintenance		
Oakbrook	Full Recoat	2026	2030
	Spot Cleaning		
Hemlock No. 2	Spot Cleaning	2027	2031
Dunbar	Spot Cleaning	2027	2031

Phase Legend: 1: purple, 2: green, 3: blue, and 4: orange (non-seismic improvements)

There are risks affiliated with delaying tank rehabilitation. Should an earthquake occur prior to construction of the seismic retrofits, there is the potential for tank loss. Completed seismic improvements will provide storage reliability. In the event of a code-level earthquake, **Figure 10** identifies the storage available each year based upon retrofits completed. Seismic improvements alone (not including recoating or tank maintenance) are estimated at \$4.4 million and would be expended over the next 6 to 10 years as illustrated in the above options. In contrast, the cost to replace those seismically vulnerable tanks would be approximately \$26.5 million, as shown in **Table 8**. Should a code-level earthquake occur, and the vulnerable tanks are lost, their replacement costs are expected to be significantly higher than the costs in **Table 8** due to labor and material shortages resulting from competing needs of other nearby water systems for their tank replacement needs.

Figure 10
Post-earthquake Storage

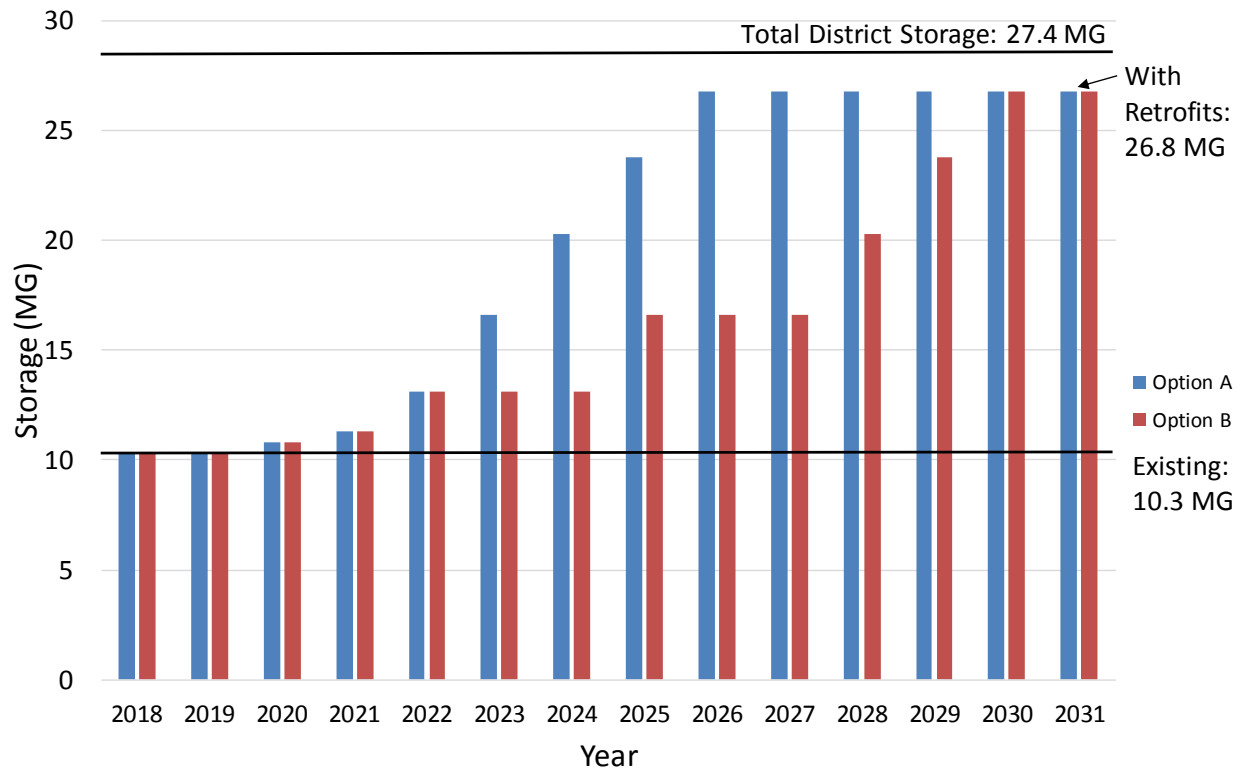


Table 8
Tank Replacement Year and Cost

Tank	Tank Replacement	
	Year	Project Cost (2017\$)
Farwest Drive	2036	\$ 3,240,000
104th & Bridgeport	2037	\$ 3,190,000
Nyanza Hill	2021	\$ 2,210,000
Steilacoom Boulevard	2046	\$ 5,190,000
Washington Boulevard	2049	\$ 4,640,000
American Lake Gardens	2062	\$ 3,970,000
Forster	2065	\$ 4,110,000
Replacement* Total (2017\$)		\$ 26,550,000
Oakbrook	2039	\$ 3,570,000
Hemlock No. 2	2081	\$ 5,240,000
Dunbar	2056	\$ 2,420,000
Non-Seismic Rehab Total		\$ 11,230,000
Total (2017\$)		\$ 37,780,000

* Replacement of seismically-deficient tanks

In addition to seismic retrofits, RH2 is recommending a maintenance program that will help maximize and extend the anticipated service life of the tanks. While each tank's estimated useful service life was 75 years at the time the tank was constructed, current tank condition dictates the

recommended replacement year. RH2 investigated current conditions and adjusted the target replacement year as shown in **Table 3**. Lack of maintenance can lead to corrosion or cracking, which can reduce the tank’s life by an estimated 20 to 30 percent. To maximize the tank’s service life, **Table 5** shows the recommended maintenance and frequency for steel and concrete tanks.

For more details, **Appendix A** contains a summary of each tank’s seismic retrofits, required maintenance, and anticipated service life. The affiliated costs with each tank’s task are in 2017 dollars and have been adjusted to project future costs based on when the seismic improvements, maintenance tasks, and eventual replacements occur.

It is anticipated that the District will utilize the currently planned 5-year budget shown in **Table 9** to continue the short-term funding of the recommended tank tasks.

Table 9
Current 5-year Tank Capital Improvement Plan Budget

Year	Planned Budget
2018	\$ 247,500
2019	\$ 590,000
2020	\$ 2,110,000
2021	\$ 1,660,000
2022	\$ 1,660,000

As a starting point for this analysis, it is assumed that beyond 2022, the District will budget \$1.5 million each year for the recommended rehabilitation.

Appendix A shows a projected account balance based on estimated construction costs and current budget. For a graphical representation of the different account balance for both options, see **Figures 11** and **12**.

RH2 is providing the District with a capital improvement plan (CIP) spreadsheet in conjunction with this report. **Appendix A** is a summary of each tab within the spreadsheet. Within select tabs, the user can adjust when the required work (seismic improvements, maintenance, or replacement) should occur, thus recreating Options A and B. The spreadsheet adjusts anticipated costs based on the year the tank work is planned to aid in future CIP budget planning.

Figure 11
 11-Year Account Balance – Option A

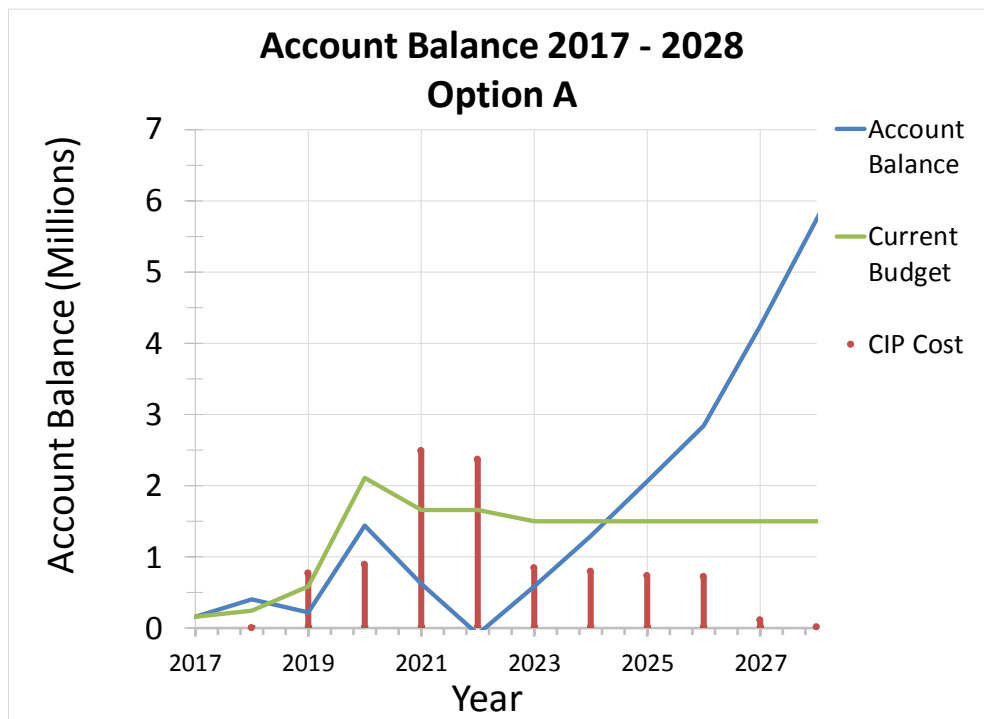
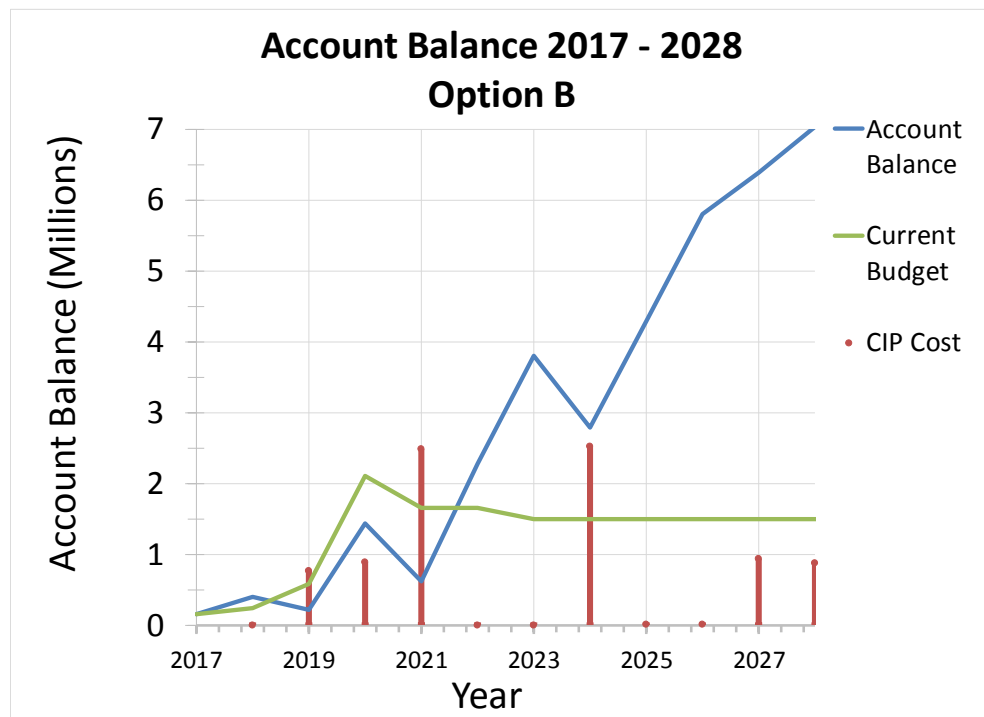


Figure 12
 11-Year Account Balance – Option B



APPENDICES

APPENDIX A
CAPITAL IMPROVEMENT AND MAINTENANCE PLANNING

Lakewood Water District
 2017 Tank Analysis
 Summary & Table of Contents

Planning Year	2017
1st year of CIP	2019

Tank	Address	Size (MG)	Year Constructed	Tank Age (yrs)	Tank Material	Tank Style	Seismic Improvements			Replacement		
							Year	Seismic Retrofit	Maintenance	Cost (\$2017)	Year	Cost (\$2017)
Farwest Drive	10001 Farwest Dr. SW	0.5	1969	48	Steel	Elevated-multi column	2019	Anchors, Footing Extension	Int. & Ext. Recoat	\$ 733,000	2036	\$ 3,240,000
104th & Bridgeport	10424 Bridgeport Way SW	0.5	1972	45	Steel	Hydropillar	2020	Spider Rod Bracing	Interior Recoat	\$ 813,000	2037	\$ 3,190,000
Nyanza	6426 127th Street S.	0.4	1952	65	Steel	Standpipe	2021	Replace Tank	Replace Tank		2021	\$ 2,210,000
Steilacoom Boulevard	5000 Steilacoom Blvd SW	3.5	1986	31	Steel	Standpipe	2022	Anchors, Footing Extension	Int. & Ext. Recoat	\$ 2,039,000	2046	\$ 5,190,000
Washington Boulevard	8019 Washington Blvd SW	3.7	1986	31	Steel	Standpipe	2023	Anchors, Footing Extension	Int. & Ext. Recoat	\$ 703,000	2049	\$ 4,640,000
American Lake Gardens	6415 150th St SW	3.5	1987	30	Steel	Standpipe	2024	Anchors, Footing Extension	Reg. Cleaning/Maint	\$ 633,000	2062	\$ 3,970,000
Forster	6325 72nd St Ct SW	3.0	1990	27	Concrete	Pre-stressed	2025	Interior Shear Curb	Reg. Cleaning/Maint	\$ 571,000	2065	\$ 4,110,000
Oakbrook	9305 Golf Course Rd SW	0.5	1964	53	Steel	Elevated-multi column	2026	Meets Code	Int. & Ext. Recoat	\$ 542,000	2039	\$ 3,570,000
Hemlock No. 2	10001 Farwest Dr. SW	0.5	2006	11	Steel	Hydropillar	2027	Meets Code	Reg. Cleaning/Maint	\$ 13,000	2081	\$ 5,240,000
Dunbar	10001 Farwest Dr. SW	1.3	1981	36	Concrete	Pre-stressed	2027	Roof Connections	Leak Repair	\$ 61,000	2056	\$ 2,420,000

Table of Contents					
Tab Title	Functionality	Supporting Tabs			
Primary Inputs & Summary	Seismic Improvements Summary	Provides a summary of tank seismic improvements and affiliated costs.	Seismic and Replace Cost summary	Maintenance Tasks and Cost Summary	
	Tank Data WS	Summary of each tank's information (address, age, size, and material). Life expectancy and potential for service life extension with maintenance improvements based on each tank's current conditions. Tank are also ranked based on ranking criteria.	Ranking Criteria		
	Seismic and Replace CIP	Projecting Seismic and Replacement future costs based on current conditions.	Ranking Criteria	Tank Data WS	Seismic and Replace Cost Summary
	Comprehensive Summary	Summary of all tank seismic improvements, continued maintenance, and expected replacement.	Tank Data WS	Seismic and Replace Cost Summary	Maintenance Tasks and Cost Summary
Schedule & Finance	Calendar	Comprehensive timeline and table of all CIP tasks.	Comprehensive Summary	Table-Full Schedule	
	Account Balance	Account status based on CIP Cost and projected budget contributions. Graph showing CIP Cost, Yearly Budget, and Account Balance.	Seismic and Replace CIP	Maintenance Tasks and Cost Summary	
Rationale	Ranking Criteria	Ranking tanks via weighted point system in the following categories: Hydraulic Importance, Tank Capacity, Redundancy, Impacts Due to Structural Failure, and Tank Benefit Area	Used in Tank Data WS	Used in Seismic and Replace CIP	
	Maintenance Periods	Frequencies of all maintenance tasks needed for steel and concrete reservoirs.	Used in Maintenance Tasks and Cost Summary		
Summaries	Seismic and Replace Cost Summary	Summary of Tank Seismic Improvements and Replacement Costs.	Seismic and Replace CIP	Comprehensive Summary	
	Maintenance Tasks and Cost Summary	Summary of all maintenance tasks and affiliated cost. Projected maintenance improvements over the tank service life.	Maintenance Periods	Used in Account Balance	Used in Comprehensive Summary
	Replacement Summary	Summary table of seismic improvements.			
	Seismic & Maintenance Cost Summary	Summary table of seismic improvements.			
Graphs and Figures	Table- Full schedule	Comprehensive table with all CIP tasks.	Used in Calendar		
	Storage Capacity	A graph and table showing the two options and their storage capacity in the event an Earthquake occurred.			
	Account - 10 year Graph	Graph of account balance over 10 years			
	Account - 40 year Graph	Graph of account balance over 40 years			

Lakewood Water District
 2017 Tank Analysis
 Seismic Improvements Summary

Planning Year	2017
Year of CIP	2019
Number of Years to Offset Start	
Phase 1	0
Phase 2	0
Phase 3	0
Non Seismic Improvements	0

Account Balance:	
Status:	Not Good <-- "Not Good" if account becomes negative
Year :	2022 <-- Year account becomes negative
Balance:	-\$76,169 <-- Negative account balance from above year

Tank	Address	Size (MG)	Year Constructed	Tank Age (yrs)	Tank Material	Tank Style	Required Retrofit To Meet Current Design Seismic Loads	Seismic Retrofit	Coatings/ Maintenance	Seismic Improvements Year	Recoating		Maintenance	Seismic Retrofit	Replacement	Reservoir Total Cost
											Interior	Interior & Exterior				
Farwest Drive	10001 Farwest Dr. SW	0.5	1969	48	Steel	Elevated-multi column	Foundation extension and column anchor bolts	Anchors, Footing Extension	Int. & Ext. Recoat	2019			\$13,000	\$720,000		\$ 733,000
104th & Bridgeport	10424 Bridgeport Way SW	0.5	1972	45	Steel	Hydropillar	Additional bracing	Spider Rod Bracing	Interior Recoat	2020	\$300,000		\$13,000	\$500,000		\$ 813,000
Nyanza	6426 127th Street S.	0.4	1952	65	Steel		To be replaced	Replace Tank	Replace Tank	2021				\$2,210,000		\$ 2,210,000
Steilacoom Boulevard	5000 Steilacoom Blvd SW	3.5	1986	31	Steel	Standpipe	New foundation and anchor bolts	Anchors, Footing Extension	Int. & Ext. Recoat	2022	\$646,000		\$13,000	\$1,380,000		\$ 2,039,000
Washington Boulevard	8019 Washington Blvd SW	3.7	1986	31	Steel	Standpipe	Footing extension and anchor bolts	Anchors, Footing Extension	Int. & Ext. Recoat	2023			\$13,000	\$690,000		\$ 703,000
American Lake Gardens	6415 150th St SW	3.5	1987	30	Steel	Standpipe	Footing extension and anchor bolts	Anchors, Footing Extension	Reg. Cleaning/Maint	2024			\$13,000	\$620,000		\$ 633,000
Forster	6325 72nd St Ct SW	3.0	1990	27	Concrete	Pre-stressed	Exterior prestressing	Interior Shear Curb	Reg. Cleaning/Maint	2025			\$61,000	\$510,000		\$ 571,000
Oakbrook	9305 Golf Course Rd SW	0.5	1964	53	Steel	Elevated-multi column	None	Meets Code	Int. & Ext. Recoat	2026		\$529,000	\$13,000	\$0		\$ 542,000
Hemlock No. 2	10001 Farwest Dr. SW	0.5	2006	11	Steel	Hydropillar	None	Meets Code	Reg. Cleaning/Maint	2027			\$13,000	\$0		\$ 13,000
Dunbar	10001 Farwest Dr. SW	1.3	1981	36	Concrete	Pre-stressed	None	Roof Connections	Leak Repair	2027			\$61,000	\$0		\$ 61,000
Subtotal											\$1,475,000	\$213,000	\$4,420,000	\$2,210,000		
Total (2017 dollars)											\$ 8,318,000					

**Lakewood Water District
2017 Tank Analysis
Seismic and Replace CIP Planning**

Est Yearly Construction Cost Inflation 3.00%
First Year of CIP 2019

Tank ID	Tank	Tank Age (yrs)	Score	Rank	Life Expectancy Based on Current Conditions
FD	Farwest Drive	48	39	1	2036
104	104th & Bridgeport	45	36	4	2037
NH	Nyanza Hill	65	25	7	2027
SB	Steilacoom Boulevard	31	38	3	2046
WB	Washington Boulevard	31	27	5	2049
ALG	American Lake Gardens	30	17	9	2062
F	Forster	27	16	10	2065
O	Oakbrook	53	19	8	2039
H2	Hemlock No. 2	11	39	1	2081
D	Dunbar	36	27	5	2056

Seismic Improvements						
Improvements Required for Tank to Remain Operational after a Code-level Earthquake	Tank Seismic Improvement Costs (2017\$)	Number of Years Seismic Improvements Deferred	Seismic Improvements Date	Number of Years Until Seismic Improvements	Tank Seismic Improvement Project Costs (Future\$)	
Yes	\$ 720,000	0	2019	2	\$ 763,848	
Yes	\$ 500,000	0	2020	3	\$ 546,364	
No					\$ -	
Yes	\$ 1,380,000	0	2022	5	\$ 1,599,798	
Yes	\$ 690,000	0	2023	6	\$ 823,896	
Yes	\$ 620,000	0	2024	7	\$ 762,522	
Yes	\$ 510,000	0	2025	8	\$ 646,053	
No						
No						
No						
					\$ 4,420,000	\$ 5,142,480

Tank Replacement						
Tank	Life Expectancy After Improvements	Replace (x) Years Ahead of Life Expectancy	Tank Replacement Project Costs (2017\$)	Target Replacement Date	Number of Years Until Replacement	Tank Replacement Project Costs (Future\$)
Farwest Drive	2036	0	\$ 3,240,000	2036	19	\$ 5,681,360
104th & Bridgeport	2037	0	\$ 3,190,000	2037	20	\$ 5,761,495
Nyanza Hill	2027	6	\$ 2,210,000	2021	4	\$ 2,487,374
Steilacoom Boulevard	2046	0	\$ 5,190,000	2046	29	\$ 12,230,575
Washington Boulevard	2049	0	\$ 4,640,000	2049	32	\$ 11,948,384
American Lake Gardens	2062	0	\$ 3,970,000	2062	45	\$ 15,012,935
Forster	2065	0	\$ 4,110,000	2065	48	\$ 16,983,555
Oakbrook	2039	0	\$ 3,570,000	2039	22	\$ 6,840,489
Hemlock No. 2	2081	0	\$ 5,240,000	2081	64	\$ 34,746,708
Dunbar	2056	0	\$ 2,420,000	2056	39	\$ 7,664,205
					\$ 37,780,000	\$ 119,357,081

^--Input how many years before life expectancy to replace tanks

Lakewood Water District
2017 Tank Analysis
Comprehensive Task Summary Table

Legend	
Maintenance after replacement	
Check - relative to replacement date or Replacement	

Tank	Total Rounded Project Costs (2017\$)	Maintenance/Improvement Dates						
		Next Maint Improvement Date	2nd Maint Date	3rd Maint Date	4th Maint Date	5th Maint Date	6th Maint Date	7th Maint Date
Farwest Drive								
Seismic Improvements	\$ 720,000	2019						
Interior Top Coating	\$ 188,000					2051		
Exterior Top Coating	\$ 87,000					2051		
Interior Full Recoating	\$ 281,000							2066
Exterior Full Recoating	\$ 218,000							2066
Cleaning and Spot Repair	\$ 13,000	2019	2024	2029	2041	2046	2056	2061
Replacement	\$ 3,240,000	2036						
104th & Bridgeport								
Seismic Improvements	\$ 500,000	2020						
Interior Top Coating	\$ 200,000				2052			
Exterior Top Coating	\$ 203,000				2052			
Interior Full Recoating	\$ 300,000	2020						2067
Exterior Full Recoating	\$ 506,000							2067
Cleaning and Spot Repair	\$ 13,000	2020	2025	2042	2047	2057	2062	
Replacement	\$ 3,190,000	2037						
Nyanza Hill								
Replacement	\$ 2,210,000	2021						
Interior Top Coating	\$ 331,000		2036				2066	
Exterior Top Coating	\$ 255,000		2036				2066	
Interior Full Recoating	\$ 397,000				2051			
Exterior Full Recoating	\$ 307,000				2051			
Cleaning and Spot Repair	\$ 13,000	2026	2031	2041	2046	2056	2061	
Steilacoom Boulevard								
Seismic Improvements	\$ 1,380,000	2022						
Interior Top Coating	\$ 538,000		2032				2061	
Exterior Top Coating	\$ 398,000						2061	
Interior Full Recoating	\$ 646,000	2022						
Exterior Full Recoating	\$ 462,000		2032					
Cleaning and Spot Repair	\$ 13,000	2022	2027	2037	2051	2056	2066	
Replacement	\$ 5,190,000	2046						
Washington Boulevard								
Seismic Improvements	\$ 690,000	2023						
Interior Top Coating	\$ 515,000		2033				2064	
Exterior Top Coating	\$ 366,000		2033				2064	
Interior Full Recoating	\$ 618,000							
Exterior Full Recoating	\$ 445,000							
Cleaning and Spot Repair	\$ 13,000	2023	2028	2038		2054	2059	
Replacement	\$ 4,640,000	2049						
American Lake Gardens								
Seismic Improvements	\$ 620,000	2024						
Interior Top Coating	\$ 500,000		2034					
Exterior Top Coating	\$ 360,000		2034					
Interior Full Recoating	\$ 600,000				2049			
Exterior Full Recoating	\$ 430,000				2049			
Cleaning and Spot Repair	\$ 13,000	2024	2029	2039	2044	2054		
Replacement	\$ 3,970,000	2062						
Forster								
Seismic Improvements	\$ 510,000	2025						
Epoxy Injection	\$ 23,000	2025						
Concrete Surface Repair	\$ 38,000	2025						
Replacement	\$ 4,110,000	2065						
Oakbrook								
Interior Top Coating	\$ 204,000					2054		
Exterior Top Coating	\$ 89,000					2054		
Interior Full Recoating	\$ 306,000	2026						
Exterior Full Recoating	\$ 223,000	2026						
Cleaning and Spot Repair	\$ 13,000	2026	2031	2044	2049	2059	2064	
Replacement	\$ 3,570,000	2039						
Hemlock No. 2								
Interior Top Coating	\$ 188,000			2037				
Exterior Top Coating	\$ 208,000			2037				
Interior Full Recoating	\$ 226,000				2052			
Exterior Full Recoating	\$ 247,000				2052			
Cleaning and Spot Repair	\$ 13,000	2027	2032	2042	2047	2057	2062	
Replacement	\$ 5,240,000	2081						
Dunbar								
Epoxy Injection	\$ 23,000	2027						
Concrete Surface Repair	\$ 38,000	2027						
Replacement	\$ 2,420,000	2056						

**Lakewood Water District
2017 Tank Analysis
Tank CIP Account**

This sheet provides controls for the variables that affect the account balance. The items in orange are for your information on how certain features function. The planned yearly budget was provided below up until 2022, where then the Control Center provides planning options.

Control Center	
Planned Yearly Budget beyond 2023	\$ 1,500,000
Increase Amount	\$ -
Year to Increase	2023
Estimated Rate of Return on Account Assets	0.50%

Year	Planned Budget
2017	\$ 160,000
2018	\$ 247,500
2019	\$ 590,000
2020	\$ 2,110,000
2021	\$ 1,660,000
2022	\$ 1,660,000

Costs are projected to year of improvements

Tank Repair & Replacement Account									
Year	Years from Now	Planned Yearly Budget	Additional Yearly Budget	Return on Investment	Tank Seismic CIP	Tank Maintenance CIP	Tank Replacement CIP	Total CIP	Account Balance
2017		\$ 160,000	\$ -						\$ 160,000
2018	1	\$ 247,500	\$ -		\$ -	\$ -	\$ -	\$ -	\$ 407,500
2019	2	\$ 590,000	\$ -	\$ 2,038	\$ 763,848	\$ 13,792	\$ -	\$ 777,640	\$ 221,898
2020	3	\$ 2,110,000	\$ -	\$ 1,109	\$ 546,364	\$ 342,024	\$ -	\$ 888,387	\$ 1,444,620
2021	4	\$ 1,660,000	\$ -	\$ 7,223	\$ -	\$ -	\$ 2,487,374	\$ 2,487,374	\$ 624,469
2022	5	\$ 1,660,000	\$ -	\$ 3,122	\$ 1,599,798	\$ 763,962	\$ -	\$ 2,363,760	\$ (76,169)
2023	6	\$ 1,500,000	\$ -	\$ -	\$ 823,896	\$ 15,523	\$ -	\$ 839,419	\$ 584,413
2024	7	\$ 1,500,000	\$ -	\$ 2,922	\$ 762,522	\$ 31,977	\$ -	\$ 794,499	\$ 1,292,836
2025	8	\$ 1,500,000	\$ -	\$ 6,464	\$ 646,053	\$ 93,741	\$ -	\$ 739,794	\$ 2,059,507
2026	9	\$ 1,500,000	\$ -	\$ 10,298	\$ -	\$ 724,149	\$ -	\$ 724,149	\$ 2,845,655
2027	10	\$ 1,500,000	\$ -	\$ 14,228	\$ -	\$ 116,921	\$ -	\$ 116,921	\$ 4,242,963
2028	11	\$ 1,500,000	\$ -	\$ 21,215	\$ -	\$ 17,995	\$ -	\$ 17,995	\$ 5,746,182
2029	12	\$ 1,500,000	\$ -	\$ 28,731	\$ -	\$ 37,070	\$ -	\$ 37,070	\$ 7,237,843
2030	13	\$ 1,500,000	\$ -	\$ 36,189	\$ -	\$ -	\$ -	\$ -	\$ 8,774,033
2031	14	\$ 1,500,000	\$ -	\$ 43,870	\$ -	\$ 39,327	\$ -	\$ 39,327	\$ 10,278,576
2032	15	\$ 1,500,000	\$ -	\$ 51,393	\$ -	\$ 1,578,221	\$ -	\$ 1,578,221	\$ 10,251,747
2033	16	\$ 1,500,000	\$ -	\$ 51,259	\$ -	\$ 1,413,746	\$ -	\$ 1,413,746	\$ 10,389,260
2034	17	\$ 1,500,000	\$ -	\$ 51,946	\$ -	\$ 1,406,573	\$ -	\$ 1,406,573	\$ 10,534,633
2035	18	\$ 1,500,000	\$ -	\$ 52,673	\$ -	\$ -	\$ -	\$ -	\$ 12,087,306
2036	19	\$ 1,500,000	\$ -	\$ 60,437	\$ -	\$ 1,027,555	\$ 5,681,360	\$ 6,708,914	\$ 6,938,828
2037	20	\$ 1,500,000	\$ -	\$ 34,694	\$ -	\$ 738,699	\$ 5,761,495	\$ 6,500,194	\$ 1,973,328
2038	21	\$ 1,500,000	\$ -	\$ 9,867	\$ -	\$ 24,184	\$ -	\$ 24,184	\$ 3,459,011
2039	22	\$ 1,500,000	\$ -	\$ 17,295	\$ -	\$ 24,909	\$ 6,840,489	\$ 6,865,399	\$ (1,889,093)
2040	23	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (389,093)
2041	24	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 52,853	\$ -	\$ 52,853	\$ 1,058,055
2042	25	\$ 1,500,000	\$ -	\$ 5,290	\$ -	\$ 54,438	\$ -	\$ 54,438	\$ 2,508,907
2043	26	\$ 1,500,000	\$ -	\$ 12,545	\$ -	\$ -	\$ -	\$ -	\$ 4,021,451
2044	27	\$ 1,500,000	\$ -	\$ 20,107	\$ -	\$ 57,754	\$ -	\$ 57,754	\$ 5,483,805
2045	28	\$ 1,500,000	\$ -	\$ 27,419	\$ -	\$ -	\$ -	\$ -	\$ 7,011,224
2046	29	\$ 1,500,000	\$ -	\$ 35,056	\$ -	\$ 61,271	\$ 12,230,575	\$ 12,291,846	\$ (3,745,565)
2047	30	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 63,109	\$ -	\$ 63,109	\$ (2,308,674)
2048	31	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (808,674)
2049	32	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 2,678,086	\$ 11,948,384	\$ 14,626,470	\$ (13,935,144)
2050	33	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (12,435,144)
2051	34	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 2,710,050	\$ -	\$ 2,710,050	\$ (13,645,194)
2052	35	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 2,464,944	\$ -	\$ 2,464,944	\$ (14,610,138)
2053	36	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (13,110,138)
2054	37	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 952,287	\$ -	\$ 952,287	\$ (12,562,425)
2055	38	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (11,062,425)
2056	39	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 123,514	\$ 7,664,205	\$ 7,787,719	\$ (17,350,145)
2057	40	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 84,813	\$ -	\$ 84,813	\$ (15,934,958)
2058	41	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (14,434,958)
2059	42	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 89,978	\$ -	\$ 89,978	\$ (13,024,936)
2060	43	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (11,524,936)
2061	44	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 3,531,937	\$ -	\$ 3,531,937	\$ (13,556,873)
2062	45	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 98,321	\$ 15,012,935	\$ 15,111,257	\$ (27,168,130)
2063	46	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (25,668,130)
2064	47	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 3,586,634	\$ -	\$ 3,586,634	\$ (27,754,764)
2065	48	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ 16,983,555	\$ 16,983,555	\$ (43,238,319)
2066	49	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 4,673,329	\$ -	\$ 4,673,329	\$ (46,411,648)
2067	50	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 3,533,428	\$ -	\$ 3,533,428	\$ (48,445,076)
2068	51	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (46,945,076)
2069	52	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (45,445,076)
2070	53	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (43,945,076)
2071	54	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (42,445,076)
2072	55	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (40,945,076)
2073	56	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (39,445,076)
2074	57	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (37,945,076)
2075	58	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (36,445,076)
2076	59	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (34,945,076)
2077	60	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (33,445,076)
2078	61	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (31,945,076)
2079	62	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (30,445,076)
2080	63	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (28,945,076)
2081	64	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ 34,746,708	\$ 34,746,708	\$ (62,191,785)
2082	65	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (60,691,785)
2083	66	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (59,191,785)
2084	67	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (57,691,785)
2085	68	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (56,191,785)
2086	69	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (54,691,785)
2087	70	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (53,191,785)
2088	71	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (51,691,785)
2089	72	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (50,191,785)
2090	73	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (48,691,785)
Total		\$ 73,927,500		\$ 607,390	\$ 5,142,480	\$ 33,227,113	\$ 84,610,373	\$ 122,979,966	

**Lakewood Water District
2017 Tank Analysis
Seismic and Replacement Cost Summary**

Tank		Subtotal Estimated Project Costs (2017\$)	Total Rounded Project Costs (2017\$)
<i>Tank Seismic Improvement Project Costs (2017\$)</i>		\$ 4,389,846	\$ 4,390,000
FD	Farwest Drive	\$ 712,152	\$ 720,000
104	104th & Bridgeport	\$ 497,188	\$ 500,000
NH	Nyanza Hill	\$ 0	\$ -
SB	Steilacoom Boulevard	\$ 1,373,201	\$ 1,380,000
WB	Washington Boulevard	\$ 688,414	\$ 690,000
ALG	American Lake Gardens	\$ 618,517	\$ 620,000
F	Forster	\$ 500,375	\$ 510,000
O	Oakbrook	\$ 0	\$ -
H2	Hemlock No. 2	\$ 0	\$ -
D	Dunbar	\$ 0	\$ -

<i>Tank Replacement Project Costs (2017\$)</i>		\$ 37,757,345	\$ 37,780,000
FD	Farwest Drive	\$ 3,239,600	\$ 3,240,000
104	104th & Bridgeport	\$ 3,189,200	\$ 3,190,000
NH	Nyanza Hill	\$ 2,205,000	\$ 2,210,000
SB	Steilacoom Boulevard	\$ 5,187,000	\$ 5,190,000
WB	Washington Boulevard	\$ 4,639,600	\$ 4,640,000
ALG	American Lake Gardens	\$ 3,964,280	\$ 3,970,000
F	Forster	\$ 4,108,759	\$ 4,110,000
O	Oakbrook	\$ 3,570,000	\$ 3,570,000
H2	Hemlock No. 2	\$ 5,237,506	\$ 5,240,000
D	Dunbar	\$ 2,416,400	\$ 2,420,000

**Lakewood Water District
2017 Tank Analysis
Maintenance Task Cost and Summary Table**

This sheet is the input for the account summary to add the cost of maintenance tasks each year. The legend shows the ability to change when maintenance should occur relative to replacement.

Legend	
Maintenance after replacement	
Check - relative to replacement date	
How many years before replacement to cease improvements	5

Tank	Subtotal Estimated Project Costs (2017\$)	Total Rounded Project Costs (2017\$)	Maintenance/Improvement Dates						
			Next Maint Improvement Date	2nd Maint Date	3rd Maint Date	4th Maint Date	5th Maint Date	6th Maint Date	7th Maint Date
Farwest Drive									
Interior Top Coating	\$ 188,000	\$ 188,000					2051		
Exterior Top Coating	\$ 87,000	\$ 87,000					2051		
Interior Full Recoating	\$ 281,000	\$ 281,000							2066
Exterior Full Recoating	\$ 218,000	\$ 218,000							2066
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2019	2024	2029	2041	2046	2056	2061
104th & Bridgeport									
Interior Top Coating	\$ 200,000	\$ 200,000				2052			
Exterior Top Coating	\$ 203,000	\$ 203,000				2052			
Interior Full Recoating	\$ 300,000	\$ 300,000	2020						2067
Exterior Full Recoating	\$ 506,000	\$ 506,000							2067
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2020	2025	2042	2047	2057	2062	
Nyanza Hill									
Interior Top Coating	\$ 331,000	\$ 331,000		2036					2066
Exterior Top Coating	\$ 255,000	\$ 255,000		2036					2066
Interior Full Recoating	\$ 397,000	\$ 397,000				2051			
Exterior Full Recoating	\$ 307,000	\$ 307,000				2051			
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2026	2031	2041	2046	2056	2061	
Steilacoom Boulevard									
Interior Top Coating	\$ 538,000	\$ 538,000		2032					2061
Exterior Top Coating	\$ 398,000	\$ 398,000							2061
Interior Full Recoating	\$ 646,000	\$ 646,000	2022						
Exterior Full Recoating	\$ 462,000	\$ 462,000		2032					
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2022	2027	2037	2051	2056	2066	
Washington Boulevard									
Interior Top Coating	\$ 515,000	\$ 515,000		2033					2064
Exterior Top Coating	\$ 366,000	\$ 366,000		2033					2064
Interior Full Recoating	\$ 618,000	\$ 618,000							
Exterior Full Recoating	\$ 445,000	\$ 445,000							
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2023	2028	2038		2054	2059	
American Lake Gardens									
Interior Top Coating	\$ 498,000	\$ 498,000		2034					
Exterior Top Coating	\$ 353,000	\$ 353,000		2034					
Interior Full Recoating	\$ 598,000	\$ 598,000				2049			
Exterior Full Recoating	\$ 429,000	\$ 429,000				2049			
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2024	2029	2039	2044	2054		
Forster									
Epoxy Injection	\$ 23,000	\$ 23,000	2025						
Concrete Surface Repair	\$ 38,000	\$ 38,000	2025						
Oakbrook									
Interior Top Coating	\$ 204,000	\$ 204,000					2054		
Exterior Top Coating	\$ 89,000	\$ 89,000					2054		
Interior Full Recoating	\$ 306,000	\$ 306,000	2026						
Exterior Full Recoating	\$ 223,000	\$ 223,000	2026						
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2026	2031	2044	2049	2059	2064	
Hemlock No. 2									
Interior Top Coating	\$ 188,000	\$ 188,000			2037				
Exterior Top Coating	\$ 208,000	\$ 208,000			2037				
Interior Full Recoating	\$ 226,000	\$ 226,000				2052			
Exterior Full Recoating	\$ 247,000	\$ 247,000				2052			
Cleaning and Spot Repair	\$ 13,000	\$ 13,000	2027	2032	2042	2047	2057	2062	
Dunbar									
Epoxy Injection	\$ 23,000	\$ 23,000	2027						
Concrete Surface Repair	\$ 38,000	\$ 38,000	2027						

**Lakewood Water District
2017 Tank Analysis
Water Tank Repair/Replacement Priority Ranking Criteria**

Points	Category	Abbreviation	Weight Factor	Weighted Points
Hydraulic Importance				
3	Water Can Be Conveyed to Other Zones	HydPlus	4	12
2	Water Has Limited Ability to be Conveyed to Other Zones	HydLim	4	8
1	Water Can Not Be Conveyed to Other Zones	HydNo	4	4
Tank Capacity				
3	>= 3.0 MG		2	6
2	>1.0 MG < 3.0 MG		2	4
1	<= 1.0 MG		2	2
Redundancy				
3	No Other Tanks in Zone or Higher Zones	RedNo	3	9
2	Other Tanks in Zone or Higher with Less Capacity	RedLess	3	6
1	Other Tanks in Zone or Higher with Greater Capacity	RedMore	3	3
Impacts Due to Structural Failure				
3	Failure Will Cause Significant Damage to Property	DamSig	4	12
2	Failure Will Cause Limited Damage to Property	DamLim	4	8
1	Failure Will Not Cause Damage to Property	DamNo	4	4
Tank Benefit Area				
3	Large Benefit Area (> xxx customers)	BenLg	3	9
2	Medium Benefit Area	BenMed	3	6
1	Small Benefit Area (< xxx customers)	BenSm	3	3

High Priority = >36 points 36
 Medium Priority = 24 - 36 points 24
 Low Priority = < 24 points 12

Criteria	Weight Factor
Hydraulic Importance	4
Tank Capacity	2
Redundancy	3
Impacts Due to Structural Failure	4
Tank Benefit Area	3

<-- District: confirm weight factor

**Lakewood Water District
2017 Tank Analysis
Target Maintenance Frequency**

Tank Material	Maintenance Element	Period (yrs)
Steel	Interior Top Coating	15
	Exterior Top Coating	15
	Interior Full Recoating	30
	Exterior Full Recoating	30
	Cleaning and Spot Repair	5
Concrete	Epoxy Injection	30
	Concrete Surface Repair	30

**Lakewood Water District
2017 Tank Analysis
Comprehensive Schedule Summary**

Reservoir	Task	Year	Cost (\$2017)	Cost (Future \$)
Farwest	Seismic Improvements	2019	\$ 720,000.00	\$ 763,848.00
Farwest	Interior Top Coating	2051	\$ 188,000.00	\$ 513,598.20
Farwest	Exterior Top Coating	2051	\$ 87,000.00	\$ 237,675.76
Farwest	Interior Full Recoating	2066	\$ 281,000.00	\$ 1,195,997.66
Farwest	Exterior Full Recoating	2066	\$ 218,000.00	\$ 927,855.84
Farwest	Cleaning and Spot Repair	2019	\$ 13,000.00	\$ 13,791.70
Farwest	Cleaning and Spot Repair	2024	\$ 13,000.00	\$ 15,988.36
Farwest	Cleaning and Spot Repair	2029	\$ 13,000.00	\$ 18,534.89
Farwest	Cleaning and Spot Repair	2041	\$ 13,000.00	\$ 26,426.32
Farwest	Cleaning and Spot Repair	2046	\$ 13,000.00	\$ 30,635.35
Farwest	Cleaning and Spot Repair	2056	\$ 13,000.00	\$ 41,171.35
Farwest	Cleaning and Spot Repair	2061	\$ 13,000.00	\$ 47,728.88
Farwest	Replacement	2036	\$ 3,240,000.00	\$ 5,681,359.61
104th & Bridgeport	Seismic Improvements	2020	\$ 500,000.00	\$ 546,363.50
104th & Bridgeport	Interior Top Coating	2052	\$ 200,000.00	\$ 562,772.49
104th & Bridgeport	Exterior Top Coating	2052	\$ 203,000.00	\$ 571,214.08
104th & Bridgeport	Interior Full Recoating	2020	\$ 300,000.00	\$ 327,818.10
104th & Bridgeport	Interior Full Recoating	2067	\$ 300,000.00	\$ 1,315,171.81
104th & Bridgeport	Exterior Full Recoating	2067	\$ 506,000.00	\$ 2,218,256.45
104th & Bridgeport	Cleaning and Spot Repair	2020	\$ 13,000.00	\$ 14,205.45
104th & Bridgeport	Cleaning and Spot Repair	2025	\$ 13,000.00	\$ 16,468.01
104th & Bridgeport	Cleaning and Spot Repair	2042	\$ 13,000.00	\$ 27,219.11
104th & Bridgeport	Cleaning and Spot Repair	2047	\$ 13,000.00	\$ 31,554.41
104th & Bridgeport	Cleaning and Spot Repair	2057	\$ 13,000.00	\$ 42,406.49
104th & Bridgeport	Cleaning and Spot Repair	2062	\$ 13,000.00	\$ 49,160.75
104th & Bridgeport	Replacement	2037	\$ 3,190,000.00	\$ 5,761,494.84
Nyanza Hill	Replacement	2021	\$ 2,210,000.00	\$ 2,487,374.47
Nyanza Hill	Interior Top Coating	2036	\$ 331,000.00	\$ 580,410.50
Nyanza Hill	Interior Top Coating	2066	\$ 331,000.00	\$ 1,408,808.63
Nyanza Hill	Exterior Top Coating	2036	\$ 255,000.00	\$ 447,144.04
Nyanza Hill	Exterior Top Coating	2066	\$ 255,000.00	\$ 1,085,335.96
Nyanza Hill	Interior Full Recoating	2051	\$ 397,000.00	\$ 1,084,566.40
Nyanza Hill	Exterior Full Recoating	2051	\$ 307,000.00	\$ 838,694.93
Nyanza Hill	Cleaning and Spot Repair	2026	\$ 13,000.00	\$ 16,962.05
Nyanza Hill	Cleaning and Spot Repair	2031	\$ 13,000.00	\$ 19,663.67
Nyanza Hill	Cleaning and Spot Repair	2041	\$ 13,000.00	\$ 26,426.32
Nyanza Hill	Cleaning and Spot Repair	2046	\$ 13,000.00	\$ 30,635.35
Nyanza Hill	Cleaning and Spot Repair	2056	\$ 13,000.00	\$ 41,171.35
Nyanza Hill	Cleaning and Spot Repair	2061	\$ 13,000.00	\$ 47,728.88
Steilacoom Boulevard	Seismic Improvements	2022	\$ 1,380,000.00	\$ 1,599,798.22
Steilacoom Boulevard	Interior Top Coating	2032	\$ 538,000.00	\$ 838,186.47
Steilacoom Boulevard	Interior Top Coating	2061	\$ 538,000.00	\$ 1,975,241.32
Steilacoom Boulevard	Exterior Top Coating	2061	\$ 398,000.00	\$ 1,461,238.00
Steilacoom Boulevard	Interior Full Recoating	2022	\$ 646,000.00	\$ 748,891.05
Steilacoom Boulevard	Exterior Full Recoating	2032	\$ 462,000.00	\$ 719,780.95
Steilacoom Boulevard	Cleaning and Spot Repair	2022	\$ 13,000.00	\$ 15,070.56
Steilacoom Boulevard	Cleaning and Spot Repair	2027	\$ 13,000.00	\$ 17,470.91
Steilacoom Boulevard	Cleaning and Spot Repair	2037	\$ 13,000.00	\$ 23,479.45
Steilacoom Boulevard	Cleaning and Spot Repair	2051	\$ 13,000.00	\$ 35,514.77
Steilacoom Boulevard	Cleaning and Spot Repair	2056	\$ 13,000.00	\$ 41,171.35
Steilacoom Boulevard	Cleaning and Spot Repair	2066	\$ 13,000.00	\$ 55,330.85
Steilacoom Boulevard	Replacement	2046	\$ 5,190,000.00	\$ 12,230,574.98
Washington Boulevard	Seismic Improvements	2023	\$ 690,000.00	\$ 823,896.08
Washington Boulevard	Interior Top Coating	2033	\$ 515,000.00	\$ 826,423.82
Washington Boulevard	Interior Top Coating	2064	\$ 515,000.00	\$ 2,066,125.94
Washington Boulevard	Exterior Top Coating	2033	\$ 366,000.00	\$ 587,322.56
Washington Boulevard	Exterior Top Coating	2064	\$ 366,000.00	\$ 1,468,353.58
Washington Boulevard	Cleaning and Spot Repair	2023	\$ 13,000.00	\$ 15,522.68
Washington Boulevard	Cleaning and Spot Repair	2028	\$ 13,000.00	\$ 17,995.04
Washington Boulevard	Cleaning and Spot Repair	2038	\$ 13,000.00	\$ 24,183.83
Washington Boulevard	Cleaning and Spot Repair	2054	\$ 13,000.00	\$ 38,807.95
Washington Boulevard	Cleaning and Spot Repair	2059	\$ 13,000.00	\$ 44,989.05
Washington Boulevard	Replacement	2049	\$ 4,640,000.00	\$ 11,948,383.99
American Lake Gardens	Seismic Improvements	2024	\$ 620,000.00	\$ 762,521.80
American Lake Gardens	Interior Top Coating	2034	\$ 500,000.00	\$ 826,423.82
American Lake Gardens	Exterior Top Coating	2034	\$ 360,000.00	\$ 595,025.15
American Lake Gardens	Interior Full Recoating	2049	\$ 600,000.00	\$ 1,545,049.65
American Lake Gardens	Exterior Full Recoating	2049	\$ 430,000.00	\$ 1,107,285.58
American Lake Gardens	Cleaning and Spot Repair	2024	\$ 13,000.00	\$ 15,988.36
American Lake Gardens	Cleaning and Spot Repair	2029	\$ 13,000.00	\$ 18,534.89
American Lake Gardens	Cleaning and Spot Repair	2039	\$ 13,000.00	\$ 24,909.34
American Lake Gardens	Cleaning and Spot Repair	2044	\$ 13,000.00	\$ 28,876.76
American Lake Gardens	Cleaning and Spot Repair	2054	\$ 13,000.00	\$ 38,807.95
American Lake Gardens	Replacement	2062	\$ 3,970,000.00	\$ 15,012,935.49
Forster	Seismic Improvements	2025	\$ 510,000.00	\$ 646,052.74
Forster	Epoxy Injection	2025	\$ 23,000.00	\$ 29,135.71
Forster	Concrete Surface Repair	2025	\$ 38,000.00	\$ 48,137.26
Forster	Replacement	2065	\$ 4,110,000.00	\$ 16,983,555.22
Oakbrook	Interior Top Coating	2054	\$ 204,000.00	\$ 608,986.24
Oakbrook	Exterior Top Coating	2054	\$ 89,000.00	\$ 265,685.17
Oakbrook	Interior Full Recoating	2026	\$ 306,000.00	\$ 399,260.59
Oakbrook	Exterior Full Recoating	2026	\$ 223,000.00	\$ 290,964.42
Oakbrook	Cleaning and Spot Repair	2026	\$ 13,000.00	\$ 16,962.05
Oakbrook	Cleaning and Spot Repair	2031	\$ 13,000.00	\$ 19,663.67
Oakbrook	Cleaning and Spot Repair	2044	\$ 13,000.00	\$ 28,876.76
Oakbrook	Cleaning and Spot Repair	2049	\$ 13,000.00	\$ 33,476.08
Oakbrook	Cleaning and Spot Repair	2059	\$ 13,000.00	\$ 44,989.05
Oakbrook	Cleaning and Spot Repair	2064	\$ 13,000.00	\$ 52,154.64
Oakbrook	Replacement	2039	\$ 3,570,000.00	\$ 6,840,489.17
Hemlock No. 2	Interior Top Coating	2037	\$ 188,000.00	\$ 339,548.91
Hemlock No. 2	Exterior Top Coating	2037	\$ 208,000.00	\$ 375,671.14
Hemlock No. 2	Interior Full Recoating	2052	\$ 226,000.00	\$ 635,932.91
Hemlock No. 2	Exterior Full Recoating	2052	\$ 247,000.00	\$ 695,024.03
Hemlock No. 2	Cleaning and Spot Repair	2027	\$ 13,000.00	\$ 17,470.91
Hemlock No. 2	Cleaning and Spot Repair	2032	\$ 13,000.00	\$ 20,253.58
Hemlock No. 2	Cleaning and Spot Repair	2042	\$ 13,000.00	\$ 27,219.11
Hemlock No. 2	Cleaning and Spot Repair	2047	\$ 13,000.00	\$ 31,554.41
Hemlock No. 2	Cleaning and Spot Repair	2057	\$ 13,000.00	\$ 42,406.49
Hemlock No. 2	Cleaning and Spot Repair	2062	\$ 13,000.00	\$ 49,160.75
Hemlock No. 2	Replacement	2081	\$ 5,240,000.00	\$ 34,746,708.28
Dunbar	Epoxy Injection	2027	\$ 23,000.00	\$ 30,910.08
Dunbar	Concrete Surface Repair	2027	\$ 38,000.00	\$ 51,068.82
Dunbar	Replacement	2056	\$ 2,420,000.00	\$ 7,664,205.30

Year

2019	2020	2021
2022	2023	2024
2025	2026	2027
2028	2029	2031
2032	2033	2034
2036	2037	2038
2039	2041	2042
2044	2046	2047

Reservoir

104th & Bridgeport	American Lake Gardens
Dunbar	Farwest
Forster	Hemlock No. 2
Nyanza Hill	Oakbrook
Steilacoom Boulevard	Washington Boulevard

Task

Cleaning and Spot Repair	Concrete Surface Repair
Epoxy Injection	Exterior Full Recoating
Exterior Top Coating	Interior Full Recoating
Interior Top Coating	Replacement
Seismic Improvements	

**Lakewood Water District
2017 Tank Analysis
Seismic and Maintenance Task Summary**

Planning Year	2017
Year of CIP	2019
Number of Years to Offset Start	
Phase 1	0
Phase 2	0
Phase 3	0
Non Seismic Improvements	0

Years from start	Reservoir	Age	Size	Task	Year	2017		Replacement Cost	TOTAL
						Seismic Cost	Maintenance Cost		
0	Farwest Drive	48	0.5	Seismic Improvements	2019	\$ 720,000			\$ 733,000
				Spot Cleaning			\$ 13,000		
1	104th & Bridgeport	45	0.5	Seismic Improvements	2020	\$ 500,000			\$ 813,000
				Interior Recoat			\$ 300,000		
				Spot Cleaning			\$ 13,000		
2	Nyanza	65	0.4	Replacement	2021			\$ 2,210,000	\$ 2,210,000
3	Steilacoom Boulevard	31	3.45	Seismic Improvements	2022	\$ 1,380,000			\$ 2,039,000
				Interior Recoat			\$ 646,000		
				Spot Cleaning			\$ 13,000		
4	Washington Boulevard	31	3.7	Seismic Improvements	2023	\$ 690,000			\$ 703,000
				Spot Cleaning			\$ 13,000		
5	American Lake Gardens	30	3.5	Seismic Improvements	2024	\$ 620,000			\$ 633,000
				Spot Cleaning			\$ 13,000		
6	Forster	27	3.0	Seismic Improvements	2025	\$ 510,000			\$ 571,000
				Concrete Maintenance			\$ 61,000		
7	Oakbrook	53	0.5	Full Recoat	2026		\$ 529,000		\$ 542,000
				Spot Cleaning			\$ 13,000		
8	Hemlock No. 2	11	0.5	Spot Cleaning	2027		\$ 13,000		\$ 13,000
9	Dunbar	36	1	Spot Cleaning	2027		\$ 61,000		\$ 61,000

TOTAL \$ 8,318,000

**Lakewood Water District
2017 Tank Analysis
Replacement Summary**

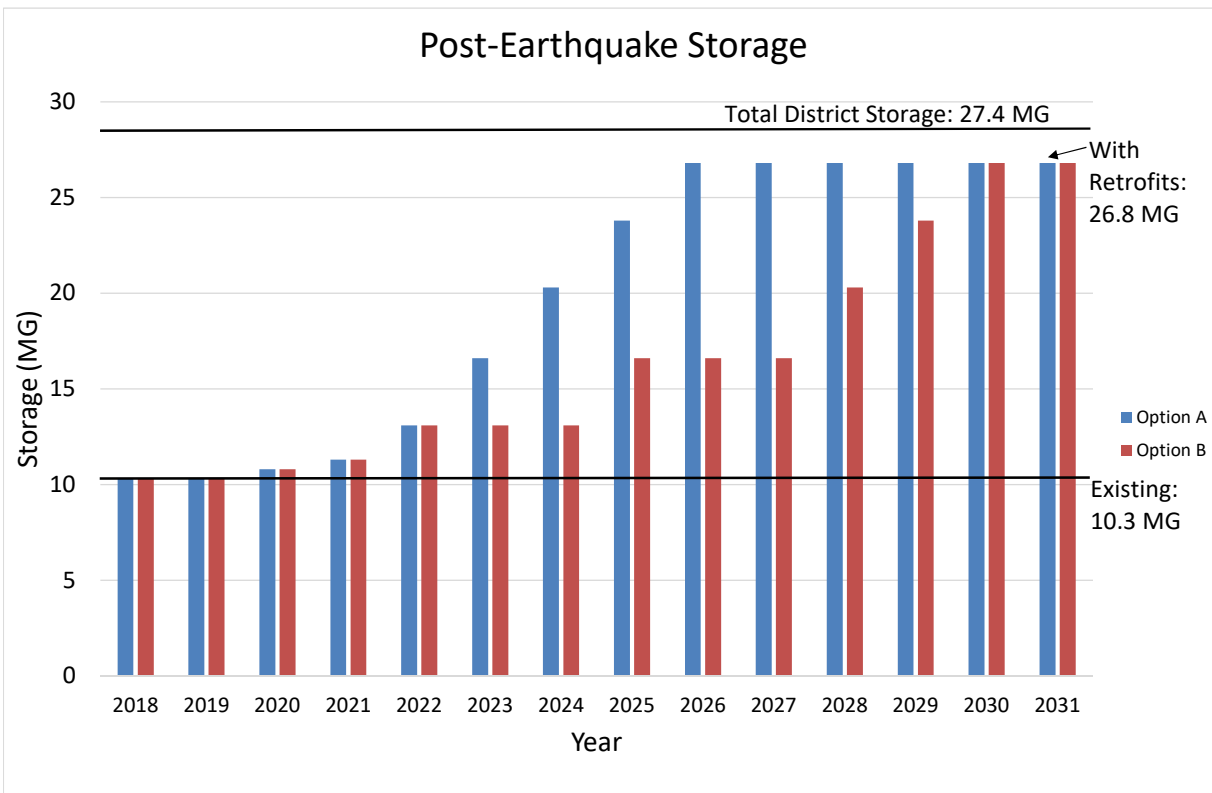
Tank	Tank Replacement	
	Year	Project Cost (2017\$)
Farwest Drive	2036	\$ 3,240,000
104th & Bridgeport	2037	\$ 3,190,000
Nyanza Hill	2021	\$ 2,210,000
Steilacoom Boulevard	2046	\$ 5,190,000
Washington Boulevard	2049	\$ 4,640,000
American Lake Gardens	2062	\$ 3,970,000
Forster	2065	\$ 4,110,000
Replacement* Total (2017\$)		\$ 26,550,000
Oakbrook	2039	\$ 3,570,000
Hemlock No. 2	2081	\$ 5,240,000
Dunbar	2056	\$ 2,420,000
Non-Seismic Rehab Total		\$ 11,230,000
Total (2017\$)		\$ 37,780,000

**Lakewood Water District
2017 Tank Analysis
Tank Storage Capacity**

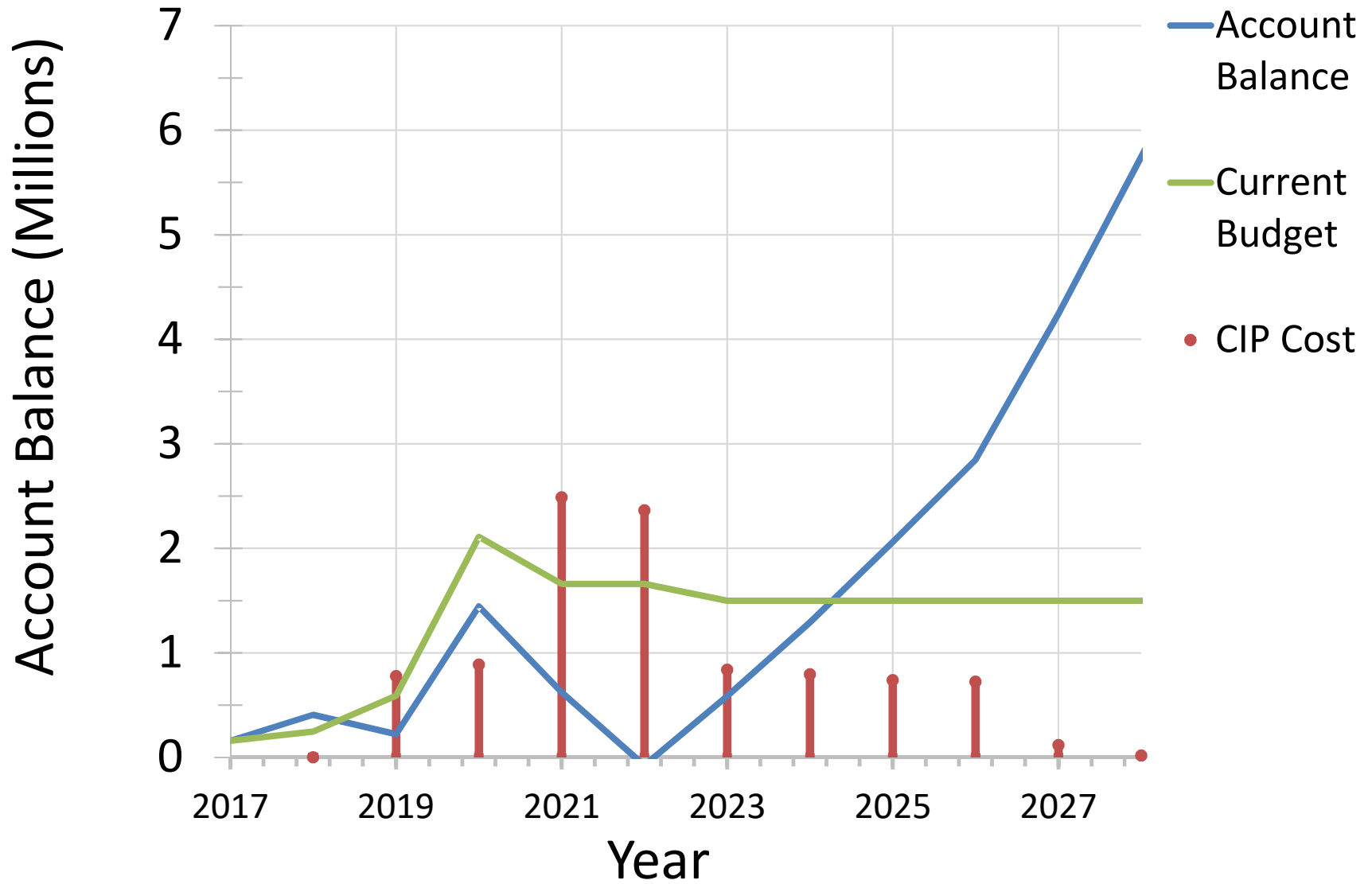
INPUTS FOR STORAGE CAPACITY GRAPH		
Year	A	B
2018	10.3	10.3
2019	10.3	10.3
2020	10.8	10.8
2021	11.3	11.3
2022	13.1	13.1
2023	16.6	13.1
2024	20.3	13.1
2025	23.8	16.6
2026	26.8	16.6
2027	26.8	16.6
2028	26.8	20.3
2029	26.8	23.8
2030	26.8	26.8
2031	26.8	26.8

Reservoir	Size	Seismic Improvement Needed
Farwest Drive	0.5	N
104th & Bridgeport	0.5	N
Nyanza	1.8	N
Steilacoom Boulevard	3.5	N
Washington Boulevard	3.7	N
American Lake Gardens	3.5	N
Forster	3	N
Oakbrook	0.5	Y
Hemlock No. 2	0.5	Y
Dunbar	1.3	Y
Philip	8	Y
Evaluation Total	26.8	

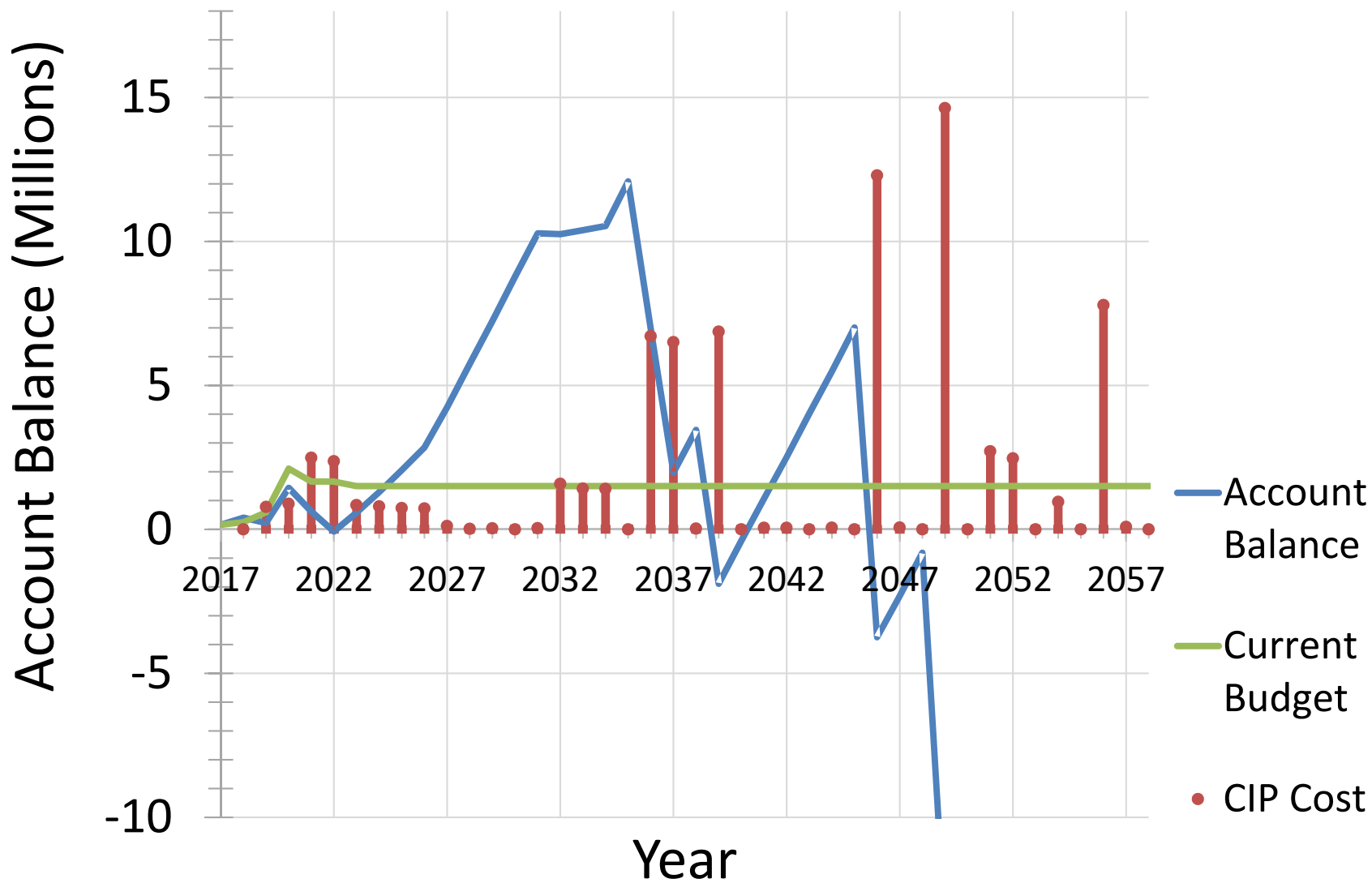
Option A Seismic/Maint Date	Option B Seismic/Maint Date
2019	2019
2020	2020
2021	2021
2022	2024
2023	2027
2024	2028
2025	2029



Account Balance 2017 - 2028



Account Balance 2017 - 2057



APPENDIX B
FORSTER AND DUNBAR RESERVOIRS GEOLOGIC
INVESTIGATION, RH2 ENGINEERING, INC., NOVEMBER
2017



RH2 TECHNICAL MEMORANDUM

Client: Lakewood Water District
 Project: 2017 Tank Analyses
 Project File: LAK 117.104.01.101 Project Manager: David Matz, PE
 Composed by: Steve Nelson, LG, LHG
 Reviewed by: Geoff Dillard, PE
 Subject: Forster and Dunbar Reservoirs Geologic Investigation
 Date: December 14, 2017



STEPHEN ERIC NELSON

12/14/17



12/14/17



12/14/17

INTRODUCTION

PROJECT DESCRIPTION

The Lakewood Water District (District) retained RH2 Engineering, Inc. (RH2) to conduct a seismic analysis, evaluate the current structural condition, estimate useful life, assess improvements that could extend the life, and provide an estimated replacement and/or repair schedule of several reservoirs, including the Forster and Dunbar Reservoirs. This technical memorandum summarizes the geotechnical investigation and analysis of site soil that supports the foundations for the reservoirs. RH2 reviewed available geologic information and geotechnical reports and conducted limited on-site exploration to examine site soil and estimate geotechnical properties of the site soil at these sites.

LOCATION AND EXISTING CONDITIONS

The two reservoir sites are located within the corporate limits of the City of Lakewood in Pierce County, Washington. The Dunbar Reservoir site is at 10121 Hemlock Street SW at an elevation 240 feet above mean sea level (amsl), and at latitude 47.191358 and longitude 122.522465 W. The Forster Reservoir site at 6325 72nd Street Court W at an elevation 400 feet amsl, and at latitude 47.164741 and longitude 122.557469 W. Both reservoirs are constructed with similar

concrete materials and founded on native soil with ring or mat foundations.

PREVIOUS WORK

RH2 reviewed the following geotechnical report to support project recommendations and design.

- GeoEngineers, Inc. 1988. *Geotechnical Investigation Report, Proposed Water Storage Tank and Booster Pump Station, Pierce County, Washington for Lakewood Water District [Forster Reservoir]*.
- Alpha Engineers, Inc. 1982. *Foundation Plan and Precast Panel Plan, Dunbar Reservoir*.

RH2 also reviewed the following documents and websites.

- Washington State Department of Natural Resources (WDNR) Washington Interactive Geologic Map. Accessed on September 15, 2017 at <http://wigm.dnr.wa.gov/>
- Well logs on file with the Washington State Department of Ecology; wells reviewed are within ½ mile of the reservoir sites.

REGIONAL GEOLOGY

The reservoir sites are in the outwash plains of the southern Puget Sound Lowland. During the last glacial period in Washington, continental ice sheets entered and filled the Puget Sound Lowland, deposited several hundred feet of variably thick layers of sand, gravel, and silt, and retreated approximately 13,000 years ago. As glacial ice retreated, thick layers of sand and gravel were deposited at, and downstream of, the edge of glacial ice in broad flat regions, forming the outwash plains in Pierce County.

Tectonically, the southern Puget Sound Lowland area lies between an oblique convergent plate boundary and the rising and volcanically active Cascade Mountain Range. An active subduction zone lies deep below Pierce County, and the continental crust is being compressed and pushed northward. This tectonic setting results in significant seismic activity and, if the design life for the new reservoir is 100 years, there is a high probability that the reservoir will experience a deep subduction earthquake, an intermediate crustal earthquake (like the 2001 Nisqually earthquake), and/or a shallow earthquake that breaks the ground surface (e.g., along the roughly east-west trending Seattle or Tacoma fault zones). Approximate 50-year probabilities for Puget Sound earthquakes are as follows.

- Cascadia M9: 10 to 14 percent
- Seattle Fault $M \geq 6.5$: 5 percent (from slip rate, GR model; 1,000 year return time)
- Deep $M \geq 6.5$: 84 percent (from 1949, 1965, and 2001)
- Random shallow $M \geq 6.5$: 15 percent for entire Puget Sound area, including Seattle Fault zone

According to WDNR's Interactive Geologic Map and the National Earthquake Hazards Reduction Program (NEHRP), the Seismic Site Class for the Dunbar Reservoir site is C, with the average shear wave velocity (1,200 to 2,500 feet per second) in the upper 100 feet. The Seismic Site Class for the Forster Reservoir site is C to D; with the average shear wave velocity in the

upper 100 feet corresponds to a C site class, and the mean shear wave velocity minus one standard deviation within the upper 100 feet corresponds to a D site class (mean shear wave velocity of 600 to 900 feet per second).

Typical Standard Penetration Test (SPT) N-values for Seismic Site Class C soils exceed 50 blows, and typical SPT N-values for Seismic Class D soils range from 15 to 50 blows.

The surficial geology at the Dunbar Reservoir site is mapped as glacial till. The surficial geology at the Forster Reservoir site is mapped as glacial outwash.

SITE INVESTIGATION

Exploration Methods and Strategy

Before site exploration, RH2 reviewed available geologic maps, soil maps, and driller's logs for the local area. On September 6, 2017, the District provided a backhoe to dig one test pit to a depth of 4 feet at the Forster Reservoir, and one test pit to a depth of 8 feet at the Dunbar Reservoir to explore the site soil characteristics (composition, texture, stratigraphy, structure, cohesion, and bearing capacity) and groundwater conditions (liquefaction, seepage, infiltration) below the ground surface within 20 feet of the reservoirs. RH2 observed the excavations to obtain representative soil samples and document the soil characteristics.

A layer of fill material that contained trace amounts of inert and organic materials mixed with locally derived native soil exists at each site in thicknesses ranging from 0 to 3 feet, increasing with proximity to the edge of the reservoirs. No groundwater was observed at either excavation. Based on the elevation and regional geology, RH2 predicts the local groundwater level below the sites is more than 30 feet below ground surface.

Upon completion of the geological exploration, the test pits were backfilled with excavated soil. The **Test Pit Logs** are attached.

Geologic Laboratory and In-situ Soil Tests

No laboratory or in-situ soil tests were performed as part of this memorandum. The site conditions were uniform and consistent with soil and geologic mapping, and the findings of previous investigations.

INTERPRETATION, ANALYSIS, AND EVALUATION OF SITE GEOLOGY

Geologic Units

Forster Reservoir Site

The site soil consists of brown, fine to coarse sand and subrounded gravel with various amounts of cobbles and a few boulders. This unit was generally stratified in layers of a few inches that exhibited variable proportions of sand to gravel; typically the sand percentage exceeded the gravel percentage and the soil was consequently characterized as Gravelly SAND (SW). The soil was moderately dense to loose, when disturbed. The excavation sidewalls were unstable and could not hold a vertical cut. The site soil is identified as recessional glacial outwash and appears consistent with descriptions for the site soil in previous investigations and geologic mapping.

Dunbar Reservoir Site

The site soil consists of light brown to gray, dry to moist, non-plastic fines, fine to coarse sand, with subrounded gravel, and few cobbles and boulders. This unit is unsorted and not stratified and exhibited variable proportions of silt, sand, and gravel; typically the silt percentage exceeded the sand and gravel percentage, and the soil was consequently characterized as Sandy SILT with Gravel (ML). The site soil was very dense and the backhoe could not readily excavate below a depth of 4 feet, where the material changed in color to gray and density increased. The excavated soil easily held a vertical cut in the excavation. The site soil is identified as weathered to unweathered glacial till and appears consistent with descriptions for the site soil in previous investigations and geologic mapping.

Bearing Capacity, Earth Pressure, and Coefficient of Friction

Estimates of bearing capacity, earth pressures, and coefficient of friction are based on observed soil characteristics during this exploration and reported estimates in the related geotechnical reports.

Forster Reservoir Site

- The undisturbed Gravelly SAND unit has a net allowable bearing capacity estimated to range from 4,000 to 5,000 psf.
- The friction coefficient for slab/subgrade is estimated at 0.4 to 0.5.
- Assuming a soil unit weight of 120 pcf and a soil friction angle of 35 degrees for the Gravelly SAND unit, the following earth pressures are estimated.
 - At rest – 51 pcf
 - Active – 33 pcf
 - Passive – 443 pcf

For the Forster Reservoir site, GeoEngineers, Inc. (1982) reported N values of 25 to greater than 50, an allowable bearing capacity of 6,000 psf, a coefficient of friction of 0.4, and a passive earth pressure of 300 pcf.

Dunbar Reservoir Site



- The undisturbed Sandy SILT with Gravel unit has a net allowable bearing capacity estimated to range from 5,000 to 6,000 pounds per square foot (psf).
- The friction coefficient for slab/subgrade is estimated at 0.4 to 0.5.



- Assuming a soil unit weight of 125 pounds per cubic foot (pcf) and a soil friction angle of 40 degrees for the Sandy SILT with Gravel unit, the following earth pressures are estimated.
 - At rest – 45 pcf
 - Active – 27 pcf
 - Passive – 575 pcf

Attachment:

Test Pit Logs

ATTACHMENT

	<p>Test Pit/Exploration Log LAK TP1 Exploration Name</p>	<p>2017 Tank Analyses Project</p>	<p>Forster Reservoir 6325 72nd Street Court W Lakewood, WA Location</p>
<p>Steve Nelson, LEG Inspected By</p>	<p>September 6, 2017 Date</p>	<p>LAK 117.104.01 Project No.</p>	<p>Deere 410J, 2-foot bucket Lakewood Water District Backhoe and Operator</p>
<p>Depth</p>	<p>Description</p>		<p>Sketch/Photo</p>
<p>0 to 1.0 feet</p>	<p>Crushed Gravel Fill</p>		
<p>1.0 to 8.0 feet</p>	<p>Gravelly Sand (SW); brown; fine to medium, some coarse; fine to coarse subrounded gravel; few cobbles and boulders; trace fines; loose to compact; dry to moist (glacial outwash). Sidewalls unstable and caving.</p>		
<p>Exploration backfilled with excavated material.</p>			

	<p>Test Pit/Exploration Log LAK TP2 Exploration Name</p>	<p>2017 Tank Analyses Project</p>	<p>Dunbar Reservoir 10121 Hemlock Street SW Lakewood, WA Location</p>	
<p>Steve Nelson, LEG Inspected By</p>	<p>September 6, 2017 Date</p>	<p>LAK 117.104.01 Project No.</p>	<p>Deere 410J, 2-foot bucket Lakewood Water District Backhoe and Operator</p>	
<p>Depth</p>	<p>Description</p>		<p>Sketch/Photo</p>	
<p>0 to 0.5 feet</p>	<p>Topsoil</p>			
<p>0.5 to 3.5 feet</p>	<p>Sandy SILT with gravel (ML); light brown; non-plastic fines; fine to medium sand; fine to medium subrounded gravel; few cobbles; many roots; very dense; dry to moist (weathered glacial till/fill).</p>			
<p>3.5 to 4.0 feet</p>	<p>Sandy SILT with Gravel (ML); gray; non-plastic fines; fine to coarse sand; fine to coarse subrounded gravel; few cobbles and boulders; very dense; dry to moist (glacial till). Sidewalls stable unless disturbed.</p>			
<p>Exploration backfilled with excavated material.</p>				

APPENDIX C
SEISMIC ANALYSIS STRUCTURAL CALCULATIONS FROM
SARGENT ENGINEERS AND RH2 ENGINEERING, INC.,
NOVEMBER 2017

PROVIDED ON CD

APPENDIX D
LAKWOOD WATER DISTRICT EARTHQUAKE
EVALUATION OF WATER TANKS, CHALKER PUTNAM
COLLINS & SCOTT, JULY 1995

PROVIDED ON CD

APPENDIX E

***STRUCTURAL EVALUATION REPORT (DRAFT),
EVALUATION OF FOUR WATER TANKS FOR LAKEWOOD
WATER DISTRICT, EQE INTERNATIONAL, INC., MAY 2001***

PROVIDED ON CD

APPENDIX F

SEISMIC EVALUATION OF STEEL STANDPIPES, RH2
ENGINEERING, INC., OCTOBER 2012

PROVIDED ON CD

APPENDIX G
PHOTOS FROM TANK INSPECTIONS

PROVIDED ON CD

PACIFIC groundwater**water GROUP**

**LAKWOOD WATER DISTRICT
2019 WELL CONDITION ASSESSMENT**

Draft

October 2019

**LAKWOOD WATER DISTRICT
2019 WELL CONDITION ASSESSMENT**

Prepared for:

**Lakewood Water District
11900 Gravelly Lake Drive SW
Lakewood, WA 98499**

**253-588-4423
lakewoodwater.org**

Prepared by:

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***JB1701.02
Lakewood Well Condition Assessment DRAFT v5***

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Table 2.1-1: Summary of Scores and Ranks

Table 2.2-1: Summary of Recommendations (except new wells)

Table 2.2-2: Planned/Possible New Wells

Table 2.2-3: Possible Replacement Wells

In each Section 4 subsection there are risk assessment tables for each well evaluated.

FIGURES

At the end of Section 1:

Figure 1.0-1: Lakewood Water District

Figure 1.0-2: Well Installations over Time

Following each Section 4 subsection:

Site Map

Water Levels and Monthly Production Volumes

List of Acronyms

DOH	Department of Health
gpm	gallons per minute
MGY	Million gallons per year
PWL	Pumping water level
SCADA	(supervisory control and data acquisition); pump control system
SWL	Static water level
TPCHD	Tacoma-Pierce County Health Department
USGS	U.S. Geological Survey
VFD	Variable frequency drive
WFI	Water Facilities Inventory

SIGNATURE

This report, and Pacific Groundwater Group's work contributing to this report, were reviewed by the undersigned and approved for release.

Burt G. Clothier, L.H.G, RG
Washington State Hydrogeologist #140

Draft

1.0 INTRODUCTION

Lakewood Water District (District) has served the community of Lakewood with potable water for over 75 years. The District regularly assesses its sources and water distribution system to ensure high performance and to plan ahead for future needs. The District's water supplies are entirely based on groundwater extracted from water wells. Over the past 76 years it has undertaken over 61 well construction projects. From this effort, 31 wells remain in service and three remain in place but are out of service (as opposed to merely inactive). The remaining wells have been decommissioned. Figure 1.0-1 is a map of the District and the well locations.

The District's main phase of growth was from the late 1950s thru the middle 1970s. A second phase occurred during the 1980s and early 1990s. Since that time only three wells have been added to the system (Figure 1.0-2). Part of this change was due to changing use patterns (conservation) and population trends but also because by 1995, the District had successfully created sufficient supply and redundancy to support the range of needs and level of demands it faced.

The average age of its production wells is 50 years. Excluding the two recently completed wells not yet in service, the minimum age is 11 years and the oldest well is almost 69 years old. With such a high number of very old wells, the District is concerned that wells will need replacement as they fail or become less productive. As part of its planning efforts, the District identified a need to review its inventory of water wells and assess the current condition of each well, list needed improvements, and plan for future well replacements or upgrades.

Pacific Groundwater Group (PGG) was retained to undertake this evaluation. PGG was requested to evaluate the District's current well inventory, identify future service needs for each well, and provide a report of findings tailored to support the District's capital improvement planning. The primary goal was to identify where and when new or additional well work will arise so the District can adequately budget for the expenditures and schedule future well projects so that they do not disrupt the District's water delivery. The investigation was based on available data provided by the District; no new testing or field inspections of wells was included in the effort.

In 1997 and 1998, the District performed a future development analysis to look at expansion of the water supply sources with the goal of creating extra supplies that would be marketed wholesale to neighboring water suppliers¹. That study formed the pre-cursor of this investigation and had the same primary author as the current effort. The findings of that study were re-reviewed and incorporated into this project as appropriate. This work replaces the 1998 report in some respects.

The report provides an upfront compendium of findings and recommendations in Section 2, describes the risk ranking process in Section 3, with subsections in Section 4 providing details for each site and well. Each site contains one or more wells.

¹ Clothier, B.G., 1998, Lakewood Water District Future Water Resource Management and Development, prepared for Lakewood Water District by Robinson & Noble, Inc., 27p.

Production aquifers are listed for each well using the nomenclature (Aquifers A through G) from the U.S. Geological Survey conceptual model of the Chambers-Clover Creek Watershed (Savoca and others, 2010)².

The work was performed, and this report prepared, using standard hydrogeologic practices used in this area and time, for exclusive use of the District, and for specific application to the cited wells. This in lieu of other warranties, express or implied.

Draft

² Savoca, M.E., Welch, W.B., Johnson, K.H., Lane, R.C., Clothier, B.G., and E.T. Fasser, 2010. Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers- Clover Creek Watershed and Vicinity, Pierce County, Washington. U.S. Geological Survey Scientific Investigations Report 2010-5055.

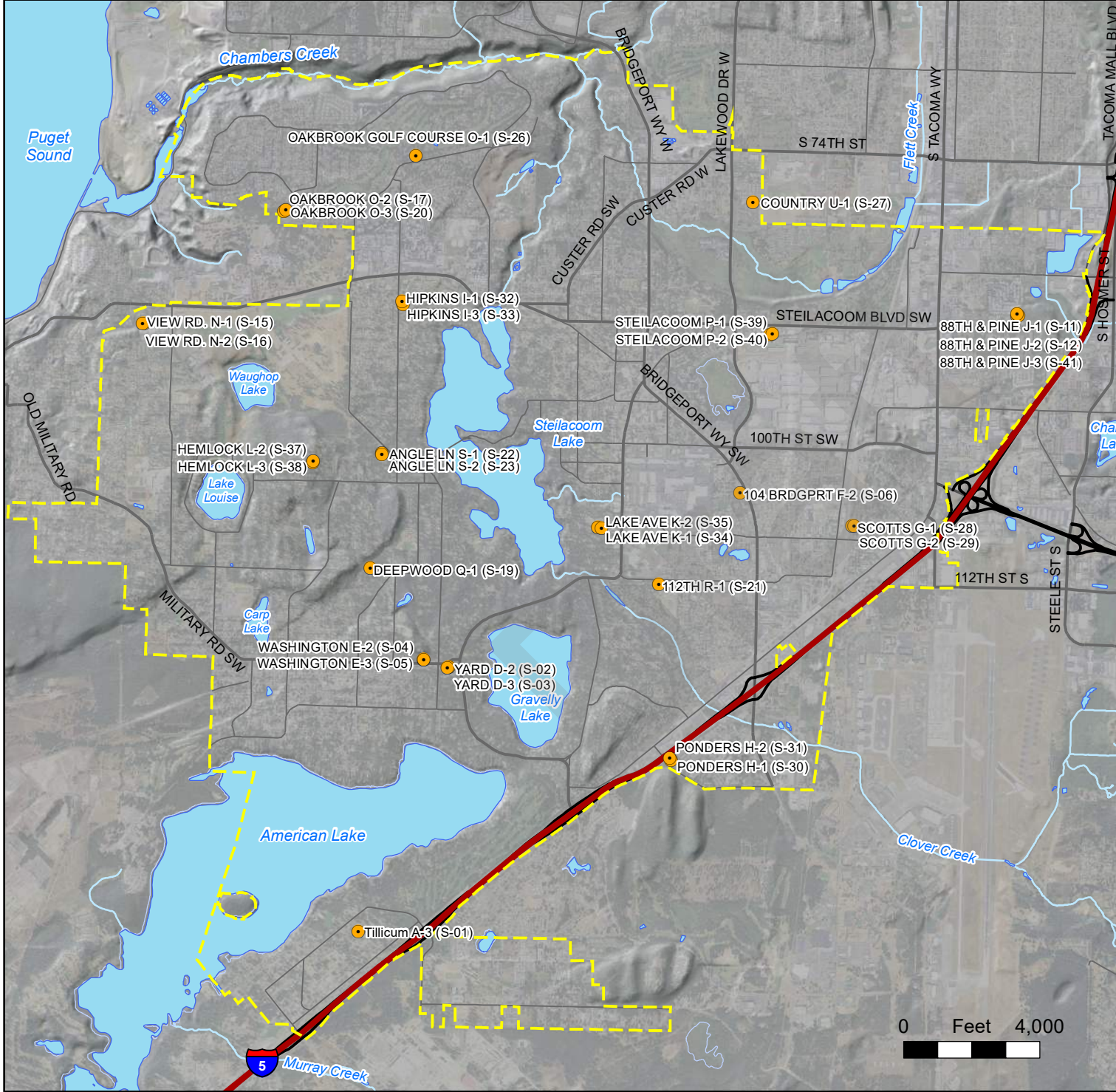




Figure 1.0-1 Lakewood Water District Water Service Area



Lakewood
Water
District



-  Service Area
-  Existing Supply Source

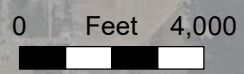
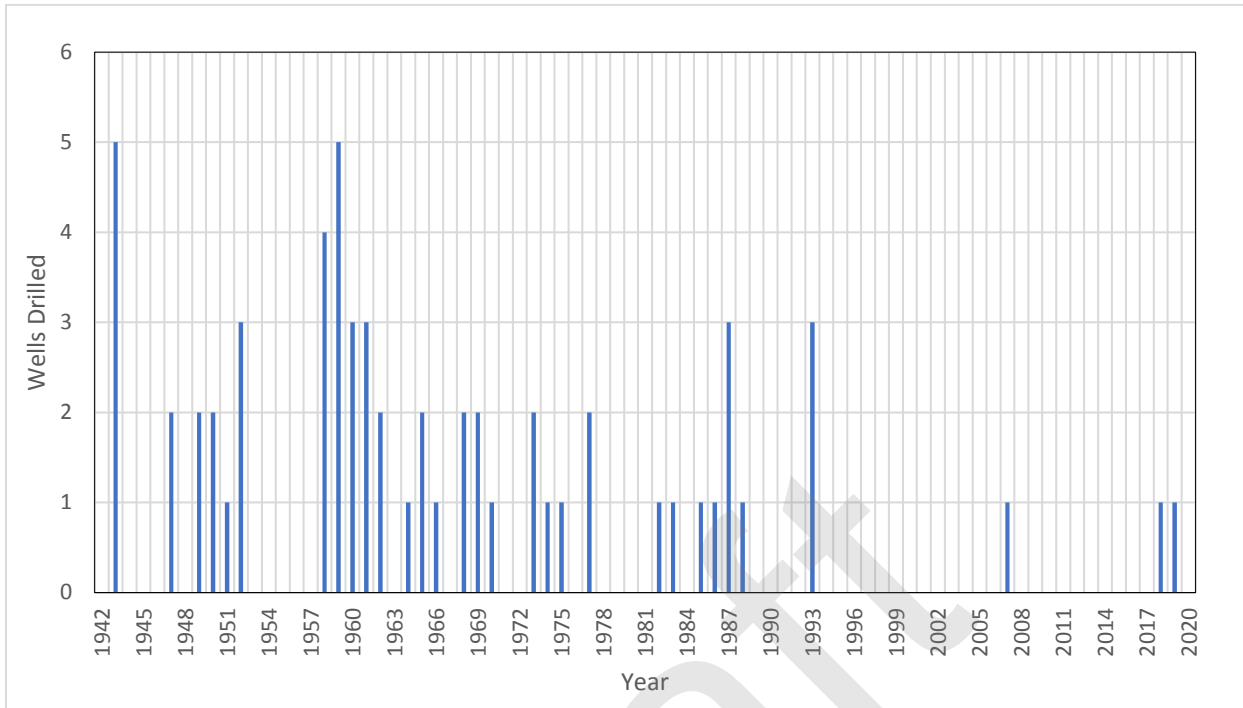


Figure 1.0-2: Well Installations Over Time



2.0 COMPILED FINDINGS AND RECOMMENDATIONS

This section presents a compilation of findings and recommendations resulting from the project. Refer to Section 3 for a description of the scoring and ranking process. Section 4 provides a further description of results for each well and wellfield.

2.1 SUMMARY OF FINDINGS

Overall, the District wells are remarkably resilient. Water chemistry across the District seems to support long-lived wells. This has provided for stable production without unusual costs to keep the wells operating.

Maintenance needs for each well are generally low and only a few wells have had failures that prevented future use. The largest rehabilitation effort at most sites has been casing brushing and screen cleaning whenever the pump gets replaced. Given the longevity of the wells and production equipment, down-hole video inspections of the wells has been limited to only a few per decade. However, as wells age and as many are reaching the end of their expected operational life, the District should take every opportunity to inspect each well and verify its condition. It is possible that even the oldest wells might continue to provide good service for decades more, but there is no way to be certain how much longer any well can continue before a mechanical failure or declines in production force the well to be taken out of service. Since the absolute risk of failure cannot be determined, the wells were ranked by relative risk. Table 2.1-1 summarizes the scoring and relative ranking.

The District should be vigilant of well performance markers (sanding, turbidity, production loss, water level changes) and plan for future well replacements. The District should place a priority for monitoring, annual review, maintenance, and repair/rehabilitation of the top ten wells in the ranking.

Regional water level declines pose a larger potential risk than declines in efficiency of individual wells. The majority of wells show relatively stable water level trends in the short term (within the past 5 years) but the potential for declines to continue (particularly in Aquifer E) may lead to lowered available draw-down, which could reduce production for some sites.

Table 2.1-1: Summary of Scores and Ranks

Well	Well Location	Hydrograph Trend	Site expandability		sum	rank	
			New well?	Treatment plant?			
G-1	Scotts	Stable	1 well	Yes	49	1	
P-2	Steilacoom Blvd	Stable*	Maybe	Maybe**	55	2	
A-3	Tillicum	Stable*	No	Maybe	56	3	
G-2	Scotts	Stable*	1 well	Yes	59	4	
F-2	104th & Bridgeport	Stable	1 well	Yes	65	5	
H-2	Ponders	Stable*	1 well	In place	68	6	
H-1	Ponders	Stable	1 well	In place	74	7	
Q-1	Deepwood	Stable	No	In place	74	8	
D-2	Yard	Stable	No	Maybe	74	9	
N-1	View Road	Stable	No	In place	74	10	
L-2	Hemlock	Stable	No	Maybe	93	11	
K-2	Lake Ave	Unknown	2 wells?	Yes	99	12	
K-1	Lake Ave	Unknown	2 wells?	Yes	101	13	
P-1R	Steilacoom Blvd	Stable*	Maybe	Maybe**	107	14	offline
J-1	88th & Pine	Stable	1 well	Yes**	110	15	
R-1	112th	Stable	1 well	Yes	110	16	
S-1	Angle Lane	Declining	Maybe	No	111	17	
I-1	Hipkins	Stable*	Maybe	Maybe	111	18	offline
O-2	Oakbrook	Stable	1 well	Yes**	112	19	
E-2	Wash Blvd	Stable	2 wells?	Yes	113	20	
O-3	Oakbrook	Stable*	1 well	Yes**	116	21	
J-2	88th & Pine	Stable*	1 well	Yes**	119	22	
S-2	Angle Lane	Stable	Maybe	No	125	23	
E-3	Wash Blvd	Production loss?	2 wells?	Yes	126	24	
U-1	Country Place	Stable	No	No	128	25	
J-3	88th & Pine	Stable	1 well	Yes**	131	26	offline
N-2	View Road	Stable*	No	In place	132	27	offline
L-3	Hemlock	Stable*	No	Maybe	132	28	offline
D-3	Yard	Stable	No	Maybe	137	29	
I-3	Hipkins	Stable	Maybe	Maybe	143	30	
L-4	Hemlock	NA	No	Maybe	169	31	offline
N-3	View Road	NA	No	In place	184	32	offline

* Partial or incomplete water level data record
 ** Space may not be sufficient for both new well(s) and treatment

2.2 SUMMARY OF RECOMMENDATIONS

Table 2.2-1 below provides a summary of recommendations for the District's existing wells. Discussion is provided in subsections to follow, as well as the individual site and well discussions of Section 4.

Table 2.2-1. Summary of Recommendations for Existing Wells

Well	Well Location	Rank	Recommendations				
			1 year	1 - 3 years	1 - 5 years	3 - 5 years	5 - 10 years
G-1	Scotts	1		Replace pump			Well testing
P-2	Steilacoom Blvd	2	Data review; well testing		Aquifer E analysis	Replace pump	
A-3	Tillicum	3	Replace pump		Aquifer E analysis		
G-2	Scotts	4	Data review		Replace pump		
F-2	104th & Bridgeport	5	Data review	Replace pump	Aquifer E analysis		
H-2	Ponders	6	Data review	Replace pump			
H-1	Ponders	7	Data review	Well testing			
Q-1	Deepwood	8	Data review	Replace pump	Aquifer E analysis		
D-2	Yard	9	Site planning		Replace pump; Aquifer E analysis		
N-1	View Road	10				Replace pump	
L-2	Hemlock	11	Data review			Replace pump	
K-2	Lake Ave	12	Data review; well testing		Aquifer E analysis		
K-1	Lake Ave	13	Data review		Aquifer E analysis		Replace pump
P-1R	Steilacoom Blvd	14			Site planning		
J-1	88th & Pine	15	Data review		Well testing		
R-1	112th	16			Aquifer E analysis		
S-1	Angle Lane	17	Data review	Replace pump			
I-1	Hipkins	18		Site planning		Site planning	
O-2	Oakbrook	19	Data review	Replace pump			
E-2	Wash Blvd	20	Data review		Aquifer E analysis		Replace pump
O-3	Oakbrook	21					Replace pump
J-2	88th & Pine	22	Replace probe	Site planning	Aquifer E analysis		
S-2	Angle Lane	23		Replace pump	Aquifer E analysis		
E-3	Wash Blvd	24		Data review; well testing			Replace pump
U-1	Country Place	25		Data review			Replace pump
J-3	88th & Pine	26	Data review		Well testing		
N-2	View Road	27			Site planning		
L-3	Hemlock	28		Site planning		Site planning	
D-3	Yard	29	Data review		Well testing		
I-3	Hipkins	30		Well testing			

L-4	Hemlock	31		Site planning			
N-3	View Road	32			Site planning		
O-1	Oakbrook C.C.		Data review		Site planning		
Year ending:		2020	2023	2025	2025	2030	

2.2.1 Expand Annual Review

Those wells that are part of the Abitibi monitoring program receive a cursory review of performance on an annual basis. It would be prudent for the District to expand the data analysis performed for the Abitibi monitoring report to cover all of its active wells. The year-to-year evaluation provided by the hydrographs can help spot trends in production or aquifer level changes. It is also useful in finding data irregularities caused by the monitoring equipment.

2.2.2 Tag Wells and Start Photo Record

Several wells are missing well tags (or recording of numbers). All wells should have a unique ID tag to comply with Ecology regulations. Create a digital photo record of the following for each wellhead:

- A good view of the overall wellhead
- A close up of the well tag
- A picture of each manual access port and/or monitoring ports – include in these measurements of the stick-up from the pumphouse floor or cement pump pad.
- Other key appurtenances (sample ports, valves, etc.).

Each of these elements might be altered whenever the well is worked on and this can lead to data collection errors if the changes aren't recorded, so having a record of the changes is important. This is especially true of sites that only see changes infrequently. It's easy to forget how a previous set-up looked and staff changes may prevent important details from being passed on. The collection of a photo record of the facilities would also be a good accompaniment to the digital mapping of each property the District is currently completing.

2.2.3 Collect More Manual Water Level Measurements

Regular analysis of water level trends are increasingly important for District operations, yet many of the records from SCADA are suspect. We recommend that District create a protocol for collecting manual water level measurements simultaneously with measurements from transducers linked to the SCADA system whenever:

- The pump equipment is lowered/replaced
- The telemetry probe is changed/replaced
- Telemetry changes or software updates occur that could affect water level reporting
- Prior to and during any well test

Paired manual and transducer water level measurements should be used to calibrate transducer-based measurements, and correct historic data if necessary and possible.

Some monthly “hand” measurements appear to be a reporting of a reading from the on-site telemetry readout, as opposed to an independent manual measurement. District staff should make note of when water levels are collected from reading telemetry versus manual measurements using an independent water level tape or sounder. The independent measurement using separate equipment is a key verification tool and should be done routinely in all wells that allow for such access. When well pump equipment is serviced or replaced, manual access ports and dedicated sounding tubes should be added if not already included.

2.2.4 Analyze Aquifer E Water Level Trends

Review of Aquifer E water level data system-wide is recommended along with production and precipitation records to assess the severity and cause of noted aquifer water level declines. Such a study is warranted to ensure that the aquifer is not being overused. This has implications to the District’s well production priorities and could also impact choices for well replacement or additional wholesale supplies. The District should collect water production data from neighboring water purveyors using the same aquifer and then compare the trends in each. Long-term production trends and the level of risks to the aquifer could then be modeled using the new USGS regional groundwater flow model. This would be an important step in cooperative management of the aquifer and in strategic planning to protect the resource.

From the assessment, we identified ten wells that should be considered in this water level analysis. The set includes all of the District’s Aquifer E wells except Wells P-1R, N-2 and N-3 which are offline and/or data sets are not available. The study should compare long-term data records (>10 years or the full available record) with precipitation patterns and production records for the same period. Modeling of withdrawals using the USGS model may also provide a method of comparison and could also be used see if downward trends might be predicted in the future.

2.2.5 Increase Well Inspection and Testing

Visual inspection of well casing and screens is a vital tool in assessing the condition of wells. The District has a program in place to perform down-hole video inspections any time the pump equipment is removed from a well. Given the general resiliency of the wells, pump removal is infrequent for any individual well and long periods may pass between inspections. Regardless, the practice is recommended as the information gain is high and the costs relatively low. Digital records of each inspection should be archived for later comparison.

With wells of the age range found in the District’s inventory, it is important to periodically look for patterns of change that can be pre-cursors of well failure. Therefore, baseline testing of each well is recommended. Typically, this should be done anytime the pump equipment (pump or motor) is changed or repaired. For wells without near-term pump replacements, we recommend testing with existing equipment in the near future, with priority given to wells over 50 years in age.

Testing should be repeated every five years using the existing pump equipment. Comparing the results of tests in a single well over time will indicate whether rehabilitation or replacement of the well is warranted.

The following protocol is recommended for well testing. The process should be repeated closely for each test, to enhance comparability of results. This protocol is for a test of the well, not the aquifer.

- Confirm that water levels and pumping rates can be accurately recorded by SCADA or other means. Confirm SCADA water level data with manual measurements. Set SCADA recording to a 1-minute interval.
- Confirm that the pump is set to produce at a typical operational rate. Ideally the rate would be the same for all tests on this well, but that may not be possible and is not essential.
- Let all wells in a given aquifer and site recover unpumped for 24 hours.
- Turn on the pump in a single well and let it run for 1 hour without adjustments. Turn off the pump after 1 hour and let the well recover for two hours. Repeat the same pumping test for other onsite wells.
- Extract water level and pumping rate data and save it as a separate data report with a title identifying the well, date, and purpose of testing.
- Calculate the 1-hour specific capacity by dividing the average pumping rate by the drawdown after 1 hour (units are gpm/ft). Record the calculation details and results (specific capacity) along with the data report. The specific capacity can serve as an index that summarizes well status and is comparable from one test to the next.

2.2.6 Acquire New Properties

The District should continue its practice of acquiring suitable properties to host additional wells or system infrastructure. Given the current limitations on many properties and the challenges in purchasing new sites, the District should retain all existing property and seek to gain additional vacant sites in targeted areas (particularly in the southeast quarter of Lakewood) whenever possible.

2.2.7 Plan for New and Replacement Wells

Based on the performance of the wells, the risks posed by the advanced age of many wells, and future water demands, new well construction is anticipated over the next 20 years. New wells are assumed to be needed to meet demand and system resiliency needs in accordance with engineering planning. New wells planned for these purposes are listed on Table 2.2-2. A second set of wells may be needed to replace wells under-going failure (Table 2.2-3). Entries on both tables are for planning purposes only, and deviations from these plans should be expected. The order of the well projects depends on engineering considerations, water rights, costs, and other considerations that are not considered in detail here.

Table 2.2-2: Planned/Possible New Wells

Well	Target Aquifer	Expected Year	Treatment likely?	New water rights needed?	Notes
G-3	E	2019	No	No	Currently under construction
P-3	A3	2021	No	Yes	Will require easement adjustment and/or reconfiguration of site
O-3	G	2024	Yes	No	Abitibi II water rights processing required first
H-3	E	2026	No	No	Delay installing until after PFAS issues w/ JBLM resolved
R-2	E	2027	No*	No	<i>Not enough space on the site for both wells;</i>
	OR				
R-2	G	2028	Yes	No	<i>Not enough space on the site for both wells</i>

W-1	E	2029	No	Yes	New well in SE Lakewood under existing Abitibi rights
K-1R	E	2030	No	No	Replace K-1;
G-4	G	2032	Yes	No	Could be swapped w/ O-3 or R-2
W-2	A3 or C	2035	No*	No	
V-1	A3	2040	No*	Yes	Winter seasonal well under a new negotiated water right;
	AND/OR				
F-3	A3	2040	No*	Yes	May require water rights; Could be processed w/ V-1

*PFAS levels may require treatment

Table 2.2-3: Possible Replacement Wells

Well	Aquifer	Projected year	Replacement on-site?	Notes
S-1	C	2020	Maybe?	
E-3	C	2022	Yes	Assumes unsuccessful rehab
H-1	A3	2025	Yes	
G-1	A3	2025	Yes	
A-3	E	2030	No	Replacement would have to be at Ponders site
P-2	E	2030	Maybe?	
D-2	E	2035	No?	Replacement would have to be at Washington Blvd site
K-2	E	2035	Yes	May not be needed if K-1R is drilled

3.0 ASSESSMENT AND RANKING

The study assessed the current condition of each well and wellfield and then ranked the sites based on their relative risks for failure or other operational shortcomings. This section describes the assessment and ranking method.

3.1 ASSESSMENT DATA

The District provided summaries of well equipment, age, replacement schedules, water rights, annual production data, and SCADA monitoring data. These data are not provided in this report.

3.2 RANKING

3.2.1 Ranking Criteria

Well Age: Years since construction. Oldest wells ranked first; youngest ranked last.

Pump Replacement: Years since the pump equipment was last replaced or rehabilitated³. Longest period since replacement ranked first; fewest years since replacement ranked last. This report also cites an

³ Replacement or refurbishment of the pump motor alone was not included.

existing pump replacement schedule provided by the District, where that schedule affects recommendations resulting from this assessment.

Well Cleaning/Rehabilitation: Years since the well was last cleaned or rehabilitated. Typically, cleaning occurs anytime the pump is removed, but not always depending on the reason for removal (electrical fault or motor failure, etc.). Formal rehabilitation of the well, beyond brushing the screen and casing of scale, is infrequent in most wells (discussed later in the report), so the primary guide for this criterion is the removal of the equipment. For ranking purposes, we assumed that the well was cleaned each time the pump was removed. This may not be strictly true, but records of the cleaning efforts were not available for most wells. Longest period since cleaning/rehabilitation ranked first; fewest years ranked last.

Production Rate: Average pumping rate when the well is on, in gallons per minute (gpm). Wells with the highest production rate were ranked first as they represent the largest risk of loss due to the potential impacts to the system if the well is off-line, especially during peak use periods.

Average Annual Volume: Average production volume in million gallons per year (MGY) for the ten-year period 2006 to 2016, based on District-reported summary of production and water rights prepared in 2016. Updating or verification of these values was not considered necessary to complete the assessment as well use patterns have not changed significantly over the intervening period (with one exception). Wells with the largest annual production volume ranked first. Some wells considered inactive (and thus tied for the last rank) were subjectively ranked based on the possibility of returning the well to service or on the possible use of the well as an emergency source (i.e. non-permanent use).

Monthly production volumes are plotted along with daily maximum and minimum depth-to-water in Section 3 but are not used directly in ranking.

Engineering Score: Priority ranking of the well based on the engineering importance of the well – that is, how key the well is to regular or peak operations of the system (based on production, location, and hydraulic modeling of moving water through the system). The ranking is based on the 2020 hydraulic scenarios developed by MurraySmith as part of the system modeling for the District's comprehensive planning⁴. The wells most important to the engineering analysis were ranked first.

Water Level score: The wells were ranked for risk reflected in water level trends. Sites with declining water levels or with missing data ranked first; those with cyclic/stable water levels ranked last. The hydrograph analysis was based on the past five years of available record provided by the District, consisting of daily maximum and minimum water depth-to-water values recorded by SCADA equipment. Detailed aquifer analysis was not conducted as it was outside the scope for this project and due to the limitations of the data.

In addition to the criteria described above, whether a site use can be expanded by the addition or replacement of wells or the addition of treatment facilities (if needed) is also discussed.

⁴ MurraySmith Engineers, *Lakewood Water District Wholesale Transmission Main Supply Hydraulic Analysis*, Draft 5 MGD Scenarios Table, personal communication, November 2018.

3.2.2 Scoring

Scoring was accomplished by summing the ranks from all well-specific criteria described above, with the lowest score being the highest priority well. The intent was to identify the greatest risk to the most important wells. Results are shown in Table 2.1-1, with individual scores provided in Section 4.

4.0 INDIVIDUAL WELL CONDITIONS

The wells and the parcels (sites) upon which they occur are described in the following subsections. The subsections are in the order of their alphabetic well naming convention (Well A-1 through Well U-1), but the subsections are named according to the District's common site name (Tillicum, Yard, Washington Blvd., etc.). In general, each review includes the basic history of the site, then describes each well individually including construction, risk ranking, a hydrograph (if available) of the past five years of data record, and recommendations resulting from the assessment. Key construction and ranking details are included, as well as the Department of Health (DOH) source number listed on the District's Water Facilities Inventory (WFI).

4.1 TILLICUM

Three wells have been drilled at the Tillicum site over the years: Well A-1 (an exploratory/production well drilled in 1943, now decommissioned), Well A-2 (1959), an Aquifer C well now out of service and decommissioned, and Well A-3 (1965), which was drilled to replace Well A-1 and is the only well that remains (Figure 4.1-1).

Additional infrastructure may not be possible at the site without additional property or easements. Replacement of the existing well (A-3) may be possible but could prove challenging given the infrastructure currently on site. The water tank, water mains, powerlines, and the old wells all pose limitations on a replacement well site. Exact location of the previous wells should be researched or located with geophysics to avoid construction at those spots. Drilling closer to the extremities of the property would necessitate securing easements or restrictive covenants on neighboring properties within a 100-ft sanitary radius (and/or a variance from the TPCHD well location requirements). The fire station property to the south and west of the well property allows some flexibility in that it should be easier to negotiate a covenant with the Fire Department than might be the case with a private property owner.

4.1.1 Well A-3

Well A-3 (S01) is ranked 3rd for risk of loss and is a high priority for future maintenance and service. The well is older and the pump equipment overdue for replacement. It has regular, year-round use serving the storage tank on-site and the southernmost portion of the District between American Lake and the American Lake Gardens Reservoir. The wellsite is relatively remote from neighboring wells (the Ponders wellfield being the next closest) and the property is small.

The well's high ranking is due to its high daily and annual use and its isolation in the southwest end of District.

4.1.1.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 12-inch, 100-slot ⁵ screen
Screened zone:	439 to 481 feet below land surface (bls)
Pump:	Submersible with VFD
5-year average SWL	94 feet bls
5-year average PWL	121 feet bls

4.1.1.2 Risk Assessment

Table 4.1-1 Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	17	6	8	8	4	9	26
Detail	1965	1998	1998	1,058 gpm	215 MGY	Stable	

4.1.1.3 Water Level Analysis

Water levels in Well A-3 have been collected via monthly manual measurements as the well needs a new telemetry probe. It is anticipated this will be included when the pump replacement occurs. The water level record is complicated by limited data and resumption of the water level data collection is a priority.

Water levels have been stable (seasonally cyclic) over the past five years (Figure 4.1-2). However, longer term data (not shown) suggest a static water level decline of about 10 feet over the past 20 years (SWL was around 75 feet bls in 1998 now about 85 feet bls on average).

4.1.1.4 Recommended Actions

- 1 to 3 years: Replace pump and install a new monitoring probe. Verify physical conditions of the well with down-hole video. Rehabilitation may be needed given the age of the well. Baseline testing of the well using the new equipment is also recommended.
- 1 to 5 years: Water level trend monitoring with annual review. In particular, analysis for continuing long-term declines in Aquifer E is recommended. This should be performed in concert with the Abitibi Monitoring project.

⁵ “100-slot” screen has openings of 0.100 inches; “50-slot” has openings of 0.050 inches, etc.



Figure 4.1-1
Tillicum Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

Facility Name:
Tillicum

Facility Type:
Well/Storage
Facility

**Description of
Facility:**
A-3 Well, Tillicum
Tank (not in use)

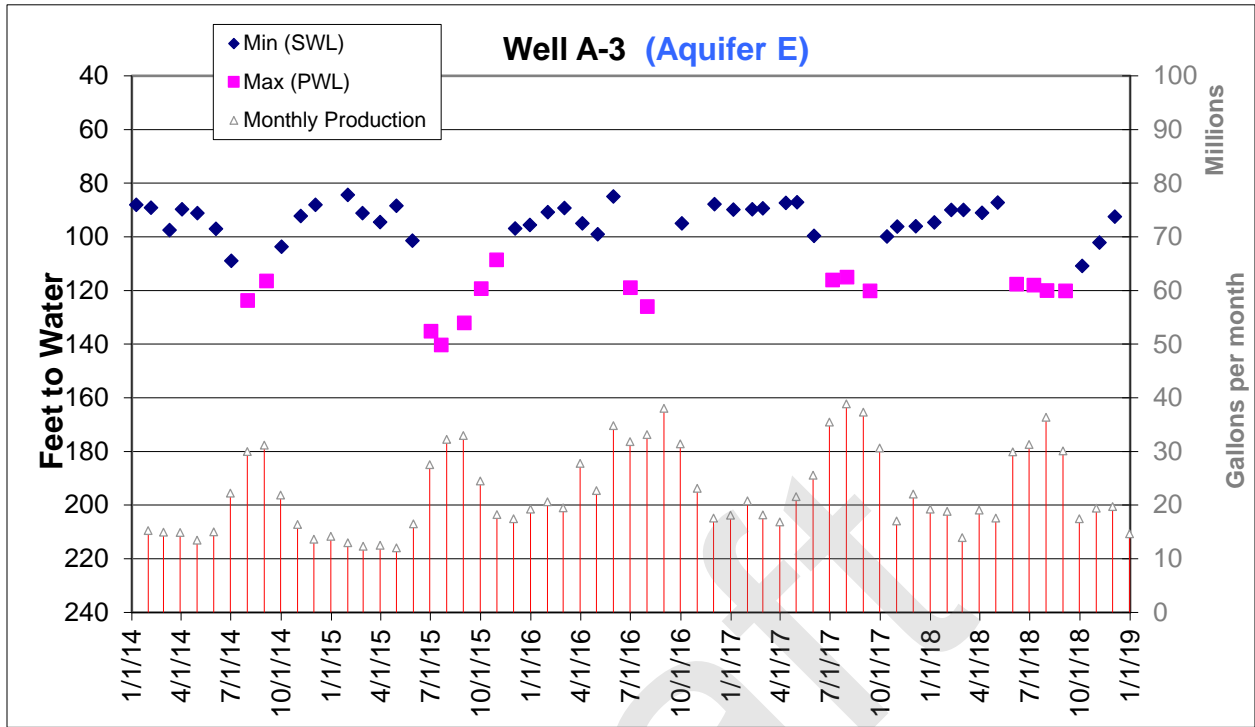
Site Area:
35,668

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.1-2. Tillicum Well A-3 Water Levels and Monthly Production Volumes



4.2 YARD WELLS

The Yard or Shop wellfield was the District’s first water source (well) location. The original Well “D” was drilled on this site⁶ in 1943 and remained in service until 1951. A second well (D-1) was drilled in 1947 and was replaced in 1952. Test Well 6 was also drilled on the site and this well became Well D-2. Well D-3 was then added in 1959. Wells D-2 and D-3 are the current production wells at the site (Figure 4.2-1).

Due to the other District buildings on the property, expansion of this wellfield is not likely. One replacement well can probably be accommodated but more than one well may be difficult without unduly impacting other existing uses of the site. There appears to be sufficient space to allow for the addition of on-site treatment facilities if needed but this could impact the room available for a replacement well.

4.2.1 Well D-2

Well D-2 (S02) ranks as a medium-high priority (9th) due to regular use and high production. Pump replacement is scheduled for 2023 and the District should review well performance at that time.

4.2.1.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 10-inch, 100-slot screen
Screened zone:	469 to 497 feet bls
Pump:	Line-shaft with VFD
5-year average SWL	87 feet bls
5-year average PWL	128 feet bls

4.2.1.2 Risk Assessment

Table 4.2-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	7	8	11	6	6	9	27
Detail	1959	2001	2001	1,174 gpm	189 MGY	Stable	

⁶ Two other early wells were also drilled here and later decommissioned: Well “C” which preceded Well “D” and a well called the “Crystal Springs Well” that may have preceded formation of the District.

4.2.1.3 Water Level Analysis

Slight declines in the static and pumping water levels are evident over the past five to ten years (Figure 4.2-2)⁷. However, this is based only on the data at this well and does not take precipitation responses into account. Those trends suggest stable well performance but slight reduction in aquifer water storage, likely response to pumping from Aquifer E from this well and others. Additional research is warranted to evaluate the overall health of the aquifer system.

4.2.1.4 Recommended Actions

- 1 year: Consider setting aside an area in the west half of the property where a replacement well (for either D-2 or D-3) could be installed and ensure the location is protected from future development.
- 1 to 5 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.
- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records to determine if aquifer declines of concern are occurring.

4.2.2 Well D-3

While one of the older wells in the system, Well D-3 (S03) ranks as low priority (29th) thanks to recent equipment replacement and stable production and water level patterns.

4.2.2.1 Key details

Aquifer:	Aquifer C
Size:	16-inch casing; 12-inch, 100-slot screen
Screened zone:	200 to 224 feet bls
Pump:	Submersible with VFD
5-year average SWL	72 feet bls
5-year average PWL	145 feet bls

4.2.2.2 Risk Assessment

Table 4.2-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	9	23	26	24	18	10	27

⁷ Average static water level between 1980 and 2000 is about five feet higher than the average between 2001 and 2019.

Detail	1959	2014	2014	735 gpm	93 MGY	Stable	
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4.2.2.3 Water Level Analysis

Water level analysis suggests that when the D-3 pump equipment was replaced in 2014, the telemetry probe was set to a different depth than previously as there is an offset in the data where water levels are now reporting as approximately 10 feet lower than in years prior to 2014 (Figure 4.2-3). When a correction factor is applied to the data good agreement with the previous data record is implied, which suggests this is a telemetry setting error not an actual water level change. This should be verified from the pump replacement records and by comparison of hand measurements versus the telemetry data. If the new data is indeed offset and not a reflection of current levels, the historic data should be adjusted to correct the record and prevent confusion in the future. This should be accomplished before the next annual Abitibi Monitoring report.

4.2.2.4 Recommended Actions

- 1 year: Correct or confirm an apparent offset in the water level monitoring probe readings as noted above. Data from this well is used for the Abitibi annual monitoring report, so verification and corrections should occur before the next report is due.
- 1 to 5 years: Baseline testing of the well using the existing equipment is recommended for comparison to future performance.



Figure 4.2-1 Yard Wells Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

Lakewood Water District Facility Map Book

Facility Name:
Yard Wells

Facility Type:
Well/Treatment Facility

Description of Facility:
D-2/D-3 Wells, Treatment

Site Area:
161,699

1 inch equals 50 feet

5/24/2019

Figure 4.2-2. Well D-2 Water Levels and Monthly Production Volumes

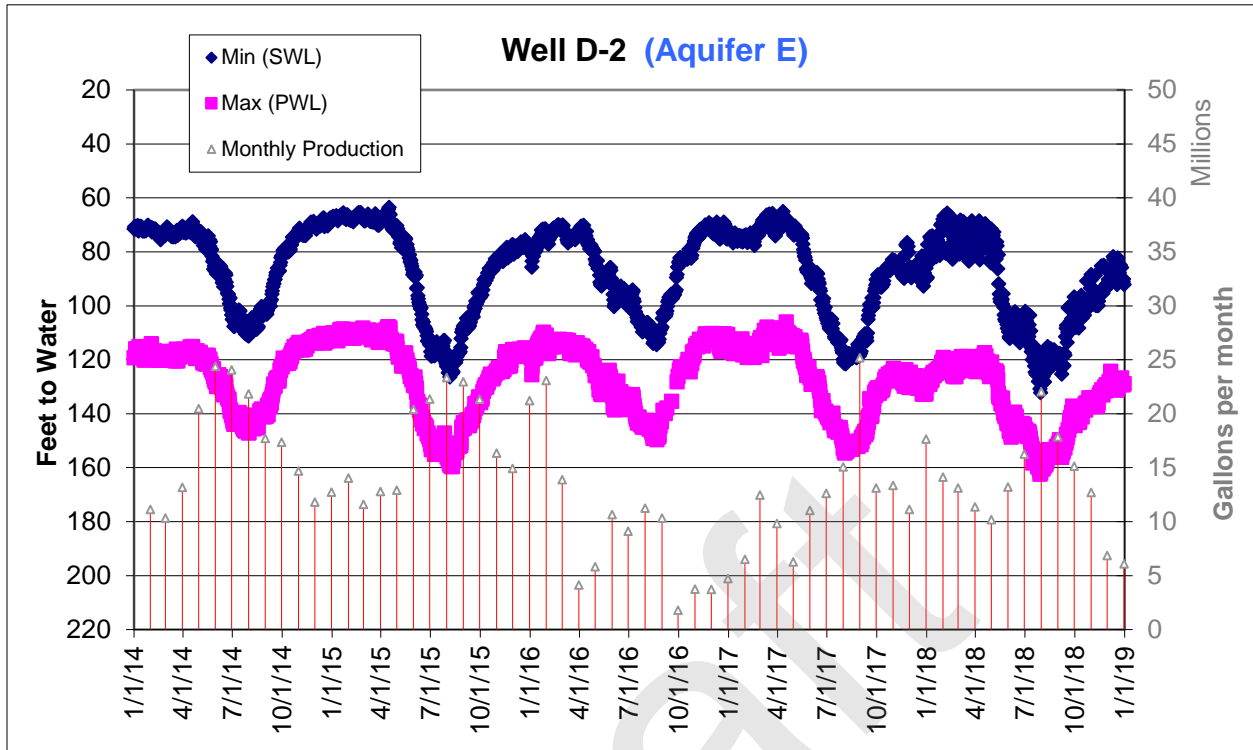
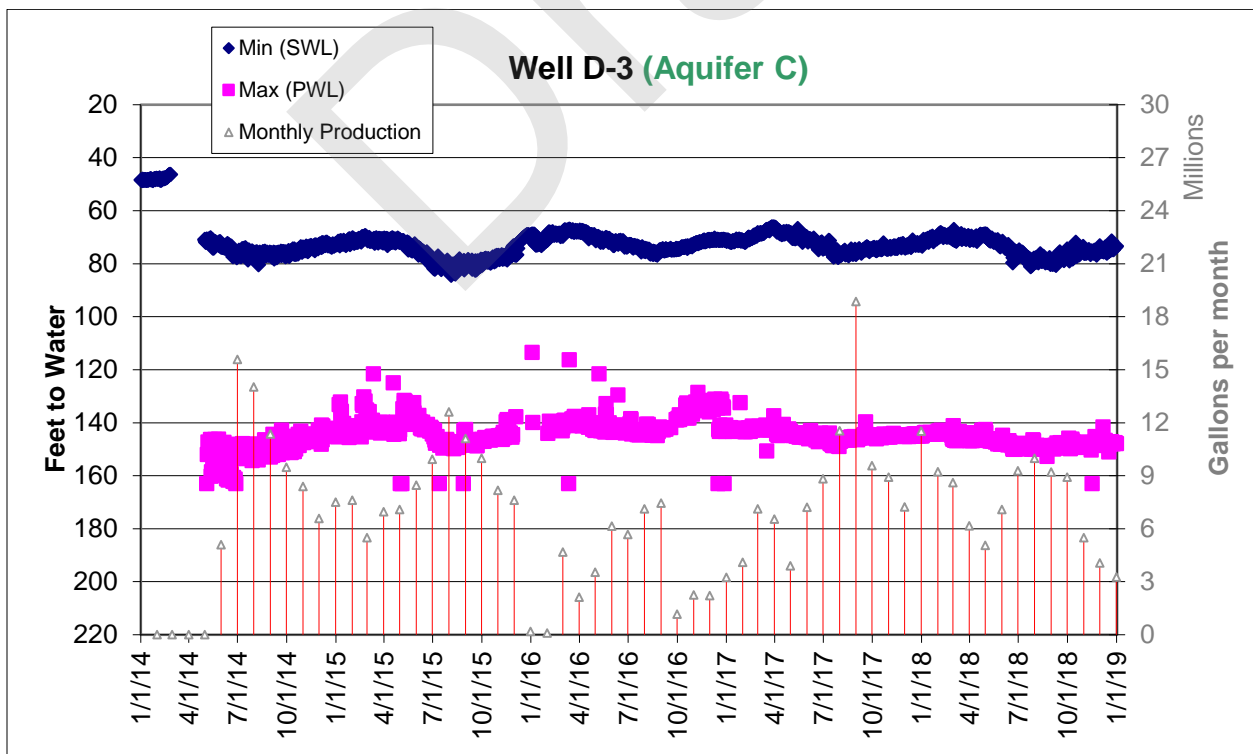


Figure 4.2-3. Well D-3 Water Levels and Monthly Production Volumes



4.3 WASHINGTON BOULEVARD

The Washington Boulevard wellfield has two wells, one each in Aquifers C and E. The original well on this site, Well “E”, was drilled in 1947. It had a relatively low production rate of 300 gpm from Aquifer C and the District stopped use in 1963 due to casing failure from electrolysis and excessive sanding⁸.

The current wells in the wellfield (E-2 and E-3, Figure 4.3-1) are relatively young, coming into service in the late 1970s. However, the field is of high priority for both quantity and regular use and is given a higher ranking due to these operational considerations. The site feeds the Washington Street Reservoir and the 404-Pressure Zone.

The Washington Boulevard site is of sufficient size for expansion. Up to two additional wells can be accommodated by making use of the neighboring “Fire Station” property, also owned by the District. The addition of treatment facilities is also possible but could impact the space available for multiple additional or replacement wells.

4.3.1 Well E-2

Well E-2 (S04) is the deeper of the pair of wells at the Washington Boulevard wellfield. The well ranks 20th in the assessment due to a relatively young age and generally stable production pattern.

4.3.1.1 Key details

Aquifer	Aquifer E
Size:	16-inch casing; 10-inch, 125-slot screen
Screened zone:	466 to 489 feet bls
Pump:	Line-shaft with VFD
5-year average SWL	94 feet bls
5-year average PWL	178 feet bls

4.3.1.2 Risk Assessment

Table 4.3-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	15	20	22	12	12	5	27
Detail	1977	2011	2011	955 gpm	136.9 MGY	Stable	

⁸ David Hall, Former Lakewood Water District Operations Manager, 2016, archival notes-to-file.

4.3.1.3 Water Level Analysis

Water level patterns in Well E-3 are generally stable over the past five years, but the data imply an off-set in measurements in 2014, and possibly 2018 (Figure 4.3-2). Additional research of the data and maintenance records is needed to see if this is a physical probe error or a SCADA programming problem.

The possible offsets in 2014 and 2018 may be masking the trend of aquifer responses. As noted in Wells A-3 and D-2, long-term records imply a decline in static water levels at other locations in Aquifer E.

Pump replacement in Well E-2 is not anticipated until after 2025, but we suggest verification of the data collection from the well probe before the pump is due for service.

4.3.1.4 Recommended Actions

- 1 year: Correct or confirm an apparent offset in the water level monitoring probe readings as noted above. Data from this well is used for the Abitibi annual monitoring report, so verification and corrections should occur before the next report is due.
- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records to determine if aquifer declines of concern are occurring.
- 5 to 10 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.

4.3.2 Well E-3

Well E-3 (S05) is ranked 24th overall for maintenance and service needs. This rank is driven mainly by the well's relatively young age and its fairly consistent, year-round use with at an average production rate of just under 1 MGD. However, this ranking may be artificially low as the water level patterns are a cause of concern (see below).

4.3.2.1 Key details

Aquifer:	Aquifer C
Size:	16-inch casing; 14-inch, 150-slot screen
Screened zone:	210 to 264 feet bls
Pump:	Line-shaft with VFD
5-year average SWL	54 feet bls
5-year average PWL	140 feet bls

4.3.2.2 Risk Assessment

Table 4.3-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	24	14	17	26	16	2	27
Detail	1977	2002	2002	715 gpm	115 MGY	Production loss?	

4.3.2.3 Water Level Analysis

Water level analysis suggests slightly lower water levels during pumping than were historically common, and that the pumping water level is nearly a constant until late in 2017, at which time erratic data were recorded (Figure 4.3-3). The static water level data appear normal and cyclic/stable. The constant pumping water level trend may be caused by the well-saver controls⁹ modifying the pumping rate to maintain the minimum pumping water level until late in 2017, at which time it was modified or turned off, or the use of the well-saver is masking the true pumping water level. In either case, the well appears to be producing less water (on average) and the well-saver is being used more frequently, which suggests that the well's efficiency is declining. This well is a candidate for testing and possibly well rehabilitation. Short term testing to verify the performance (specific capacity) and clarify the water level patterns discussed above should be possible with the existing equipment. If well performance decline is implied from this testing, well rehabilitation should be considered.

4.3.2.4 Recommended Actions

- 1 to 3 years: Perform detailed water level analysis and well testing to clarify well and pump performance. This will provide guidance on future pump replacement (pump setting, rate, annual use, and monitoring needs). Testing should be possible with existing pump equipment in place but may require some wellhead work if flow cannot be controlled at a level needed for testing.
- 3 to 10 years: Based on findings from above, schedule pump replacement. Verify well conditions with down-hole video. Rehabilitation may be needed given the age of the well and possible production declines as noted. Baseline testing of the well using the new equipment after any rehabilitation work is also recommended. Verify monitoring probe performance.

⁹ Variable-speed controller on the pump regulating production output to prevent water levels from falling below a designated depth.



Figure 4.3-1
Washington Blvd. Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water District
Facility Map Book**

Facility Name:
Washington Blvd

Facility Type:
Well/Storage
Facility

Description of Facility:
E-2/E-3 Wells, 3.5
MG Tank, 1 MG
Reservoir

Site Area:
146,184

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.3-2: Well E-2 Water Levels and Monthly Production Volumes

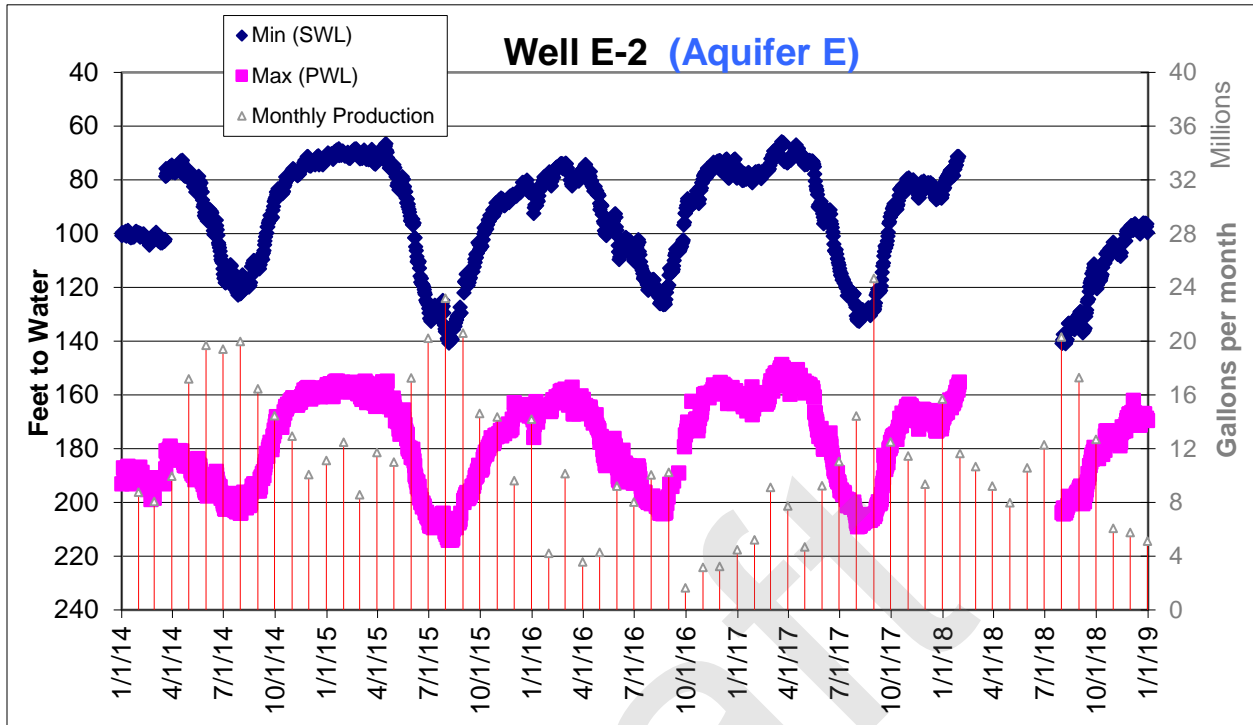
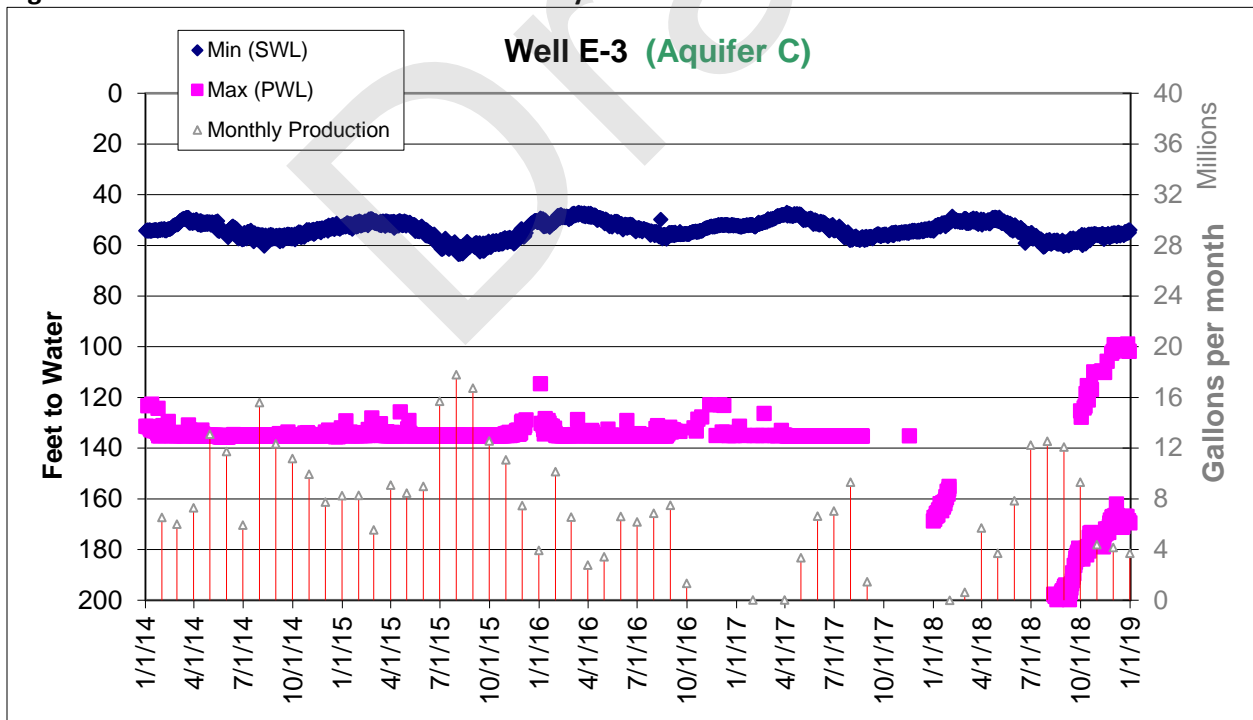


Figure 4.3-3 Well E-3 Water Levels and Monthly Production Volumes



4.4 BRIDGEPORT

The Bridgeport property is the site of the District's first test well (Test Well 1). Drilled in 1949, the well identified an aquifer zone between 75 and 95 feet bls but did not identify other favorable zones before the end of drilling at 394 feet bls. The well was converted into a production well (F-1) and produced around 450 gpm from the shallow aquifer (Aquifer A3). It was later abandoned due to loss of capacity and increased drawdown and had been decommissioned by 1966.

Well F-2 (S06, Figure 4.4-1) was installed in 1965. One of the operational considerations at this location is the Bridgeport storage tank as the size of the tank can limit production from the site during non-peak times.

The well site is a good candidate for expansion, given the space available and its central location within the water system. This will need to be balanced against space required to expand or replace the Bridgeport storage tank (if any). The site could be used for a new well tapping the shallow aquifers (A3 or C, if present), a replacement Aquifer E well, or for a deep well to explore for Aquifer G. Aquifer G was identified at the Scotts wellfield suggesting that similar deep drilling at Bridgeport may be possible.

4.4.1 Well F-2

Well F-2 is ranked 5th overall due to aging pump equipment and high engineering importance (for location and peak production support).

4.4.1.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 10-inch, 50- to 100-slot screen
Screened zone:	480 to 535 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	103 feet bls
5-year average PWL	148 feet bls

4.4.1.2 Risk Assessment

Table 4.4-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	16	1	1	9	29	6	3
Detail	1965	1982	1982	1,020 gpm	5.2 MGY	Stable	

4.4.1.3 Water Level Analysis

Well F-2 saw higher than average use in 2018 due to other wells being out of service. Water level records for this well show regular seasonal summer drawdown of around 40 feet even when the well is not pumping significantly (Figure 4.4-2). This may be a response to regular extended pumping in one or more of the other Aquifer E wells on the east side of the lakes (R-1, P-2, K-2). Interestingly however, the summer drawdown in 2018 was not much larger than previous years even with added hard pumping of the well.

The water level patterns are generally stable over the past five years except for apparent offsets in 2017 and again in 2018. As with Well E-2, these offsets might be related to probe or programming changes and may be obscuring other trends in the well or aquifer. While very slight Aquifer E declines are present in the static water level record from 2014 through 2016, it is difficult to determine if these are related to precipitation trends, regional production, or data issues. This well should be assessed in conjunction with other Aquifer E wells to determine the health of the source aquifer.

4.4.1.4 Recommended Actions

- 1 year: Correct or confirm an apparent offset in the water level monitoring probe readings as noted above. Data from this well is used for the Abitibi annual monitoring report, so verification and corrections should occur before the next report is due.
- 1 to 3 years: Replace pump. Verify well conditions with down-hole video. Clean well casing and screen as needed. Baseline testing of the well using the new equipment is also recommended.
- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records to determine if aquifer declines of concern are occurring.



104TH &
BRIDGEPORT 0.5 MG
HYDROPIILLAR TANK

F-2 WELLHOUSE

S-06 104
BRDGPR1 F-2

Figure 4.4-1
Bridgeport Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Bridgeport**

**Facility Type:
Well/Storage
Facility**

**Description of
Facility:
F-2 Well, 0.5 MG
Hydropillar Tank**

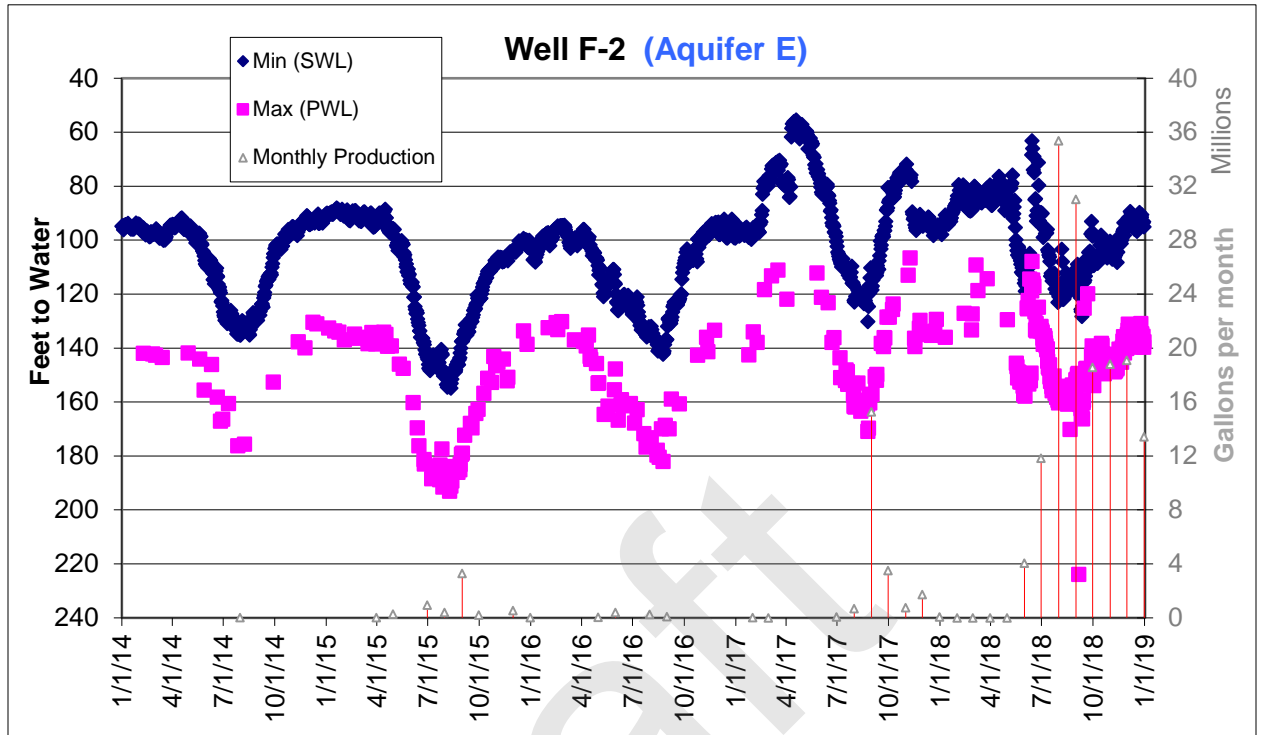
**Site Area:
64,151**

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.4-2. Well F-2 Water Levels and Monthly Production Volumes



4.5 SCOTTS WELLFIELD

The Scotts Wellfield (S07) is important to District operations. The site is highly productive and has proven reliable over the years. The wellfield supports both internal water system needs and the wholesale supply demands. The District's second test well (T-2) was drilled here and when it proved successful, became Well G-1. Well G-2 was installed ten years later. A new deep source well (Well G-3) has been completed but is not yet rated for production.

The wellfield site is sufficiently large to allow for expansion. Initial testing suggests Well G-3 will be able to add production at this site from Aquifer G. Regardless, there is sufficient space to allow for one additional well and may also allow for one or both of the existing wells to be replaced.

There is also adequate space to install treatment facilities should they be needed, either to address water quality concerns from the new deep well (e.g. high concentrations of iron or manganese) or to resolve contamination of the shallow aquifer possibly related to per- and polyfluoroalkyl substances (PFAS) found on Joint Base Lewis-McChord (JBLM).

4.5.1 Well G-1

Well G-1 (S28) is the primary supply source in the wellfield. It typically has about double the annual production of Well G-2. G-1 is the District's oldest well, but evaluation in 2011 indicated relatively good condition of the well and screens. The development effort appeared to improve well performance somewhat. So long as the casing and screen remain in good condition, rehabilitation similar those used in 2011 should be considered if the well performance declines again.

Due to the well's age and importance to the system, this well ranks 1st in the assessment. The well's age is the dominant concern, but this is tempered somewhat by the apparently stable conditions shown in its pumping responses and the good condition of the well casing and screen in 2011. It is very difficult to predict the longevity of a well and the District should plan possible replacement of this well within the next 10 years.

4.5.1.1 Key details

Aquifer:	Aquifer A3
Size:	24-inch casing; 20-inch, 150-slot screen
Screened zone:	152 to 173 feet bls
Pump:	Submersible with VFD
5-year average SWL	29 feet bls
5-year average PWL	148 feet bls

4.5.1.2 Risk Assessment

Table 4.5-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	1	11	21	4	5	6	1
Detail	1950	2004	2011	1,285 gpm	191 MGY	Stable	

In general, water level trends in this well are stable over recent years. However, the summer peak production in 2018 shows extended drawdown patterns not seen since prior to the well redevelopment in 2011. The additional drawdown does not appear to be wholly a function of drawdown from use of Well G-2. The District reports that the transducer in this well was replaced in December 2018 so the data may be suspect. Alternatively, the well may be experiencing a loss of efficiency.

Additional monitoring will help determine if the 2018 drawdown pattern is real and persistent. If the pattern is repeated in 2019, testing of the well should be scheduled to determine if well redevelopment will be needed in the near future. Pump replacement is scheduled for 2020 and depending on the 2019 monitoring responses, any needed work could be combined into a single effort.

4.5.1.3 Recommended Actions

- 1 year: Review monitoring data at the end of the 2019 summer pumping period. If excessive drawdown is again evident, perform controlled testing to verify current performance and evaluate need for future redevelopment (could be concurrent with below).
- 1 to 3 years: Replace pump. Verify well conditions with down-hole video. Rehabilitation may be needed given the age of the well and possible production declines as noted. Baseline testing of the well using the new equipment is also recommended. Verify monitoring probe performance. Monitoring of G-1 and G-2 should occur during testing and the results analyzed to identify the range of drawdown interference. Establish new wellfield operation limits based on the testing results.
- 5 to 10 years: In addition to annual water level data review, follow-up testing using the existing pump equipment should be performed at least every five years. This is then compared to the baseline testing and analyzed for well performance changes. This information will guide the well rehabilitation needs and schedule.

4.5.2 Well G-2

Well G-2 (S29) is the secondary well in the field and is used on an as-needed basis. The well is ranked 4th in the assessment due to its location in the system, age, and use. While not at as much risk of failure as Well G-1 given that it is younger by ten years and has a lower average production and use pattern, the well is still a priority well key in the District's system as it helps support peak production and the wholesale contracts.

4.5.2.1 Key details

Aquifer: Aquifer A3

Size: 24-inch casing; 12-inch, 125-slot screen
 Screened zone: 154 to 180 feet bls
 Pump: Submersible with Soft Start
 5-year average SWL 20 feet bls (2014 to 2016)
 5-year average PWL 50 feet bls (2014 to 2016)

4.5.2.2 Risk Assessment

Table 4.5-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	10	4	4	15	19	6	1
Detail	1960	1995	Overdue	851 gpm	92 MGY	Stable	

Based on District records, Well G-2 is now overdue for pump replacement and possible rehabilitation. The well performance appears to be generally stable with the pump still capable of maintaining fairly consistent rates over the past five years (both pumping alone or in tandem with G-1). The additional life span of the pump is difficult to predict but given the importance of this wellfield, it may be prudent to prioritize the pump replacement and use the opportunity to also verify the well and screen conditions.

The District should also plan for wellfield performance testing once the new equipment is installed. This would entail controlled flow tests on each well and both wells together while monitoring water levels. Analysis of such data will allow for balancing of individual and tandem production.

The water level data record from 2017 onwards shows an offset compared to data prior to 2016, and the 2016 data are apparently erroneous. Further investigation as part of this work and monitoring during the drilling of the new Well G-3 suggests that this is a probe error. Manual water levels collected by the District in 2018 in wells G-1 and G-2 suggest coincident values, which is what would be expected. However, the Well G-2 recorded values are about 15 to 20 feet too high as compared to what would be expected. Further work is needed to investigate and correct this apparent offset.

This current dataset is short by comparison to other wells (beginning in 2014) because as it is in a wellfield, Well G-1 was used as a proxy for both wells and because hydrograph analysis was not needed for the Abitibi annual monitoring report.

4.5.2.3 Recommended Actions

- 1 year: Correct or confirm an apparent offset in the water level monitoring probe readings as noted above.
- 1 to 5 years: Replace pump. Verify well conditions with down-hole video. Clean well casing and screen as needed. Baseline testing of the well using the new equipment is also recommended. Monitoring of well testing should occur in both wells and the results

analyzed to identify the range of drawdown interference. Establish new wellfield operation limits based on the testing results.

4.5.3 Well G-3

Well G-3 has been drilled and tested but final analysis of the well was not complete at the time of writing. Currently, it is anticipated that the new well will require treatment for iron and manganese. This treatment may need to be located with possible future PFAS treatment needs for Wells G-1 and G-2 in mind.

The final report for the new well will include recommendations for equipping the well, its suggested use pattern, and for short- and long-term monitoring. Additionally, it will likely be prudent to have a regular sampling schedule for the first six months of operations to check for sand production, in addition to any requirements of the treatment plant. We also suggest a review of water level and production data after one year of regular operations.

Draft



Figure 4.5-1
Scotts Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Scotts**

**Facility Type:
Well Site**

**Description of
Facility:
G-1, G-2**

**Site Area:
121,227**

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.5-2. Well G-1 Water Levels and Monthly Production Volumes

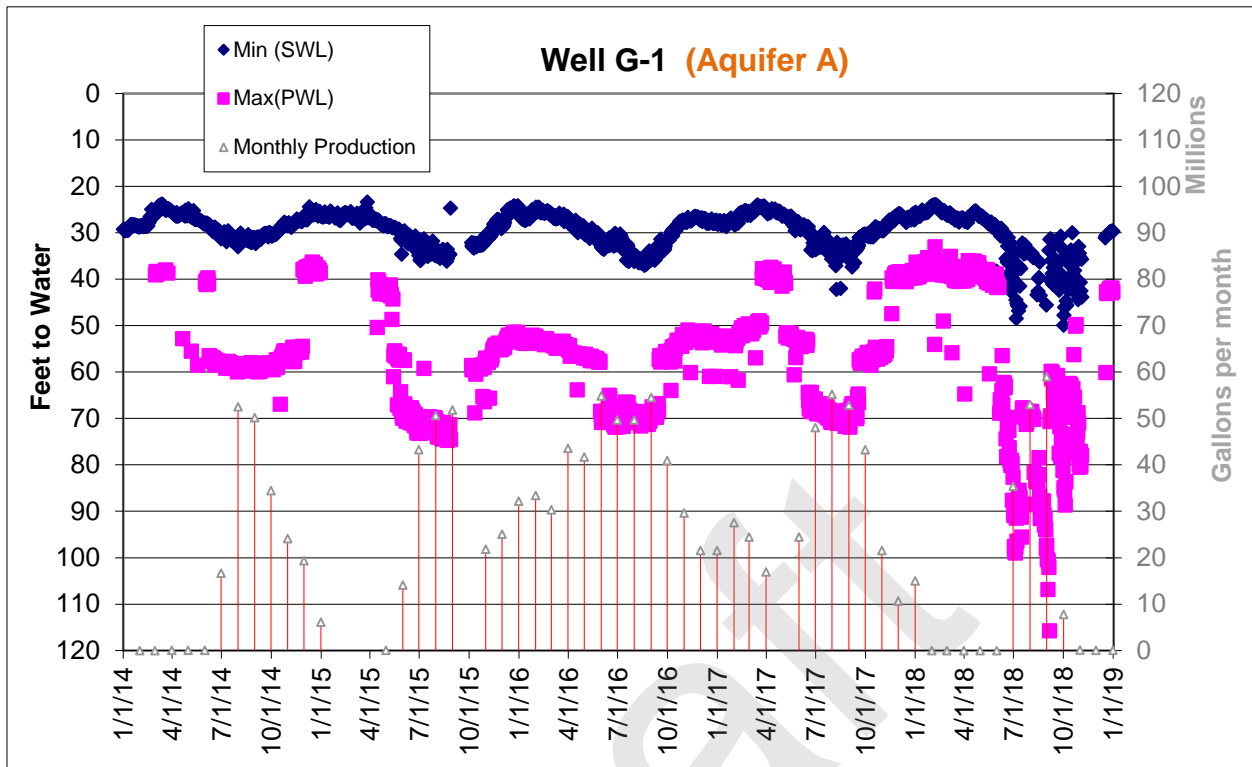
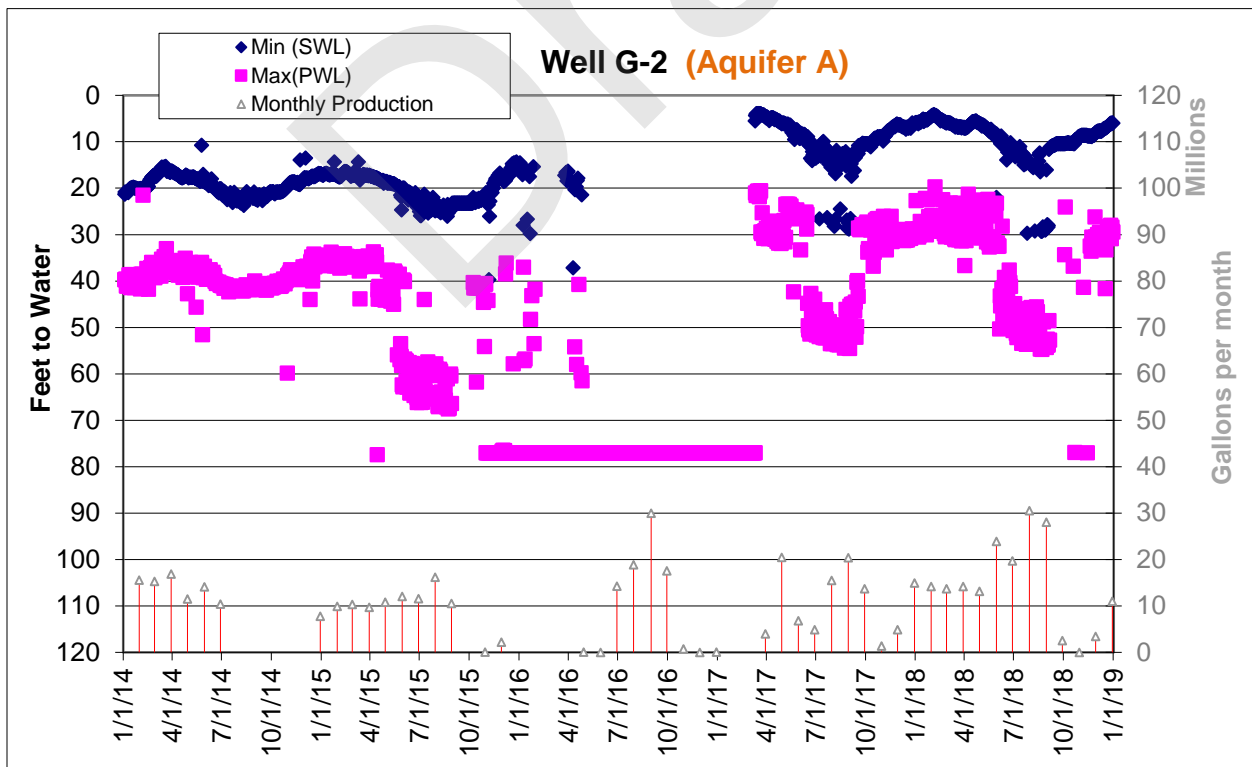


Figure 4.5-3. Well G-2 Water Levels and Monthly Production Volumes



4.6 PONDERS WELLFIELD

Like the Scotts wellfield, the Ponders Wellfield (S08) is a key production location for the District. There is also a practical need for continued use in that the Ponders Corner superfund clean-up process used the Ponders wellfield to capture contamination. The stripping towers required for the treatment are currently being replaced and additional treatment to address the PFAS contamination is also being planned. The wellfield is off-line during the re-construction project.

The site has two wells, Well H-1 completed in 1951 and Well H-2 added in 1959. The wells were typically run separately as production in tandem tended to lower the practical production rates in each. The former treatment plant capacity was also a limiting factor.

Beyond the current wellfield reconstruction, space is available for one additional well or a replacement well. Past planning has looked at the possible drilling of a new well, Well H-3, to tap Aquifer E at this location and this option should be retained. A deep well at this site could offer additional or replacement production for the existing shallow wells or make up for the loss of Well A-3 in case that well cannot be replaced onsite. Drilling a deeper well should be prioritized after a new Well at 112th street (R-2) and/or finding a new location in the vicinity of St. Clair's Hospital (proposed Well W-1), but this somewhat depends on the engineering considerations.

The new treatment plant is being designed to allow for wellfield production of 1,400 gpm on average and with a peak production of 2,000 gpm. The plant is designed to treat up to 2,800 gpm. This would occur after installation of Well H-3, if drilled.

4.6.1 Well H-1

Well H-1 (S30) is in regular use and is important for the District's production. Primarily a peak-period production well, the well's main use has been during the Summer and Fall months when demand is highest.

This well ranks 7th in the assessment due to its age, regular use, and high production rate. The well is at a key location and given the reconstruction of the treatment plant represents a critical well to retain in good condition and production. Given the risks posed by the well's age and use level, the District should plan ahead for its replacement (separate from the planning of Well H-3).

4.6.1.1 Key details

Aquifer:	Aquifer A3
Size:	24-inch casing; 20-inch, 100-slot screen
Screened zone:	86 to 106.5 feet bls
Pump:	Line shaft with VFD
5-year average SWL	43 feet bls
5-year average PWL	63 feet bls

4.6.1.2 Risk Assessment

Table 4.6-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	2	22	24	3	7	9	7
Detail	1951	2012	2012	1,389 gpm	163 MGY	Stable	

Production in this well is high due to the nature of the treatment plant operations, but pumping levels appear to be consistent and static levels indicate some small change over time, but these may be related to responses to precipitation patterns. The data record should be analyzed further by comparing with the precipitation patterns for the same time period in order to clarify the pattern.

Pump replacement is not due for Well H-1 until 2032. Baseline testing of the well and review of the monitoring data are recommended when the treatment plant construction is finished.

4.6.1.3 Recommended Actions

- 1 year: Once the treatment plant reconstruction is complete, verify water level and production against historic record. Test pumping of the well can also be considered at this time (see next bullet) or combined with similar testing of Well H-2.
- 1 to 3 years: Perform baseline testing of the well using existing equipment. Both wells should be monitored during testing and the results analyzed to identify the range of draw-down interference. Determine new wellfield operation limits based on the testing results.

4.6.2 Well H-2

Well H-2 (S31) is a companion of Well H-1. H-2 is typically operated when H-1 is off, but they are sometimes run together. The well ranks 6th in the assessment as it has the same risks and high use/production as Well H-1, but its equipment is older, and the well is in need of a performance assessment.

Since the production rate is lower than in H-1, this well was often preferentially used in the winter and spring months when system demands are lower. This shared production pattern seemed to work well with the old treatment plant requirements the new plant may alter this pattern. Continuing the seasonal split between the two wells should be considered.

4.6.2.1 Key details

Aquifer:	Aquifer A3
Size:	16-inch casing; 14-inch 80- to 125-slot screen
Screened zone:	86 to 105 feet bls
Pump:	Line shaft with VFD
5-year average SWL	42 feet bls (2014 only)

5-year average PWL 58 feet bls (2014 only)

4.6.2.2 Risk Assessment

Table 4.6-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	8	10	13	7	14	9	7
Detail	1959	2003	2003	1,152 gpm	131 MGY	Stable*	

* Based on H-1 responses.

The water level data for Well H-2 is incomplete and has inconsistencies that prevent assessment of this well on its own. Once the treatment plant reconstruction is finished, the monitoring will resume, and the historic record can be verified or corrected.

The water level data in Figure 4.6-3 is likely incorrect as the recorded levels beginning January 2015 are too low by comparison to Well H-1. Additionally, the data patterns, especially the static water levels, appear to be nearly identical to those shown in Well H-1 suggesting that the data collected could be a duplication rather than an independent recording. Once the wellfield is back on-line, these data errors should be further analyzed and corrected.

Pump replacement for Well H-2 is scheduled for 2021. Additional monitoring verification and well testing should take place at that time.

4.6.2.3 Recommended Actions

- 1 year: Re-assess the water level monitoring probe readings as noted above.
- 1 to 3 years: Replace pump. Verify well conditions with down-hole video. Clean well casing and screen as needed. Baseline testing of the well using the new equipment is also recommended. Both wells should be monitored during testing and the results analyzed to identify the range of interference effects. Establish new wellfield operation limits based on the testing results.



Figure 4.6-1
Ponders Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Ponders**

**Facility Type:
Wellsite**

**Description of
Facility:
H-1/ H-2 Wells**

**Site Area:
50,066**

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.6-2. Well H-1 Water Levels and Monthly Production Volumes

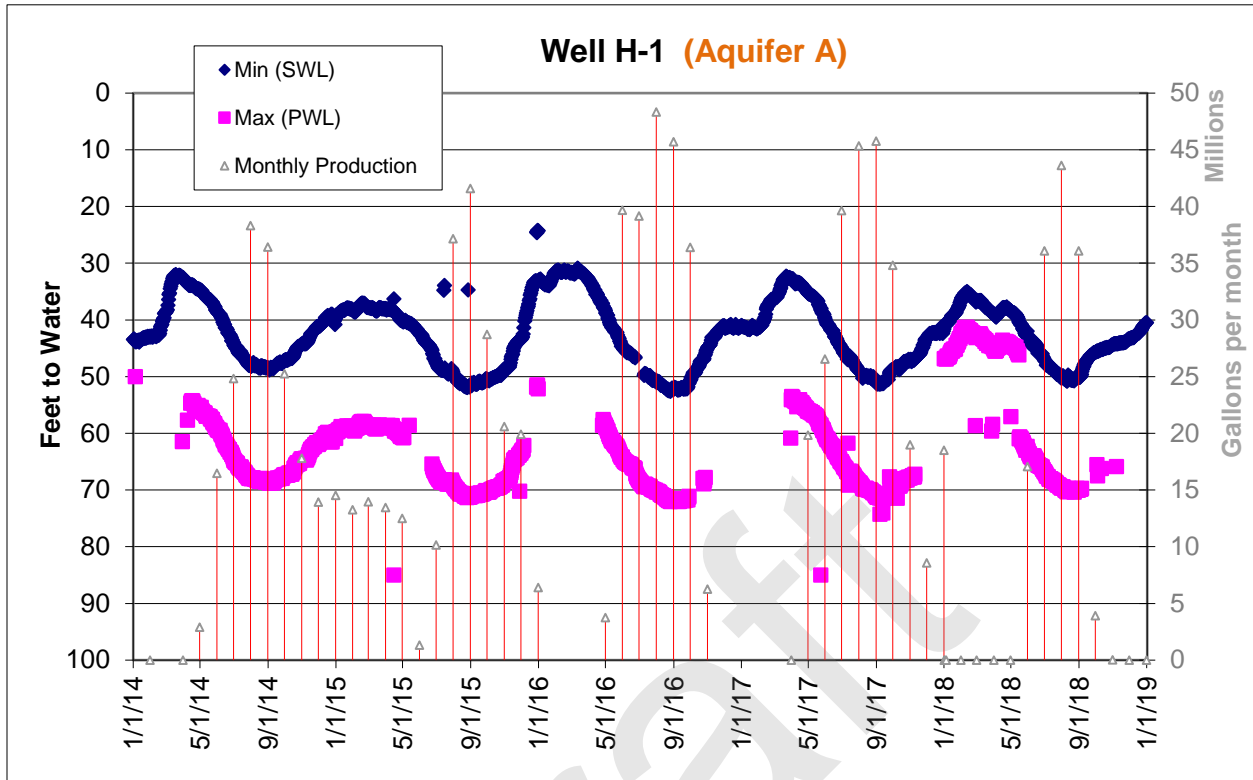
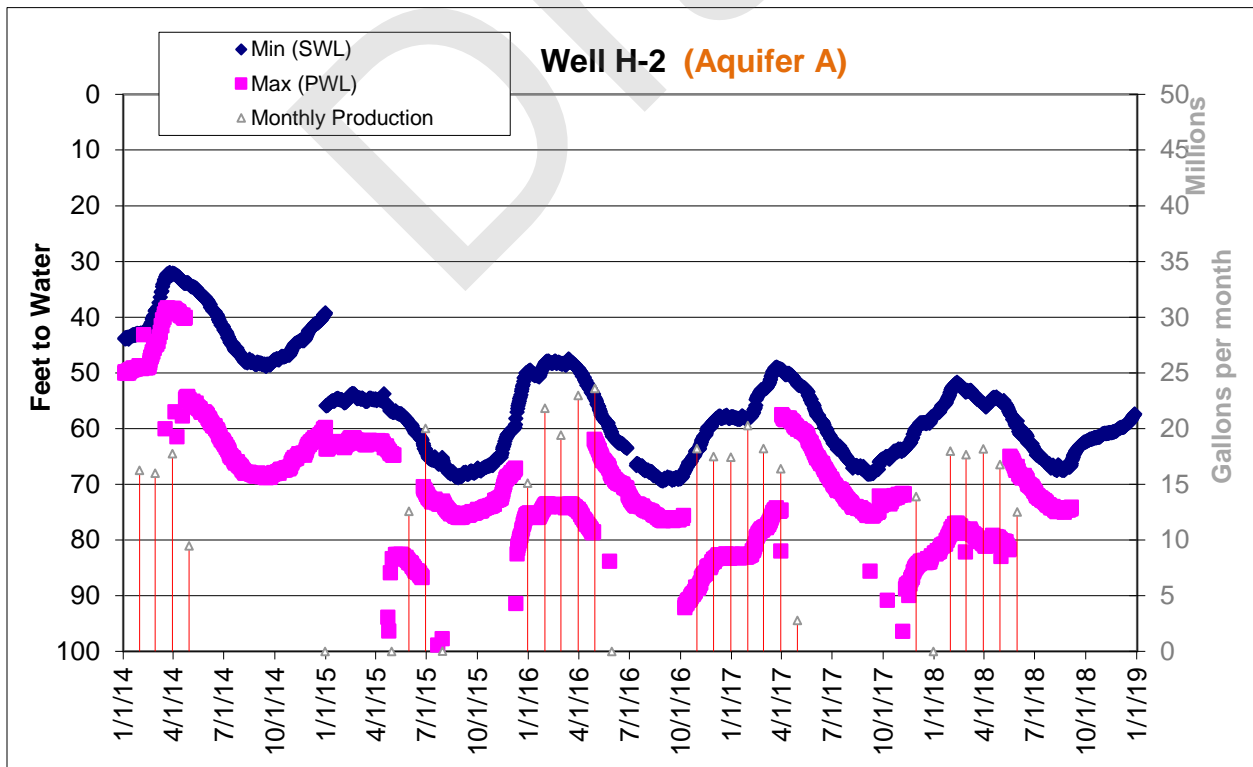


Figure 4.6-3. Well H-2 Water Levels and Monthly Production Volumes



4.7 HIPKINS WELLFIELD

The Hipkins Road wellfield (S09) was the fourth major well site developed by the District (after the Yard, Scotts and Ponders wellfields). The original test well on this site was named I-1. The subsequent production well drilled in 1952 was initially called Well I-2. Two more wells were later drilled and became Wells I-3 and I-4. However, at some point the test well was decommissioned and Well I-2 has been called Well I-1 ever since.

Site expansion is not expected given previous drilling experience and the space available. However, there is probably enough room to allow replacement of Well I-3 should that prove necessary.

Well I-4 explored to a depth of 675 feet bls, but poor water quality in the deeper zones prevented completion of a deeper well. Expanding the site to allow use of deeper aquifers (E or G) is possible but would necessitate a treatment plant to handle the expected high iron or manganese concentrations. As noted, there may be adequate space for a treatment plan to be added, but this might require reconfiguration of the site (e.g. decommissioning one or more wells) and could impact the space available for a replacement well for Well I-3.

4.7.1 Well I-1

Well I-1 (S32) is out of service and is considered an emergency-use well. The well has pump equipment but has not been operated in over five years. Its current operating conditions are not known. The well is not anticipated to be used regularly in the future.

The well is the 3rd oldest in the District's inventory and has pump equipment from the 1980s. These factors push the well's ranking high (coming in at 18th in the assessment), which seems inappropriate given its emergency-use status. The lack of use, does raise the question of whether the well would perform as desired in an emergency.

There are limited water level data from this well. The District should continue to collect manual water level measurements and plot these data against the Well 1-3 trends (see below). It may be useful to include this reporting in the Abitibi annual monitoring. This may be particularly true if this well transitions from an emergency well to being offered as a mitigation offset for future water rights (similar to I-4).

4.7.1.1 Key details

Aquifer:	Aquifer C
Size:	18-inch casing; 12-inch screen
Screened zone:	211 to 267 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	85 feet bls (based on monthly hand measurements; 2018 data may be erroneous)
5-year average PWL	Well not pumped

4.7.1.2 Risk Assessment

Table 4.7-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	3	27	2	31	31	9	7
Detail	1952	1982	1982?	0 gpm	0 MGY	Stable*	

* Based on Well I-3 levels and a partial record of hand measurements

The water level data for Well I-1 is sparse and inconsistent. The well is better evaluated in comparison to the other wells in the wellfield. See the Well I-3 hydrograph below.

4.7.1.3 Recommended Actions

- 1 to 3 years: Review future plans for this well. If retained in emergency-only status, perform a benchmark test of the existing equipment to verify well and pump performance. Establish an upper and lower limit of production and identify any operational limits if extended use becomes necessary.
- 3 to 5 years: If transitioned to a mitigation asset, the water right processing effort will dictate the future use of the well. At a minimum, the pump equipment will likely be removed. Ecology may request or recommend that the well be decommissioned but we suggest that it become a dedicated monitoring point instead.

4.7.2 Well I-3

Well I-3 (S33) is the only well still active in the wellfield. It is ranked 30th in the assessment due to its medium age, low use, and recent pump replacement. The well is primarily a support well, helping to meet peak needs.

4.7.2.1 Key details

Aquifer:	Aquifer C
Size:	20-inch casing; 12-inch, 125-slot screen
Screened zone:	219 to 266 feet bls
Pump:	Line Shaft with VFD
5-year average SWL	76.7 feet bls
5-year average PWL	148.8 feet bls

4.7.2.2 Risk Assessment

Table 4.7-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	21	27	25	29	25	9	7
Detail	1970	2018	2001	585 gpm	26 MGY	Stable*	

*Only data partial record available

Water level patterns in this well are confusing. Monthly production volume seems to be similar year-to-year but pumping water levels rose 35 ft between 2014 and 2017. It is possible this is a reflection of the declining instantaneous pumping rate prior to the pump's failure in late 2017.

Static water levels appear stable, aside from the odd data in Well I-1 during 2017-2018, which are lower than expected.

Given the irregularities in the water level data and the recent pump replacement in Well I-3, the wellfield should be field tested to verify probe readings and well performance. In particular, the water level elevation relationships between each of the three wells on the site should be confirmed and compared with the current telemetry programming to ensure accuracy. Additional analysis of the historic record should follow to review the wellfield conditions and confirm trends.

4.7.2.3 Recommended Actions

- 1 to 3 years: Baseline testing of the well using the new pump equipment is recommended. Verify monitoring probe performance, settings, and elevations.

4.7.3 Well I-4

Well I-4 (S10) is out of service and has been dedicated as a mitigation offset for the Abitibi water rights. The well was included in the assessment, but not ranked. The well has no equipment and cannot return to service without a water rights change. Manual measurements of water levels are possible in this well but are irregularly collected.

If Well I-1 is transitioned to a mitigation asset, then a monitoring program using just one of these wells may be sufficient to provide Ecology with proof of non-use. In such case, use of Well I-1 for this purpose is recommended as it is further from Well I-3 and thus has less drawdown interference.



Figure 4.7-1
Hipkins Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

Facility Name:
Hipkins

Facility Type:
Wellsite

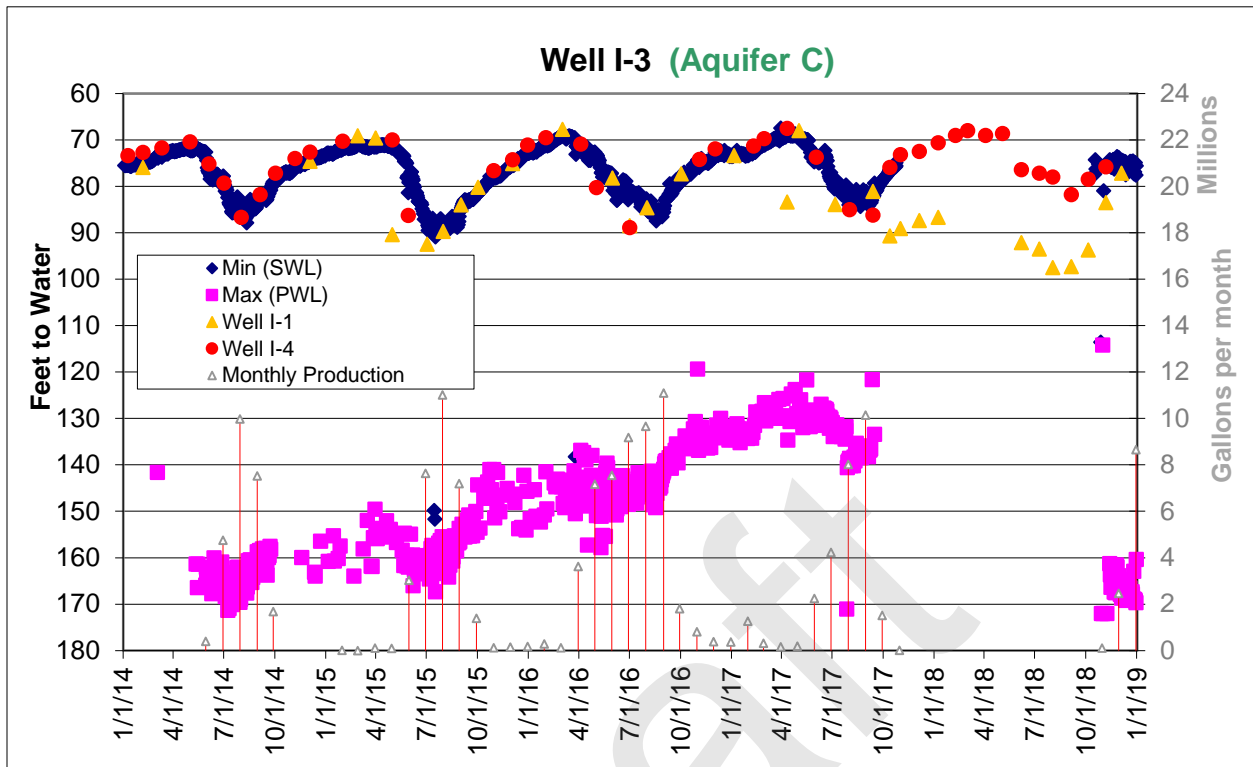
**Description of
Facility:**
I-1/I-3 Wells

Site Area:
39,266

1 inch equals 50 feet

5/24/2019

Figure 4.7-2. Well I-3 Water Levels and Monthly Production Volumes



4.8 88TH & PINE WELLFIELD

The 88th and Pine wellfield was initiated in 1952 with the drilling of Well J-1. Well J-2 was added in 1961 and Well J-3 in 2007. The wellfield is important given its location in the northwestern corner of the service area, serving the 455-Pressure Zone and having an on-site storage tank.

The site is of sufficient size and layout to allow for expansion or an additional well, particularly as the neighboring parcel is District-owned. However, elevation changes on the site may make siting harder or more expensive. Space is also available for a treatment plant, if needed, but more evaluation might be needed if both a plant and one or more new wells are all needed.

The PFAS concentrations noted in these wells (and near-by Tacoma Well 10C) also raise concerns for this site. Given the importance of the wellfield to the pressure zone, evaluation of treatment options and contingency planning may be needed relatively soon in order to have advance plans in place so site production can be maintained without significant interruption.

Note, the District's WFI should be updated to reflect both Well J-1 and Well J-3 as a 'Well in a wellfield' rather than a stand-alone well. This is a minor consideration but helps the DOH engineers properly understand the well relationships, particularly where sampling and data requirements are concerned.

4.8.1 Well J-1

Well J-1 (S11) was constructed in 1952 (the fourth oldest well). The well is tied with Well R-1 in the assessment scoring but is ranked slightly ahead of Well R-1 because Well J-1 is older. Well J-1 ranks 15th in the assessment due to its age and regular use.

4.8.1.1 Key details

Aquifer:	Aquifer A
Size:	24-inch casing; 16-inch, 100-slot screen
Screened zone:	135 to 156 feet bls
Pump:	Line Shaft with VFD
5-year average SWL	78 feet bls
5-year average PWL	111 feet bls

4.8.1.2 Risk Assessment

Table 4.8-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average Peak use	Average Annual use	Water level trend score	Engineering score
Rank	4	25	28	10	20	7	16
Detail	1952	2016	2016	1,017 gpm	86 MGY	Stable	

The well was off-line during 2016 and part of 2017 and water level data appears to be slightly offset between the end of data collection in 2016 and the re-start of data in 2017. Current telemetry data collection should be verified against hand measurements to ensure consistency.

4.8.1.3 Recommended Actions

- 1 year: Update the Well J-1 (S11) designation as a ‘Well in a wellfield’ on the DOH’s Water Facilities Inventory form for the District.
- 1 year: Correct or confirm an apparent offset in the water level monitoring probe readings as noted above. Data from this well is used for the Abitibi annual monitoring report, so verification and corrections should occur before the next report is due.
- 1 to 5 years: Baseline testing of the well using the new equipment. Both wells should be monitored during testing and the results analyzed to identify the range of interference effects. Establish new wellfield operation limits based on the testing results.

4.8.2 Well J-2

Well J-2 (S12) was installed in 1961 and drilled to Aquifer E. This initially allowed production from both Wells J-1 and J-2 without concern for interference between the wells. However, over the years this well began producing sand. The recommended pumping rate was lowered to 750 gpm in 1996 in part to attempt to address this problem. Redevelopment of the well is hampered by the well’s construction (a 12-inch liner perforated in two zones with an 8-inch, gravel packed screen in the lower zone) and the pump house configuration. Development inside the screened portion is considered risky given its age. Reconfiguring the well or additional development may be possible but could be expensive.

Performance testing of this well is recommended. The current pump is due for replacement by 2024. It may be appropriate for this pump to be removed and testing of the well performed with a temporary pump. The testing would attempt to assess whether there is a lower rate of production where sanding is diminished or does not occur. In such case, a new pump could be installed, and the well would then be available for regular use. A common recommendation for sanding wells is to avoid repeated start-stop sequences as much as possible so, the ideal situation would be that new, lower rate would allow for consistent production rather than using the well for peak production.

Given the sanding condition, the well is generally only used intermittently for peaking purposes. Despite its age, Well J-2 places 22nd in the assessment due to its relatively newer equipment and a lower engineering ranking due to the sanding issue limiting the well use.

4.8.2.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 12-inch perforated casing; 8-inch, 30-slot screen
Screened zone:	498 to 605 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	143 feet bls (2014 to 2017)

5-year average PWL 180 feet bls (2014 to 2017)

4.8.2.2 Risk Assessment

Table 4.8-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	12	17	19	22	27	6	16
Detail	1961	2009	2009	750 gpm	11 MGY	Stable*	

*Only data partial record available

The limited water level data for this well are used for the Abitibi annual monitoring report, so reestablishing data collection here is important. This well should also be part of a regional analysis of water level signatures in Aquifer E in conjunction with data from other wells (e.g. Wells D-2, E-2, P-2, R-1, etc.).

Testing to establish upper and lower limits of production may be warranted. Average production is quite low due to the sanding issue, but the well may be important to retain as a supplement to production from Wells J-1 and J-3, especially if consistent (not peaking) pumping appears possible. Balance this against other wellfield needs such as the need for a treatment system if the shallow wells are contaminated with PFAS. In the case where PFAS treatment is needed, the District should assess whether blending production from Well J-2 (even at low rates) would help offset the contaminant concentrations in the other wells.

4.8.2.3 Recommended Actions

- 1 to 2 years: Replace probe if possible or begin collection of hand measurements.
- 1 to 5 years: Review future plans for this well. When the pump equipment is due for replacement, assess the well condition with downhole video. Perform testing as discussed above to determine if a lower production rate will eliminate sand production and assess if additional work on the well is justified.
- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records.

4.8.3 Well J-3

Well J-3 (S41) was completed in 2007. Originally drilled to 611 feet, this well was intended to tap Aquifer E as a supplement to or replacement for Well J-2. However, Aquifer E at this location offered poor production rates from the well and the well was reconfigured to pump from Aquifer A3 instead. As a supplement to Well J-1, this well provides regular supply. Well J-3 has a low ranking (26th) in the assessment, being relatively young and having new equipment.

4.8.3.1 Key details

Aquifer: Aquifer A3
 Size: 20-inch casing; 16-inch, 100-slot screen

Screened zone: 140 to 160 feet bls
 Pump: Submersible with VFD
 5-year average SWL 64 feet bls
 5-year average PWL 95 feet bls

4.8.3.2 Risk Assessment

Table 4.8-3

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	31	18	20	17	22	10	4
Detail	2007	2009	2019	817 gpm	60 MGY	Stable	

The well was off-line for 2018 and part of 2019 due to pump work and is only recently back in service. Current indications are that the well is in good condition and production levels can return to that seen in recent years. Baseline performance testing of the well is suggested to establish values to compare with future performance.

4.8.3.3 Recommended Actions

- 1 to 2 years: Update the Well J-3 (S41) designation as a ‘Well in a wellfield’ on the DOH’s Water Facilities Inventory form for the District.
- 1 to 5 years: Baseline testing of the well using the new equipment is recommended. Both Aquifer A wells should be monitored during testing and the results analyzed to identify the range of drawdown interference. Establish new wellfield operation limits based on the testing results.



Figure 4.8-1 88th & Pine Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

Lakewood Water District Facility Map Book

Facility Name:
88th & Pine

Facility Type:

Description of Facility:
0.44 MG Tank, J-1/
J-2/J-3 Wells, 2
Boosters

Site Area:
107,522

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.8-2. Well J-1 Water Levels and Monthly Production Volumes

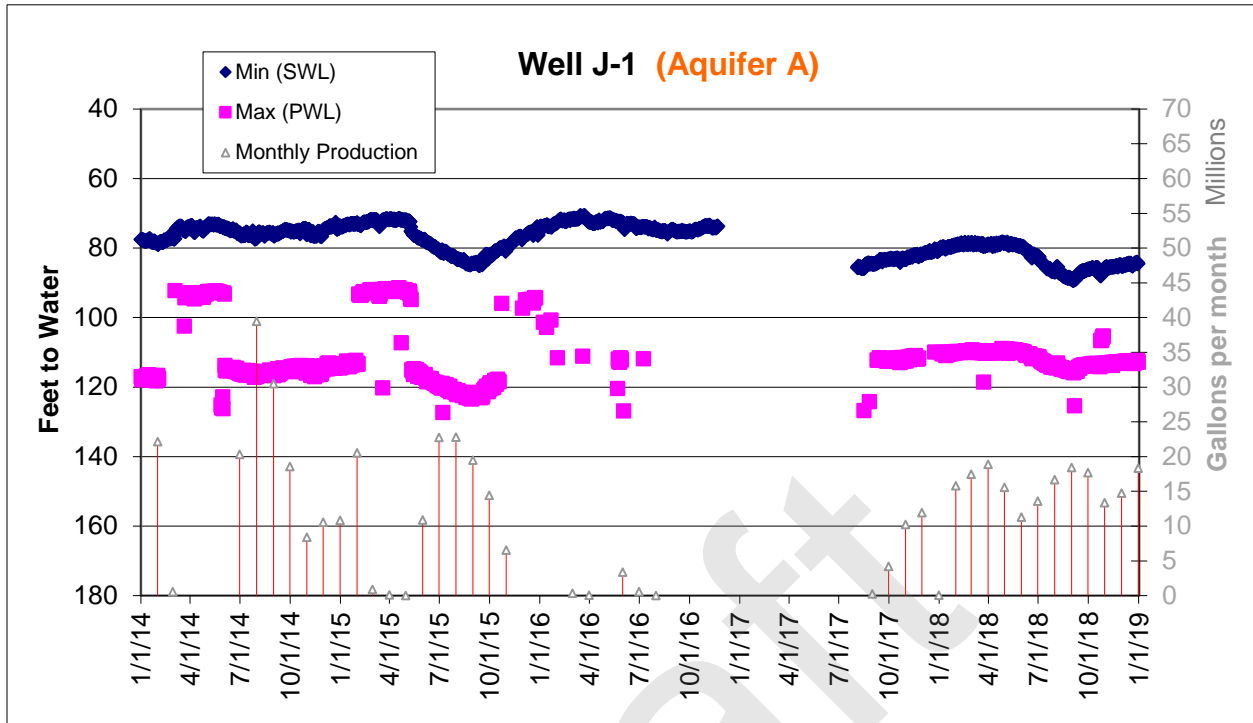


Figure 4.8-3. Well J-2 Water Levels and Monthly Production Volumes

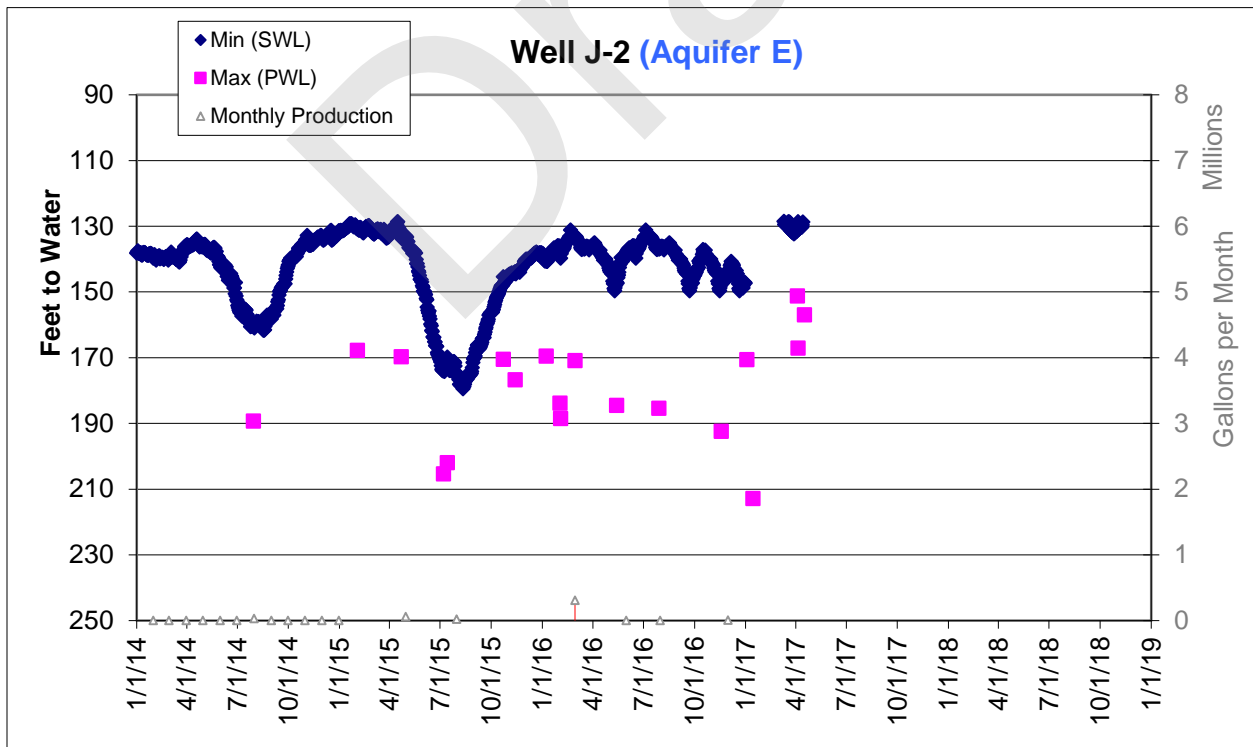
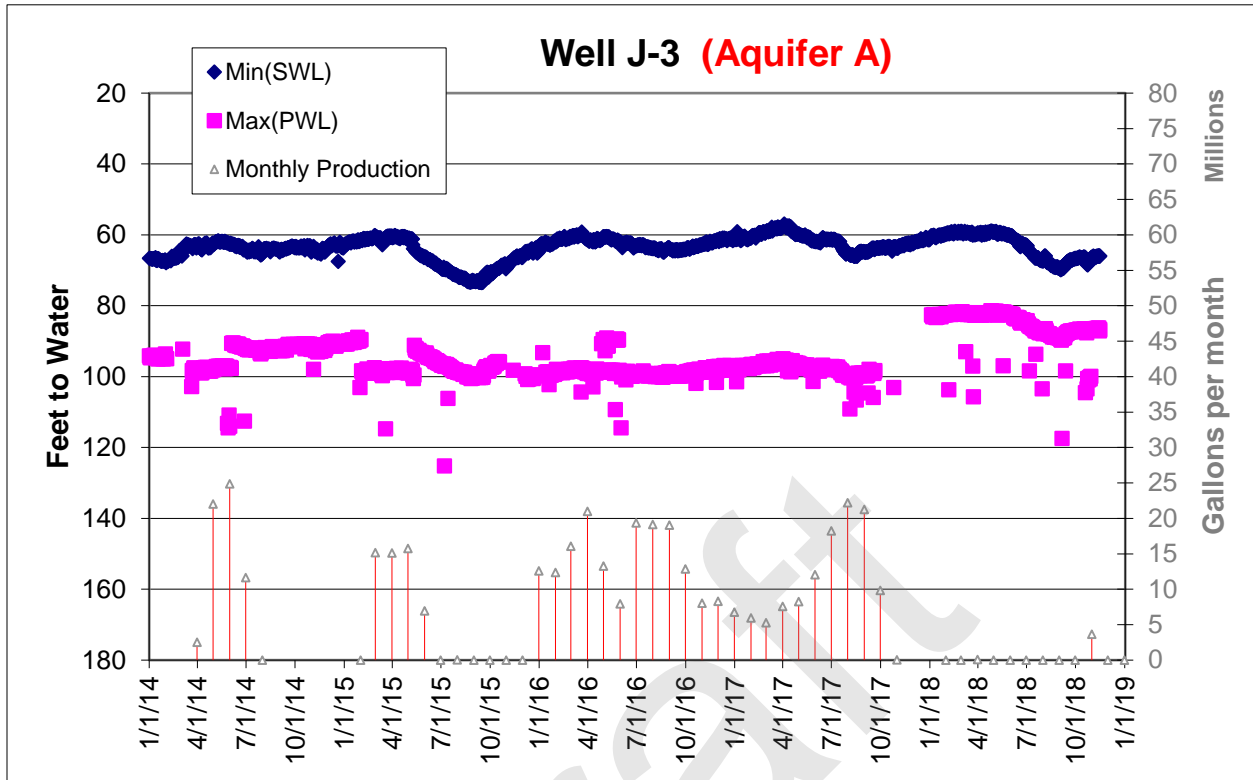


Figure 4.8-4. Well J-3 Water Levels and Monthly Production Volumes



4.9 LAKE AVENUE WELLFIELD

The Lake Avenue wellfield (S13) was established in 1958 with Wells K-1 and K-2 completed within a few months of each other¹⁰. The wellfield is central to the 404-Pressure Zone and provides high production to the system throughout the year, making this site of medium-high priority for the District.

Well K-1 was drilled as a test/exploratory well and then converted into a production well. Well K-2 was drilled as a production well, using a larger casing size, and thus dominates production from the field.

The wellfield property is sufficient to allow for well replacement and may be large enough to accommodate two wells (additional or replacement). A treatment plant could also be added to the site but would probably impact the ability to drill new wells. Current expectations are that a treatment plant would not be needed at this site.

4.9.1 Well K-1

Well K-1 (S35) was completed in 1958 as a test well to identify deep aquifers on the east side of the lakes. This was the first production well completed in Aquifer E. The well's pump equipment was replaced in 2010 and no deficiencies were noted in the well. The well appears to be stable and is a solid producer, but water level data errors make it difficult to evaluate fully (see below). The well is operated as a support well and mainly used when demands are elevated.

4.9.1.1 Key details

Aquifer:	Aquifer E
Size:	12-inch casing; 8-inch, 20-slot
Screened zone:	504 to 571 feet bls
Pump:	Submersible with VFD
5-year average SWL	No current data; 68 feet bls (2004 to 2008)
5-year average PWL	No current data; 139 feet bls (2004 to 2008)

¹⁰ A previous well was reportedly drilled in 1943. The location of the well is unclear but is believed to be in the same neighborhood, possibly just south of the wellfield on School Street SW. The well was shallow at only 257 feet deep and produced around 275 gpm but was decommissioned sometime before 1966. This well has been called the "Clover Park Well" in past reviews. It may also represent the elusive "Well B" which to date has not been positively identified in District records.

4.9.1.2 Risk Assessment

Table 4.9-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	5	19	10	23	15	5	24
Detail	1958	2010	2010?	748 gpm	127 MGY	Unknown*	

* Anecdotal information from the District suggests the well is stable, but no recent data are available.

Water level data for Well K-1 after 2013 is incomplete and seems erroneous. Further investigation of this record is needed. Data presented here is assumed to be incorrect but is included for completeness.

Replacement of pump equipment is not scheduled until 2029, but the well probe appears faulty and should be replaced sooner. In the meantime, the District should collect hand measurements of the water levels, if possible.

Reconstruction of past data trends (if possible) and new data collection at this wellfield is important to assess responses of Aquifer E to production. As noted with other Aquifer E wells, some regional water level declines have been noted. In order to be sure that continued production remains stable and is not over taxing the aquifer, multiple monitoring points are needed. Regular data collection at this wellfield is strongly recommended for comparison to data from Wells F-2 and R-1, as these wells form a backbone of supply from this deep aquifer on the east side of the lakes.

4.9.1.3 Recommended Actions

- 1 year: Correct or confirm the water level monitoring probe readings.
- 1 to 5 years: Once new data is available (or existing data is corrected), review water level hydrograph data and compare with other Aquifer E wells and precipitation records.
- 5 to 10 years: Replace pump. Verify well conditions with down-hole video. Rehabilitation efforts may be needed given the age of the well. Baseline testing of the well using the new equipment is also recommended. Verify monitoring probe performance. Both wells should be monitored during testing, and the results analyzed to identify the range of draw-down interference. Establish new wellfield operation limits based on the testing results.

4.9.2 Well K-2

Well K-2 (S35) is a workhorse well having both high production rates and regular use. As noted, the well was completed in 1958 as a production well version of Well K-1, installing a 16-inch casing to allow for higher production rates.

4.9.2.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 10-inch 25- to 60-slot screen
Screened zone:	497 to 572 feet bls

Pump: Line Shaft with VFD
 5-year average SWL No current data; 96 feet bls (1996 to 2001)
 5-year average PWL No current data; 165 feet bls (1996 to 2001)

4.9.2.2 Risk Assessment

Table 4.9-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	6	26	30	5	3	5	24
Detail	1958	2019	2019	1,278 gpm	223 MGY	Unknown*	

* Anecdotal information from the District suggests the well is stable, but no recent data are available.

Water level data presented here is assumed to be incorrect but is included for completeness (production data is accurate). As noted under the Well K-1 discussion above, data correction and new data collection at this well is important to evaluate the health of Aquifer E. Historic water level information is lacking but based on the available data the well has had relatively stable performance.

The pump equipment in Well K-2 has just been removed and replaced. Video inspection of the well after the pump equipment was removed indicated a generally good condition of the well and the screen. Standard maintenance was recommended as a result and the well was cleaned out and brushed. New monitoring equipment was installed with the pump equipment. Short-term testing of the well with the new equipment is recommended to verify the probe performance (in both wells) to help resolve the data issues discussed. Testing will also allow evaluation of the current well and wellfield performance and will identify any new operational limits. Since this well is relied on for support during high-demand periods, it is important to establish a new performance baseline for comparison as the well gets older.

4.9.2.3 Recommended Actions

- 1 year: Correct or confirm the water level monitoring probe readings.
- 1 year: Baseline testing of the well using the new equipment. Verify monitoring probe performance. Both Aquifer E wells should be monitored during testing, and the results analyzed to identify the current range of interference effects. Establish new wellfield operation limits based on the testing results.
- 1 to 5 years: Once new data is available (or existing data is corrected), review water level hydrograph data and compare with other Aquifer E wells and precipitation records.

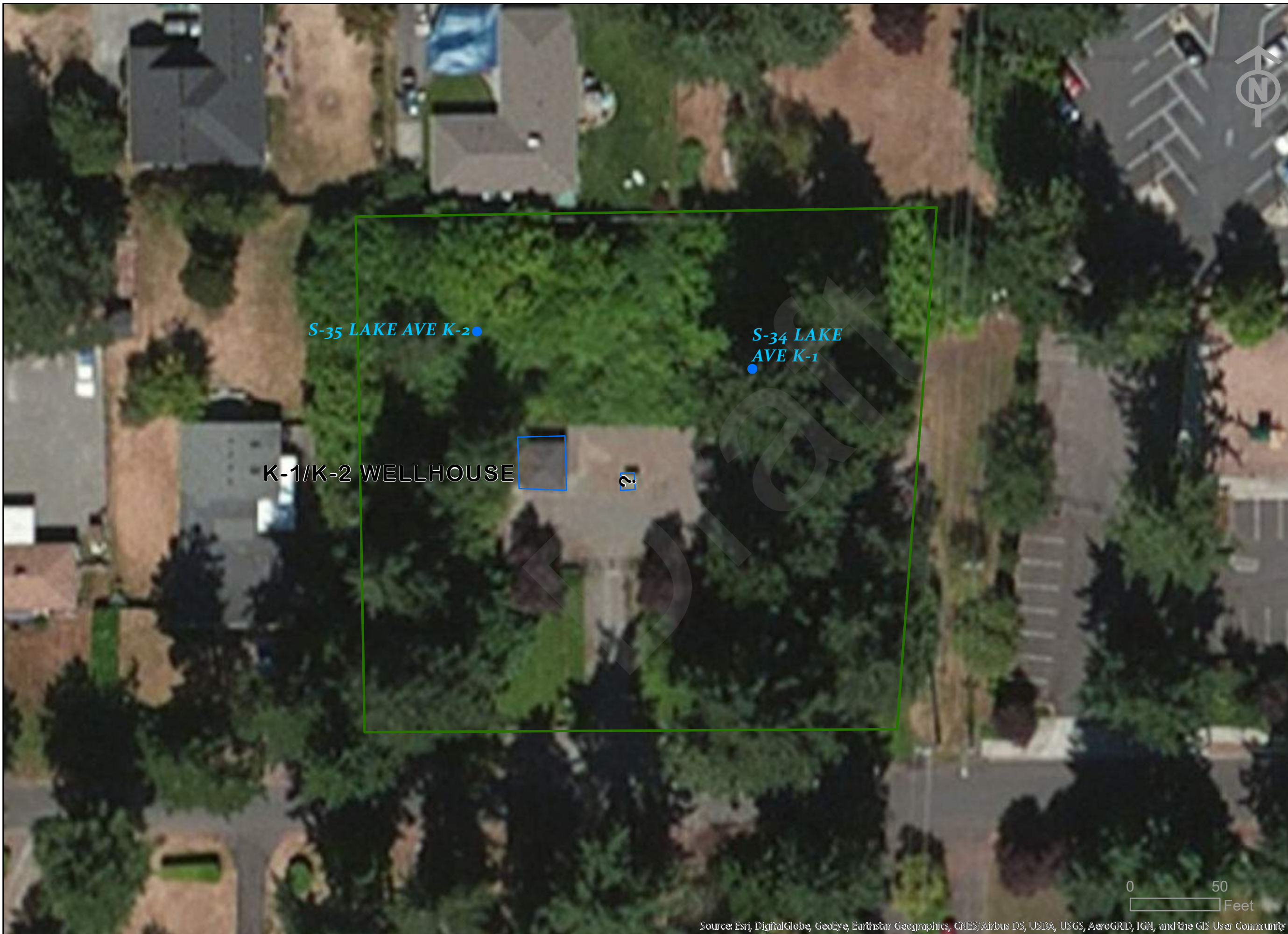


Figure 4.9-1 Lake Ave. Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

Lakewood Water District Facility Map Book

Facility Name:
Lake Ave

Facility Type:
Well

Description of Facility:
K-1, K-2 Wells

Site Area:
41,524

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.9-2. Well K-1 Water Levels and Monthly Production Volumes

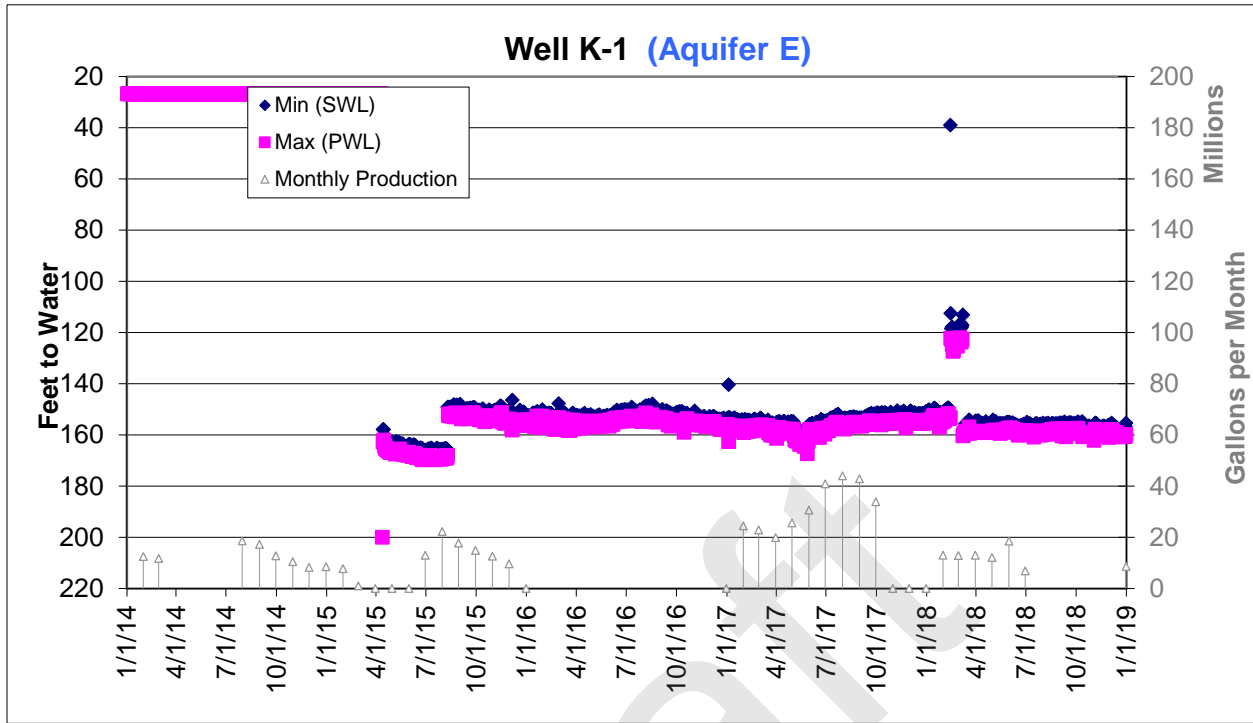
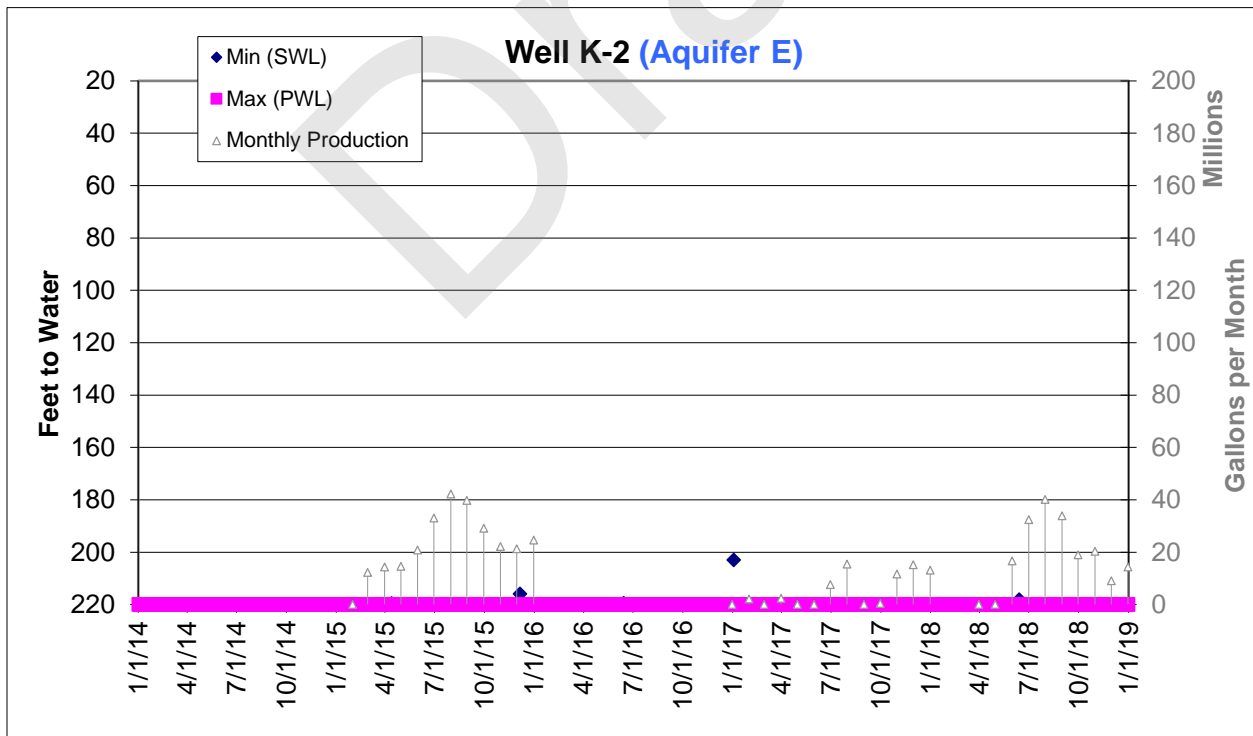


Figure 4.9-3. Well K-2 Water Levels and Monthly Production Volumes



4.10 HEMLOCK HILL WELLFIELD

The Hemlock Hill wellfield (S14) serves the 404-Pressure Zone and the 513-Pressure Zone via the on-site storage tanks. Four wells were constructed on the site: Wells L-1, L-2, L-3 and L-4. Three of these remain but only L-2 is in service (or capable of production). Well L-4 is an emergency-only status well and is currently disconnected from the system.

Occasional low water levels close to the screen tops (or in the case of Well L-4, often below the screen top) are a persistent problem for these wells. This is a result of a seasonal aquifer-wide water level declines, high production levels in the wellfield, or both. The low water levels are part of the reason both Wells L-3 and L-4 are out of service.

The wellfield is cramped given the current facilities on site. Adding an additional well at this site is not likely. Past drilling explored for the sea-level aquifer (Aquifer C) and found that the shallowest aquifer (Aquifer A3 at this location) was more productive. Deeper drilling to Aquifers E or G might be possible, but other sites probably have better space availability.

4.10.1 Well L-1

Well T-11 was installed in 1959 as the initial test well on this site. The well was completed in Aquifer A3 and is screened between 189 and 228 feet bls. The well was renamed Well L-1 and continued in service until 1975 when it was decommissioned. At that time, pumping water level was below the top of the screen and performance had suffered. The well was replaced by Well L-4. This led to some confusion as later documents refer to production from Well L-1. This mainly occurred because Well L-4 was installed under the Well L-1 water right and when Well L-1 was removed from service, the production was simply continued to be recorded under the Well L-1 name even though it was from Well L-4. Accordingly, this well was not ranked and is fully replaced by Well L-4, discussed below.

4.10.2 Well L-2

Well L-2 (S37) is the remaining primary well at Hemlock Hill. Given this and the and the well's age (11th oldest), the well ranks high in the assessment placing 11th overall.

4.10.2.1 Key details

Aquifer:	Aquifer A3
Size:	20-inch casing; 16-inch, 100-slot screen
Screened zone:	182 to 213 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	168 feet bls
5-year average PWL	172 feet bls

4.10.2.2 Risk Assessment

Table 4.10-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	11	13	15	18	10	10	16
Detail	1961	2006	2006	795 gpm	149 MGY	Stable	

Water levels in this well appear to be cyclic/stable. High-use years do not appear to result in lowered water levels, but the lower-than-average levels seen in summer of 2015 may reflect responses to the extended dry winter and summer drought conditions that year. Further comparison with precipitation patterns is warranted to better understand how vulnerable this wellfield is to seasonal or dry-year/extended drought conditions.

The pump equipment in Well L-2 is due for replacement in 2024. Verification of water level relationships across the wellfield is recommended at that time to ensure telemetry is accurate.

4.10.2.3 Recommended Actions

- 1 year to 3 years: Resolve the differences between the L-2 and L-3 water level records. Compare hydrograph data with seasonal precipitation patterns and review pumping level elevations above pump intake and screen top. Adjust pumping program if needed.
- 3 to 5 years: Replace pump. Verify well conditions with down-hole video. Clean well casing and screen as needed. Baseline testing of the well using the new equipment.

4.10.3 Well L-3

Well L-3 (S38) was completed in 1969 and was operated in a wellfield configuration with Well L-2 through about 1999. After that point, well use diminished significantly to the point of non-use after about 2008. The well is still equipped so it is classified on the District's WFI as an emergency source. Given this the well was included in the assessment, but it ranks 28th due to its limited use. If used, this well is currently configured to only pump to the storage tanks and 513-Pressure Zone.

4.10.3.1 Key details

Aquifer:	Aquifer A3
Size:	12-inch casing; 8-inch, 30-slot screen
Screened zone:	189 to 228 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	No data
5-year average PWL	No data

4.10.3.2 Risk Assessment

Table 4.10-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	20	29	7	25	26	9	16
Detail	1969	1997	1997	732 gpm	11 MGY*	Stable**	

* Use of the well limited; no recent data are available.

** Hand-measured data only. Trend analysis based on Well L-2 data

Manual water level measurements of Well L-3 are lower than expected, given that the well is out of service. Water levels in L-2 and L-3 should have similar elevations. It is possible this represents a telemetry error on the Well L-2 data or some other error. Further analysis is suggested.

If this well is not expected to return to service, continued hand-measurements of water levels is recommended. Like Well I-4, this well could serve as a mitigation asset in which case monitoring may be requested by Ecology.

If this well is intended to remain as an emergency source, the pump equipment should be serviced or replaced with new equipment sized for the well's capacity. Since Well L-3 has had only very low use in the past ten years and none within the past five or more years, the well should be test pumped to determine its current capabilities. Testing can be accomplished with the current equipment if it still works. If not, it may be prudent to test the well with a temporary pump in order to establish an appropriate range of performance for the selection of new equipment.

4.10.3.3 Recommended Actions

- 1 to 3 years: Review future plans for this well. If retained in emergency-only status, perform a benchmark test of the existing equipment to verify well and pump performance. Establish an upper and lower limit of production and identify any operational limits if extended use becomes necessary.
- 3 to 5 years: If transitioned to a mitigation asset, the water right change will dictate the future use of the well. At the minimum, the pump equipment will likely be removed. Ecology may request or recommend that the well be decommissioned but we suggest that it become a dedicated monitoring point instead.

4.10.4 Well L-4

Well L-4 (S36) is out of service and has been disconnected from the system. It is considered an emergency-only well in the District's current WFI, so it was included in the assessment but ranks near last (31st) due to its status. The well has no operational equipment and will cannot return to service without additional evaluation. Manual measurements of water levels in this well are not currently possible.

If Well L-3 also is transitioned to a mitigation asset, then a monitoring program using just one of the Aquifer A wells on this site may be sufficient to provide Ecology with proof of non-use.

4.10.4.1 Key details

Aquifer:	Aquifer A3
Size:	16-inch casing;
Screened zone:	189 to 234 feet bls
Pump:	None
5-year average SWL	No data
5-year average PWL	No data

This well is being considered for transition into a mitigation asset. It may be useful to consider collecting regular water level measurements at this well as part of the Abitibi monitoring program or in support of any mitigation-offset package.

4.10.4.2 Recommended Actions

- 1 to 3 years: Review future plans for this well.



Figure 4.10-1
Hemlock Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

Facility Name:
Hemlock

Facility Type:
Well/Storage
Facility

**Description of
Facility:**
0.1 MG Tank, 0.5
MG Tank, 1.35 MG
Reservoir, Wells

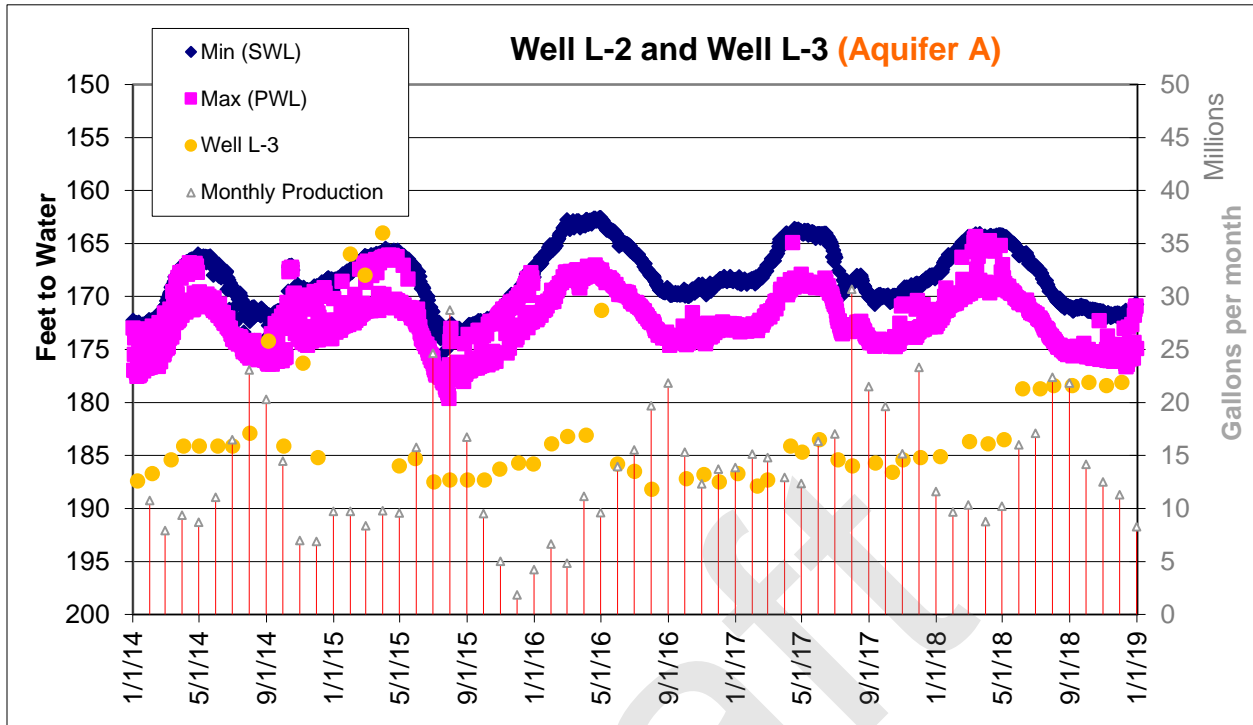
Site Area:
77,934

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.10-2. Wells L-2 and L-3 Water Levels and Monthly Production Volumes



4.11 VIEW ROAD WELLFIELD

The View Road wellfield is unusual in that Wells N-1 and N-2¹¹ were constructed in 1962 but the wellfield was not fully developed for another 35 years. Despite the large capacity of the two wells, the District rarely used these wells due to water quality concerns. The wells were unused and without equipment for the 1980s and most of the 1990s. Once the View Road Treatment Plant was constructed both wells went into regular production to serve the 404-Pressure Zone. Well N-2 went off-line in 2016 and a third well, Well N-3, was added in 2018 to replace Well N-2. However, only Well N-1 is currently in service.

The site has space constraints. The drilling of Well N-3 probably precludes the addition of another new or replacement well unless easements or restrictive covenants on neighboring properties can be secured.

Due to the loss of Well N-2 and the lower-than-expected production in Well N-3, the treatment plant is oversized for the wellfield's current production level. Ideally, additional production should be identified to supplement the production from Well N-1 (e.g. the Town of Steilacoom's Well 4 or a neighboring property if possible).

4.11.1 Well N-1

Well N-1 (S15) is the deepest of the District's wells and the only one to produce from Aquifer G. The well was completed in 1962. Due to difficulties during construction, the well has a kinked casing which limits the diameter of tools that can pass through. As a result, rehabilitation efforts in this well are difficult and not very effective. The well has generally good performance.

The well ranks tenth in the assessment, reflecting its age and regular use, and the importance of the treatment plant. This well could be ranked higher considering that it is the only operational well in the wellfield and the only Aquifer G well. Replacing this well would be costly and may be precluded by the lack of space mentioned above.

4.11.1.1 Key details

Aquifer:	Aquifer G
Size:	16-inch casing; 8-inch 30- to 80-slot screen
Screened zone:	947 to 1,064 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	174 feet bls
5-year average PWL	335 feet bls

¹¹ Note that there are no longer any "M" Wells. Two wells, M-1 and M-2, were drilled in the northeast end of the District in 1960. M-1 was a test well. M-2 was a production well until decommissioned in 1969 due to poor water quality.

4.11.1.2 Risk Assessment

Table 4.11-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	13	9	12	14	2	11	13
Detail	1962	2002	2002	854 gpm	256 MGY	Stable	

The static water level in Well N-1 has been rather stable. An offset in 2016 is assumed to be the result of uncorrected changes to the water level probe. The pumping water level has declined slightly which may reflect slight plugging of the well. Increases to the instantaneous pumping rate may also explain that change. The pump equipment is scheduled for replacement in 2024 and the District should consider additional inspection and revisit maintenance options at that time.

4.11.1.3 Recommended Actions

- 1 to 3 years: Correct or confirm the water level monitoring probe readings.
- 3 to 5 years: Replace pump. Verify well conditions with down-hole video and clean well casing and screen to the degree possible. Baseline testing of the well using the new equipment is also recommended.

4.11.2 Well N-2

Well N-2 (S16) was also finished in 1962 and, like Well N-1, remained unused until the treatment plant was constructed. This well produced from Aquifer E and so did not compete with the pumping in Well N-1, but over time production efficiency declines and lowering water levels in the aquifer caused a reduction in the annual production from the well.

The pump was replaced in 2016 but the well failed during testing, producing large amounts of sand. Rehabilitation efforts failed to control the sand and the well was taken offline with the pump removed.

Given the well's current condition, future production is not expected. The well might be operable at low production rates where sand production does not occur or is controllable. In such case, the well could serve as a supplement to production from Well N-3.

Well N-2 ranks 27th in the risk assessment. This is probably artificially high given the recent difficulties with the well. Unless future testing or evaluation suggests otherwise, the well should probably be considered like Wells I-4 and L-4 as a potential emergency source well or long-term monitoring point.

4.11.2.1 Key details

Aquifer: Aquifer E
 Size: 16-inch casing; 8-inch, 40- to 80-slot screen
 Screened zone: 506 to 566 feet bls

Pump: None
 5-year average SWL ~160 feet bls (estimated; incomplete data record)
 5-year average PWL ~310 feet bls (estimated)

4.11.2.2 Risk Assessment

Table 4.11-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	14	31	29	²¹	11	11	13
Detail	1962	2016	2017	765 gpm	142 MGY*	Stable**	

* production only up through 2015

** Incomplete data record with possible probe errors

Water level data for Well N-2 are incomplete and have inconsistencies for a year or two before the well failure such that a hydrograph analysis is not possible. The current well condition also makes the analysis unwarranted. Hand measurements are not currently collected at this well.

The well may prove useful as an Aquifer E monitoring point, particularly if a regional analysis of the general health of the aquifer is undertaken or if modeling of aquifer responses to future withdrawals is planned. Collection of manual water level measurements at this well is suggested.

4.11.2.3 Recommended Actions

- 1 to 5 years: Review future plans for this well. If retained in emergency-only status, perform a benchmark test of the well to determine the upper limit of production where sanding is not problematic. Or, if considered for low-production, regular-use pumping to the treatment plant, perform testing to establish an upper and lower limit of production and identify any operational limits for new pump equipment.

4.11.3 Well N-3

Well N-3 was constructed in 2018 as a replacement for Well N-2. The well targeted Aquifer E but initial testing indicated lower-than-anticipated capacity. Only a preliminary construction report was available for review during this project, so conditions may change before the well is finally integrated into the system.

If not already accomplished, Well N-3 should be evaluated to determine if a low rate of production would make it viable to use the well, perhaps combined with low-rate production from Well N-2. If this configuration was not sufficient to warrant regular use, then perhaps the wells could operate in conjunction with Well N-1 to supplement that production.

Further field evaluation of the stability of this well and Well N-2 is apparently also needed to ensure sand-free water and consistent production rates. We suggest that this well and the overall wellfield performance be re-assessed once these efforts are complete.

4.11.3.1 Recommended Actions

- 1 to 5 years: Review future plans for this well in conjunction with well N-2. If considered for low-production, regular-use pumping to the treatment plant, perform testing to establish an upper and lower limit of production and identify any operational limits for new pump equipment (if not already available).

Draft



Figure 4.11-1 View Road Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

Lakewood Water District Facility Map Book

Facility Name:
View Road Treatment Facility

Facility Type:
Well/Treatment Facility

Description of Facility:
N-1/N-2/N-3 Wells, Treatment Facility, Lab

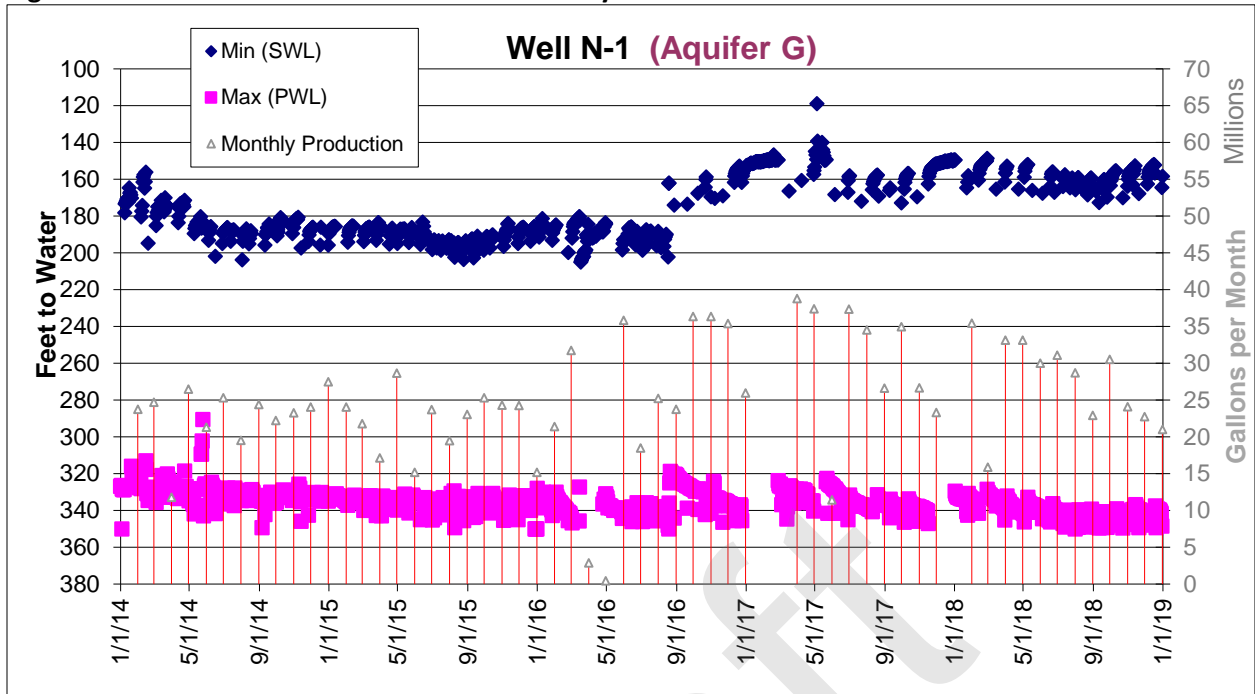
Site Area:
54,956

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.11-2. Well N-1 Water Levels and Monthly Production Volumes



4.12 OAKBROOK WELLFIELD

The Oakbrook wellfield (S25), located just north of Western State Hospital serves the northwestern portion of the District through the on-site storage tank that feeds the 404-Pressure Zone. The wellfield consists of two wells, Wells O-2 and O-3.

The site is large enough to accommodate an additional well and possibly a treatment plant should that be needed. The location is one of the possible sites being considered for a new deep well to Aquifer G under a second Abitibi water right application.

4.12.1 Well O-2

Well O-2 (S17) is primarily a summertime/peak use well. Drilled in 1966, the well produces from Aquifer C. The well ranks 19th in the assessment mainly driven by its age and usage level. Pump servicing occurred in 2007 and the well was in generally good condition at that time.

4.12.1.1 Key details

Aquifer:	Aquifer C
Size:	20-inch casing; 12-inch, 100-slot screen
Screened zone:	283 to 311 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	101 feet bls (2015 to 2018)
5-year average PWL	173 feet bls (2015 to 2018)

4.12.1.2 Risk Assessment

Table 4.12-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	18	15	16	16	24	7	16
Detail	1966	2007	2007	842 gpm	39 MGY	Stable	

Water levels are generally stable, but the data is offset in 2015. Historic levels from about 2009 through 2014 show a more muted pattern of seasonal change (similar to that shown for 2014 above). After 2015, the elevations are changed, and a greater variability is seen on both static and pumping levels. Summer-time use appears to be ramping up over the period shown, but similar high-use summers (15 to 18 million gallons pumped per month) also occurred in 2009 and 2010 so the pattern is not unusual.

Also shown are hand measurements in Well O-3. There appears to be good agreement between the Well O-2 data and Well O-3 measurements from 2015 onward, suggesting that the 2014 and prior data in Well O-2 is erroneous and the current data is correct. This should be field verified.

The pump equipment is due for replacement in 2024. Barring any performance irregularities, the next inspection and maintenance can await the pump removal.

4.12.1.3 Recommended Actions

- 1 year: Correct or confirm the water level monitoring probe readings.
- 3 to 5 years: Replace pump. Verify well conditions with down-hole video and clean well casing and screen to the degree possible. Baseline testing of the well using the new equipment is also recommended. Both Aquifer C wells should be monitored during testing, and the results analyzed to identify the range of interference effects. Establish new well-field operation limits based on the testing results.

4.12.2 Well O-3

Well O-3 (S20) was added to the wellfield in 1983. Even though it has higher production rates and greater annual use, Well O-3 has lower priority (21st) in the assessment than Well O-2. The main difference is that O-3 is younger by 17 years.

4.12.2.1 Key details

Aquifer:	Aquifer C
Size:	20-inch casing; 16-inch, 100-slot screen
Screened zone:	263 to 292 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	106 feet bls (manual measurements 2015 to 2018)
5-year average PWL	Not available

4.12.2.2 Risk Assessment

Table 4.12-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	25	16	18	11	23	7	16
Detail	1983	2008	2008	972 gpm	50 MGY	Stable*	

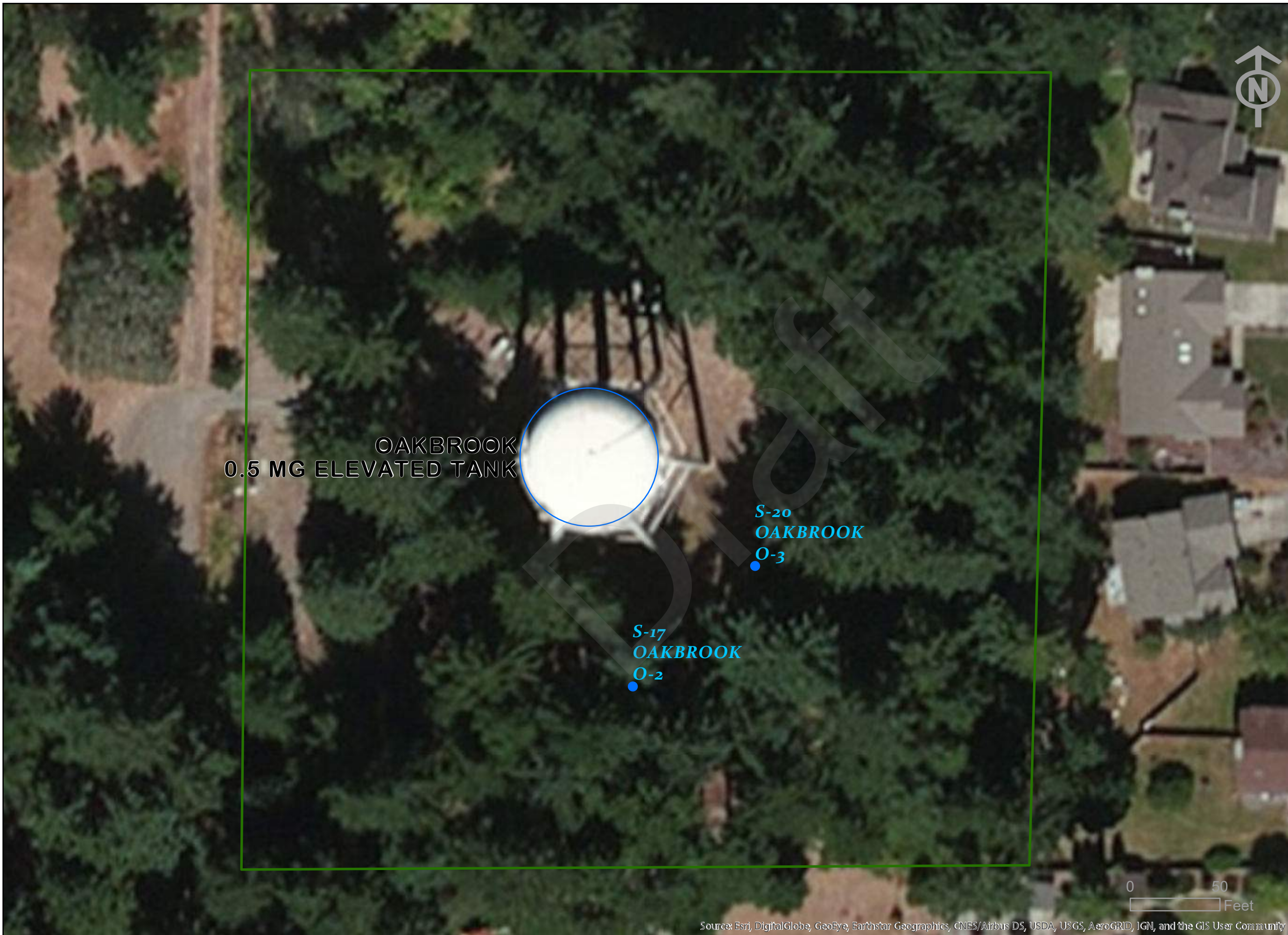
* Hand-measured data only. Trend analysis based on Well O-2 data (see graph above)

There are no telemetry data for Well O-3 and a new probe should be installed. From District anecdotal reports, Well O-3 is generally stable and reliable. Based on the Well O-2 water level data, no immediate concerns are likely at O-3. The pump equipment in Well O-3 is not due for replacement until 2027 and based on current performance, any in-hole work can await that schedule. However, wellfield testing should occur at the time of Well O-2's next scheduled pump maintenance. This will help to confirm assumptions about Well O-3 performance and determine if direct monitoring via telemetry is needed sooner.

4.12.2.3 Recommended Actions

- 5 to 10 years: Replace pump. Replace telemetry probe. Verify well conditions with down-hole video and clean well casing and screen to the degree possible. Baseline testing of the well using the new equipment is also recommended.

Draft



OAKBROOK
0.5 MG ELEVATED TANK

S-20
OAKBROOK
O-3

S-17
OAKBROOK
O-2



0 50
Feet

Figure 4.12-1
Oakbrook Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Oakbrook**

**Facility Type:
Well/Storage
Facility**

**Description of
Facility:
O-2/O-3 Wells, 0.5
MG Elevated Tank**

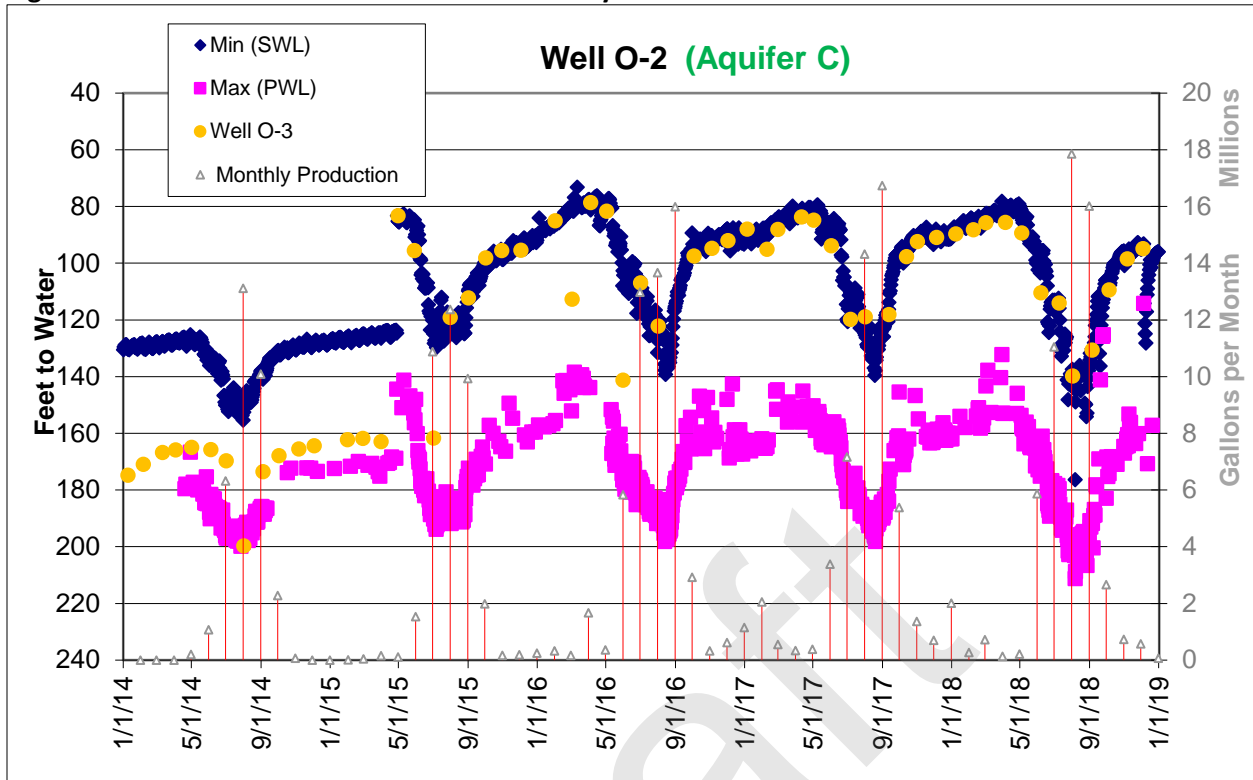
**Site Area:
90,918**

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.12-2. Well O-2 Water Levels and Monthly Production Volumes



4.13 OAKBROOK GOLF COURSE WELLFIELD

Well O-1 (S26) is a special case as the well is not actually part of the Oakbrook wellfield but instead is located at the Oakbrook Golf Club, just under a mile to the northeast from Wells O-2 and O-3. The well is also unique as it is owned by the District but operated by the golf club and is only used for irrigation of the course. The well is not connected to the District's system. No potable supplies are provided from the well; the golf club gets its potable supply from a service connection to the system.

4.13.1 Well O-1

The well was drilled in 1964 as a deep exploration well (T-15) reaching almost 900 feet. A deep aquifer was located between 780 feet and 880 feet bls and tested for possible use but had high iron concentrations. With the high costs of production from this deep zone and the need for treatment, it was considered too costly for the District to complete such a deep well at the time. The well was then converted to tap the sea-level aquifer at this location (Aquifer C), but again the water quality was problematic for use in the system. The well was later provided to the golf course to supply its irrigation needs rather than using system water.

Since the well is not connected to the system and operated only for irrigation uses, the well was not included in the survey and thus not ranked. It is still a District asset however as it could provide emergency supplies if connected to the system. This is considered an unlikely case as the effort to make use of this well is greater than would be the case for other emergency wells (e.g. Wells I-4 or L-4).

Well O-1 is incorrectly listed on the District's WFI, showing up part of the O-2/O-3 wellfield and thus having an incorrect location designation. It is listed as a chlorinated source, which is also incorrect.

Water level in Well O-1 is currently not monitored. If possible, the well should be integrated into the District's data collection. Annual production should be recorded, and water levels should be measured monthly or bi-monthly to capture seasonal changes in the aquifer for comparison to other Aquifer C wells. This data collection is oriented more toward resource management of the aquifer system than specifically the use of this well, so adding telemetry is not expected. Adding a meter or setting the well up for water level measurements may need to wait until the pump is serviced/replaced, but the service life on the pump is not known. The District is advised to work with the golf club on the best way to accomplish these changes and on who will collect/report the data.

Based on the test well information, a deep well to Aquifer G should be possible at this site, if space is available. In such case, a water quality treatment facility would be needed, but this could potentially allow Well O-1 to also be treated and converted to regular system use, if desired.

4.13.1.1 Recommended Actions

- 1 year: Update the District's WFI to correctly reflect the current status of the well.
- 1 to 5 years: Work with the golf club to begin monitoring the well as part of regular data collection. If not already equipped, add a meter to this well and record annual usage. If possible, measure water levels in the well on a monthly basis (bimonthly at a minimum). If not currently possible, configure well for monitoring access when the pump equipment is next removed.

Figure 4.13-1 Oakbrook Golf Course Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Oakbrook Golf
Course**

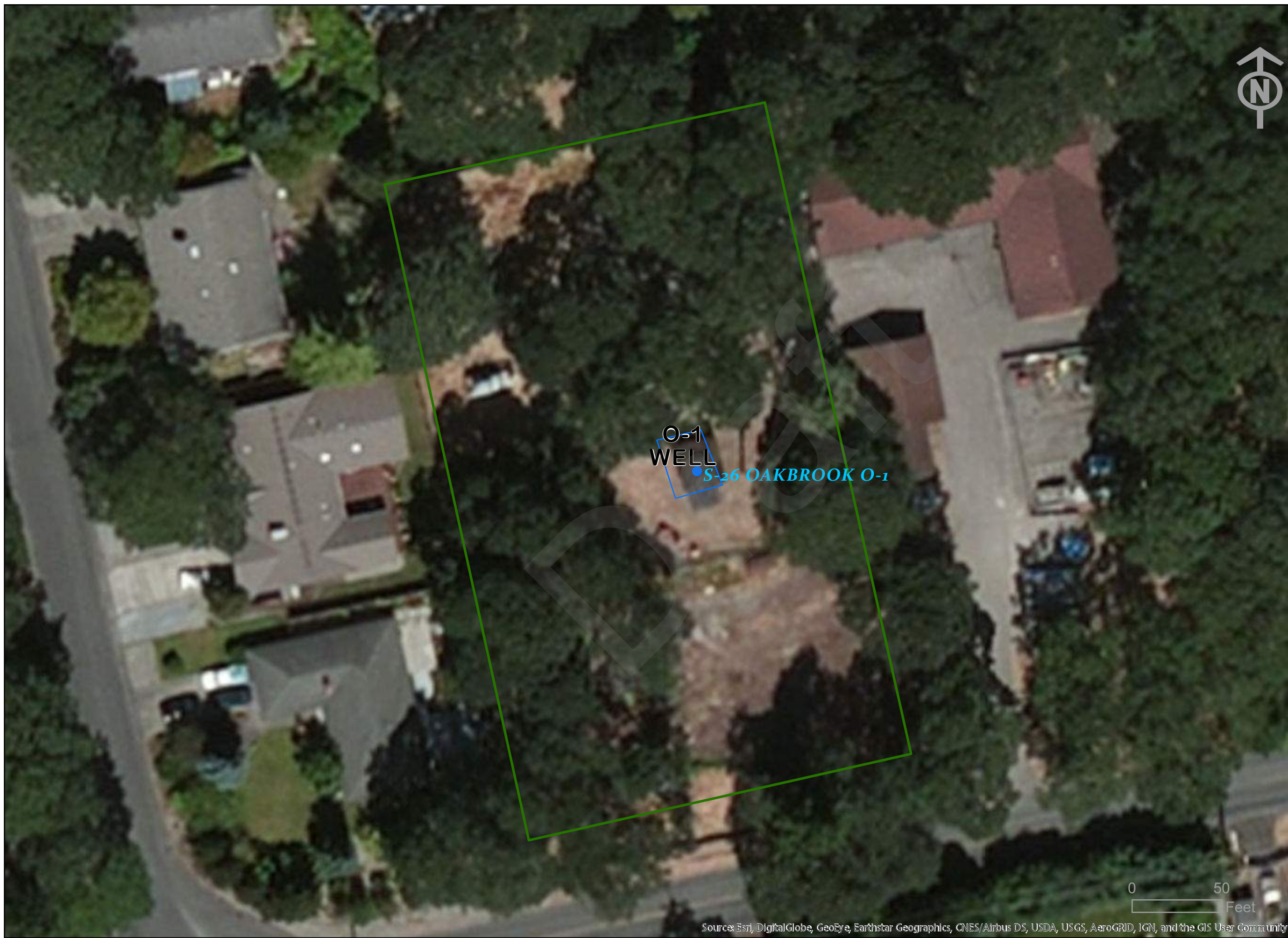
**Facility Type:
Well**

**Description of
Facility:
O-1 Well**

**Site Area:
37,543**

1 inch equals 50 feet

5/24/2019



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

4.14 STEILACOOM BOULEVARD

The Steilacoom Boulevard wellfield (S18) was established between the fire station property and Clover Park schools. The wells here supply the onsite storage tank and the 404-Pressure Zone. Three production wells have been drilled (Wells P-1, P-2, and P-1R). In old records these were called the “Navy Base wells.”

The District leases the wellfield property from Pierce County Fire District 3 (West Pierce Fire & Rescue, Station 21). The site is relatively small and most of it is taken up by the storage tank and pumping infrastructure. Any new construction would likely entail altering the current lease and/or getting an easement or restrictive covenant on one or more of the neighboring properties. The site borders parcels owned by Clover Park Technical College, primarily consisting of access roads and parking lots.

It may be possible to accommodate a treatment facility if that becomes needed since some of the infrastructure installed for Wells P-1 and P-1R could be reconfigured to allow for more space. Alternatively, decommissioning one or both of Wells P-1 or P-1R may allow enough space for construction of a new, shallow well targeting Aquifer A3.

4.14.1 Well P-1

Well P-1 was drilled in 1968 to a depth of 626 feet and completed from 506 to 524 feet, which corresponds with Aquifer E. Unfortunately, use of the well was problematic. Initial production was high (up to 1,500 gpm) but the District soon reported cloudy water and sanding during pumping. On inspection in 1971, a casing break was found in the well and a repair effort undertaken. However, sand production persisted at high pumping rates. Further redevelopment was tried in 1985, but the sanding problem continued, and a recommendation was made to replace the well.

The well has no equipment and due to its construction issues is probably not available as an emergency well. Accordingly, the well was not ranked.

4.14.2 Well P-1R

Well P-1R (S39) was drilled in 1986 as the replacement for Well P-1. This well also suffered from production difficulties and sanding, despite multiple redevelopment efforts in the 1980s and 1990s. The well has effectively been off-line ever since but has been retained as an emergency well. The well ranks 14th in the survey due to the long period without pump replacement or redevelopment. Although the consequences of failure are relatively low as a result of the well’s emergency status, the risks of failure are relatively high due to its instability and the long period of inactivity.

Given the well’s current condition, future regular production is not expected. Evaluation of the possibility of operating the well at low production rates where sand production does not occur or is controllable is recommended. One possible use would be to convert the well to a non-system emergency source that could supply water to walk-up customers using portable containers. The well is suited to this option by location near the fire station and Clover Park schools, both of which will likely be community refuge points during a catastrophic event such as a major earthquake. If equipped with a smaller, generator-driven pump, the well could potentially supply water independent of the system, allowing Well P-2 and the on-site storage tank to be dedicated to other system uses such as fire suppression.

A low-rate pumping test should be performed on the well when the existing pump equipment is removed. Hopefully, testing can identify a rate where sanding is not problematic or is low enough to allow for emergency use without concern for well failure or significant impacts to the pump equipment.

4.14.2.1 Key details

Aquifer: Aquifer E
 Size: 16-inch casing; 10-inch, 80-slot screen
 Screened zone: 439 to 494 feet bls
 Pump: Submersible with Soft Start
 5-year average SWL 143 feet bls
 5-year average PWL 181 feet bls

4.14.2.2 Risk Assessment

Table 4.14-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	27	3	5	28	28	9	7
Detail	1986	1995	1995	670 gpm	7 MGY	Stable*	

*Only data partial record available

Water level patterns were primarily assessed in comparison to Well P-2 data. Transducer data is available but is incomplete and were not considered sufficient to generate a separate hydrograph. Hand measurements were not available. See the Well P-2 graph below.

The well may prove useful as an Aquifer E monitoring point, particularly if a regional analysis of the general health of the aquifer is undertaken or if modeling of aquifer responses to future withdrawals is planned. Collection of manual water level measurements at this well is suggested.

4.14.2.3 Recommended Actions

- 1 to 5 years: Review future plans for this well. If retained in emergency-only status, perform a benchmark test of the well to determine the upper limit of production where sanding is not problematic.

4.14.3 Well P-2

Well P-2 (S40) is the second most important well in the assessment after Well G-1. It has high production and high year-round use, is located centrally in the system, and feeds a major storage tank. The well is average in age and the pump equipment is coming due for replacement (2021). The well has not had an inspection, testing or redevelopment in recent years. All of these factors increase the ranking and make it

an important target for inspection and maintenance. Unlike the older wells on this site, Well P-2 has apparently never produced sand.

Drilling a replacement or additional well on this site would be challenging because the wellfield parcel is leased and small. Removal of Well P-1 or P-1R infrastructure might allow more space, but drilling a replacement well targeting Aquifer E near to either old well may not be prudent. A minimum of 25 feet from both old wells is suggested. Given the difficulties each of those older wells had with sanding, careful planning and close attention to the drilling, design, and construction process would be crucial.

4.14.3.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 12-inch screen
Screened zone:	459 to 488 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	134 feet bls (2014 only)
5-year average PWL	147 feet bls (2014 only)

4.14.3.2 Risk Assessment

Table 4.14-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	19	5	6	1	9	8	7
Detail	1969	1996	1996	1,512 gpm	154 MGY	Stable*	

*Only data partial record available

Water levels appear cyclic/stable, but the data record is confusing. Pre-2015 data appear offset and higher than current data. It is unclear if the offset is real or an artifact. Some water levels from 2004/2005 (not shown) are similar to the low levels seen in 2015 onwards. The recent maximum production topping 40 MG per month also has historic precedence, so the current low water levels may not be anomalous. The summertime pumping levels are below the probe depths which prevents proper monitoring. While the well saver controls will prevent over-pumping from damaging the pump equipment, excessive draw-downs can still have an effect on well performance. As the well has not had a recent inspection, the level of risk these low pumping water levels might pose cannot be determined.

Field testing of this well using the existing equipment is recommended once the water level data recording issues are resolved. The main purpose of testing will be to quantify its short-term performance and establish a baseline for comparison once the pump equipment is replaced or refurbished. Given the importance of this well, testing should be accomplished as soon as practical.

4.14.3.3 Recommended Actions

- 1 year: Correct or confirm the water level monitoring probe readings.
- 1 year: Perform field test of well using existing equipment to measure current performance.
- 1 to 5 years: Once new data is available (or existing data is corrected), review water level hydrograph data and compare with other Aquifer E wells and precipitation records.
- 3 to 5 years: Replace or refurbish pump. Verify well conditions with down-hole video and clean well casing and screen to the degree possible. Baseline testing of the well using the new equipment is also recommended. Both Aquifer E wells should be monitored during testing, and the results analyzed to identify the range of drawdown interference. Establish new well operation limits based on the testing results.

Draft



Figure 4.14-1
Steilacoom Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

Facility Name:
Steilacoom Blvd

Facility Type:

**Description of
Facility:**

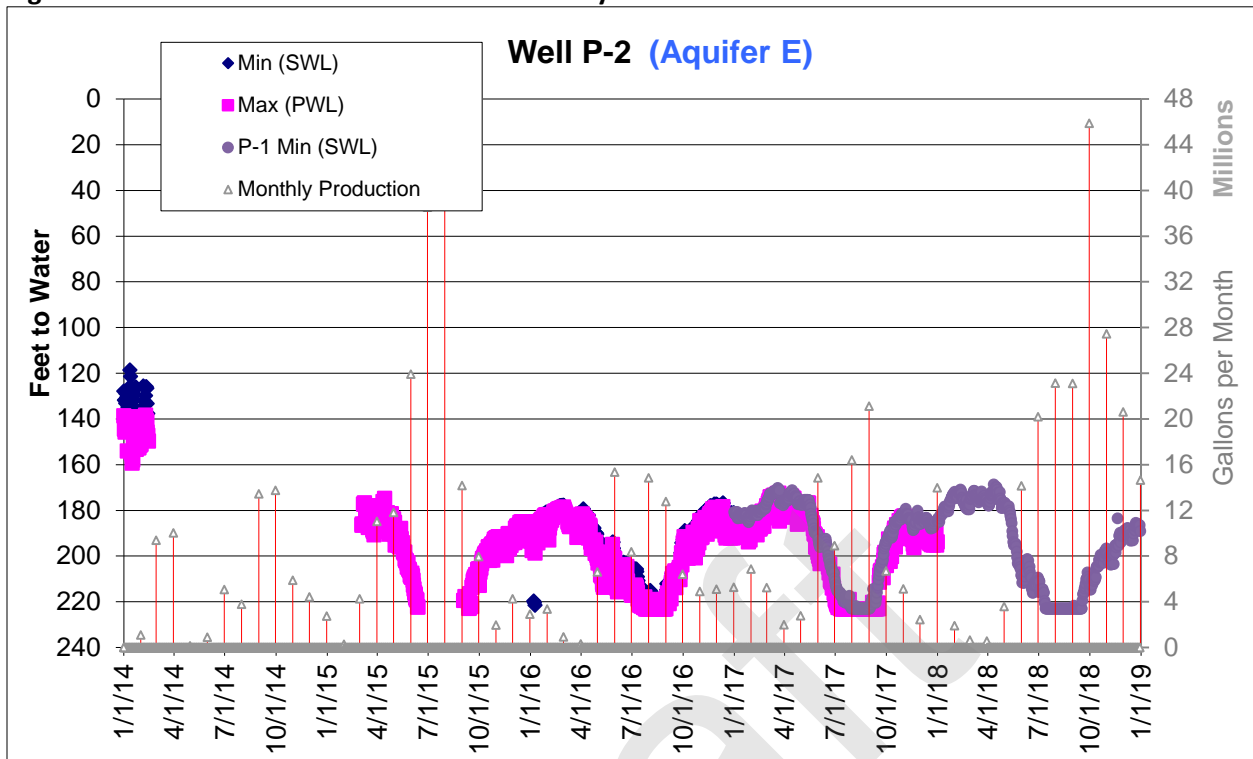
Site Area:
25,853

1 inch equals 50 feet

5/24/2019

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.14-2. Well P-2 Water Levels and Monthly Production Volumes



4.15 DEEPWOOD

Drilling at the Deepwood wellfield began in 1973 with a test well completed to 545 feet. Several water bearing zones were identified, and the well was converted to a production well becoming Well Q-1. Later that same year a second well was drilled targeting the shallow Aquifer A3 (informally Well Q-2). However, drilling results were not promising, and the borehole was decommissioned. Finally, in 1988, Well Q-3 was drilled and screened in the uppermost water bearing material (Aquifer A1). The well was initially rated for about 300 gpm. The well was used intermittently until it was decommissioned in 2001. The water right for Well Q-3 was converted to a mitigation asset in support of the Abitibi water right transfer.

The Deepwood wellfield is relatively small due to the nearby hillside. A water quality treatment plant is already established on site, which would hopefully mean any site expansion would be limited to additional wells. However, given the past record of drilling at this location, new well drilling is not recommended. A replacement well for Well Q-1 may be possible.

4.15.1 Well Q-1

When drilled, Well Q-1 (S19) had notable production of over 1,000 gpm but was unique in the District's inventory as having high manganese concentrations. The concentrations were high enough that blending with other low-manganese sources was difficult, so the well was mainly used during summer peak production periods up until about the mid-1990s. The treatment plant was completed in 2001 and the well went into full-time service in 2002. Since then the well has served as a year-round source feeding the 404-Pressure Zone and the storage tanks at Washington Boulevard. An onsite booster station provides water to the neighboring 513-Pressure Zone and the tanks at Hemlock Hill and these conditions raise the engineering importance of the wellfield.

4.15.1.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 10-inch, 60- to 100-slot screen
Screened zone:	470 to 536 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	98 feet bls
5-year average PWL	210 feet bls

4.15.1.2 Risk Assessment

Table 4.15-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	22	7	9	13	8	11	4
Detail	1973	1998	1998	950 gpm	156 MGY	Stable	

Water levels at Well Q-1 appear stable/cyclic over the past five years. However, water levels in the aquifer here have declined by over 20 feet since the well was constructed.

A few periods during summer appear to show pumping water levels at or possibly below the lower limit of the probe. If true, then the current probe settings are not fully capturing the water level patterns. Probe depths and readings should be verified in the field and confirmed in the telemetry system. If water levels are indeed falling below the probe's lower limit, the unit should be re-set and recalibrated at the next opportunity.

The pump equipment is overdue for replacement or refurbishment. When the equipment is next removed, the telemetry probe depth can be corrected (if needed). The well should also be video inspected for future maintenance needs and test pumped once new equipment is in place.

As noted with other Aquifer E wells, some regional level declines in water levels have been noted. Further investigation is recommended to assess whether continued production at the current rate is sustainable.

4.15.1.3 Recommended Actions

- 1 year: Correct or confirm the water level monitoring probe readings.
- 1 to 3 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.
- 1 to 5 years: Once new data is available (or existing data is corrected), review water level hydrograph data and compare with other Aquifer E wells and precipitation records.

Figure 4.15-1
Deepwood Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Deepwood**

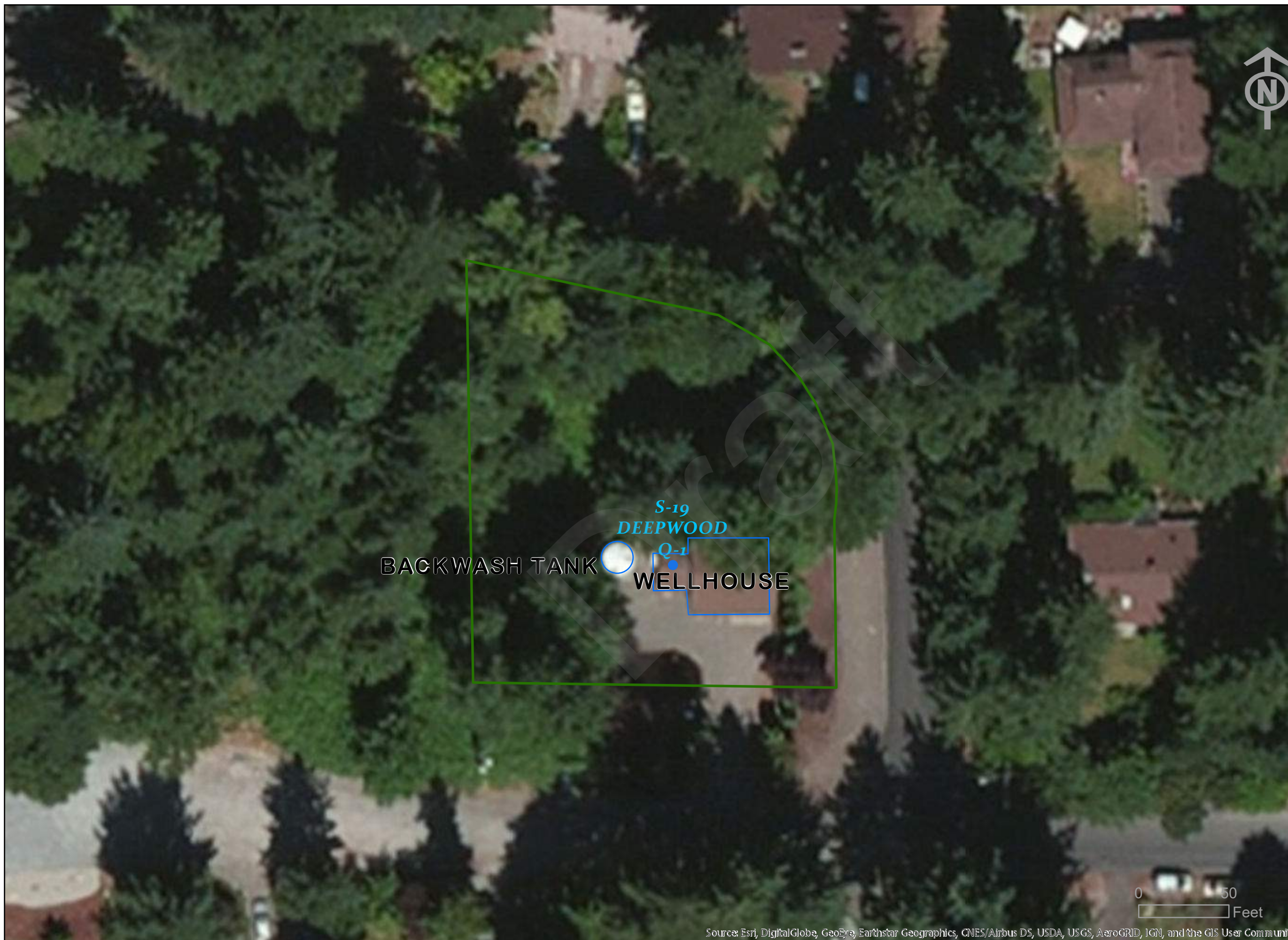
**Facility Type:
Well**

**Description of
Facility:
Q-1 Well, Booster
Pump**

**Site Area:
19,389**

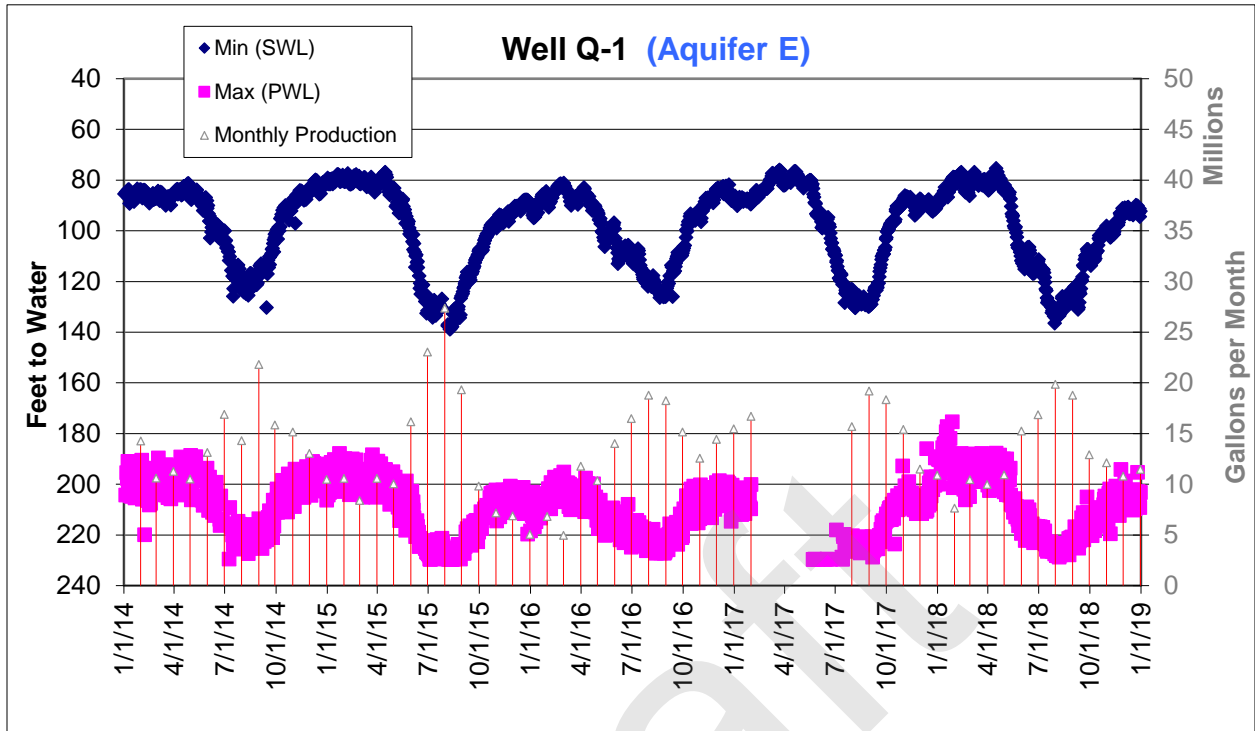
1 inch equals 50 feet

5/24/2019



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.15-2. Well Q-1 Water Levels and Monthly Production Volumes



4.16 112TH STREET

The 112th Street wellfield is the second youngest in the District. This is another of the District's 'work-horse' sites in that it has year-round use and high production rates. Only one well has been constructed here thus far.

The site is suitable for expansion, having space enough for one additional well (replacement or otherwise). Adding a second well may require a reduced control radius around the well (or an easement from the neighboring properties), depending on where the well is placed. Testing of Well R-1 implied a second well could be added, tapping Aquifer E and providing additional production.

Past investigations have also raised the possibility of adding a shallow production well at this location targeting Aquifer A3. If successful, such a well could expand production without additional impacts to Aquifer E. It might also offer flexibility in allowing a seasonal production scheme where Well R-1 is rested during the winter months and the new shallow well operates in its place. The roles would then be reversed in the summer peak periods when preservation of water levels in the shallow aquifers is of greater importance. However, due to space constraints, it may not be possible to add more than one well on the property.

4.16.1 Well R-1

Well R-1 (S21) is second only to Well N-1 in total annual production over the past ten years (and this may reverse in future if Well N-1 usage keeps declining). It was drilled in 1985 and has provided solid service ever since. As a younger well and thanks to recently installed equipment plus, the well ranks only 16th in the assessment despite being crucial to the District's day-to-day production needs. So, on a practical level, the well is of high importance, but risks of loss or the necessity of additional work on the site are generally low.

4.16.1.1 Key details

Aquifer:	Aquifer E
Size:	16-inch casing; 10-inch, 30- to 80-slot screen
Screened zone:	494 to 552 feet bls
Pump:	Line shaft with VFD
5-year average SWL	119 feet bls
5-year average PWL	177 feet bls

4.16.1.2 Risk Assessment

Table 4.16-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	26	24	27	2	1	6	24
Detail	1985	2015	2015	1,420 gpm	308 MGY	Stable	

Water levels in Well R-1 are cyclic/stable over the past 5 years. However, as noted in several other Aquifer E wells average static levels appear to have declined close to 30 feet since 2000. The well has seen higher use since 2016 compared to previous 15 years, in part due to other wells being offline (Ponders and View Road in particular). Additional water level trend analysis is warranted especially if this higher use pattern is likely to persist.

4.16.1.3 Recommended Actions

- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records.



Figure 4.16-1
112th St. Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
112th St**

**Facility Type:
Well**

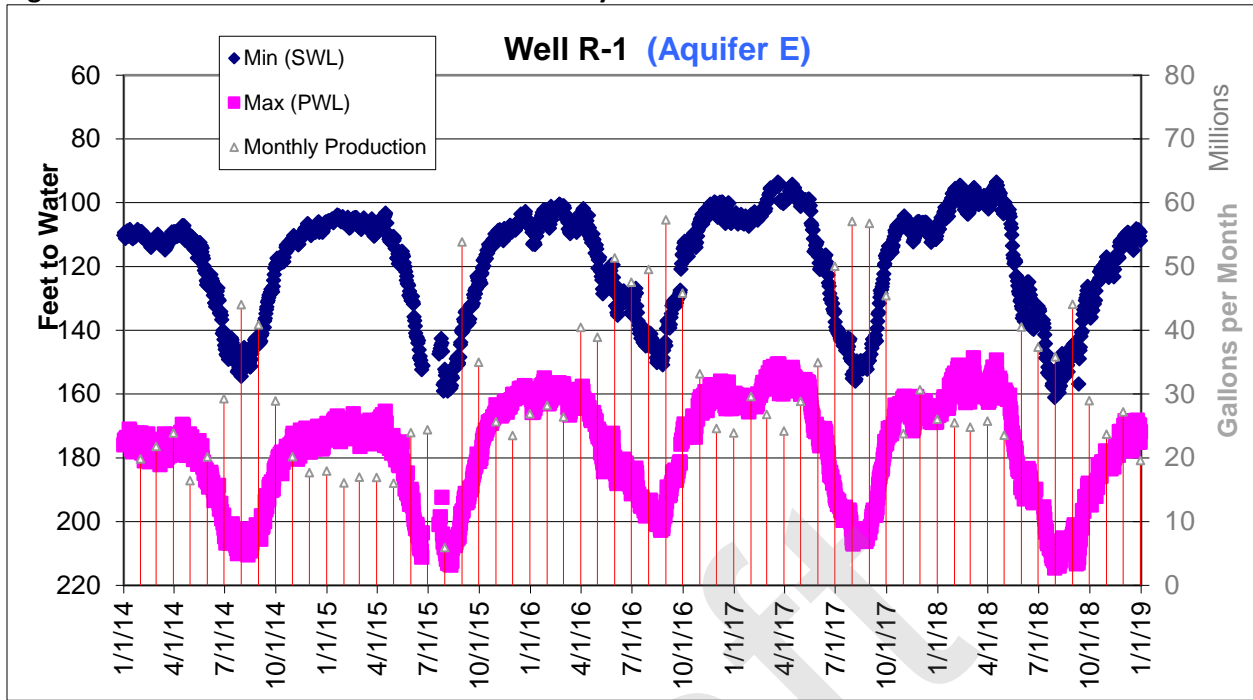
**Description of
Facility:
R-1 Well**

**Site Area:
60,202**

1 inch equals 50 feet

5/24/2019

Figure 4.16-2. Well R-1 Water Levels and Monthly Production Volumes



4.17 ANGLE LANE WELLFIELD

Drilling at the Angle Lane property began in the 1980s and three wells were installed. The two current production wells, Well S-1 and Well S-2 were completed in Aquifers C and E, respectively. Both wells serve the 404-Production Zone. A third well, Well S-2a, was drilled in an attempt to tap the shallow aquifer (Aquifer A3) at the site but was unsuccessful as production was too low.

Expansion at the property is constrained by three wells having already been drilled. A single replacement well might be possible but may require easements or a variation from the DOH set-back requirements.

4.17.1 Well S-1

Well S-1 (S22) was added to the system in 1987 as supplemental production to other sources. The well is completed in Aquifer C. The well ranked 17th in the assessment. The primary risk factors are time since pump replacement and rehabilitation, and declining water levels.

4.17.1.1 Key details

Aquifer:	Aquifer C
Size:	12-inch casing; 8-inch, 35-slot screen
Screened zone:	303 to 349 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	68 feet bls
5-year average PWL	137 feet bls

4.17.1.2 Risk Assessment

Table 4.17-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	28	2	3	27	17	7	27
Detail	1987	1988	1988	685 gpm	115 MGY	Declining	

Static and pumping water levels at Well S-1 are declining. Other District wells completed in Aquifer C do not show similar declines. The trend is troubling in that both static and pumping water levels are dropping concurrently, both having declined around 80 feet since the beginning or 2016. Typically, concurrent changes in static and pumping levels are a sign of lack of equilibrium between pumping and recharge in the aquifer (as opposed to a well- or pump-related failure). Such equilibrium is likely caused by increased pumping. The District has field confirmed the current readings. Similar declines are not observed at Hipkins and Washington Blvd wellfields.

To investigate possible increases in pumping, we attempted to collect data from the well at the Chambers Creek Hatchery run by Washington State Fish and Wildlife (WDFW) in hopes of comparing with the

Well S-1 record. However, WDFW did not have water level records through this period. They did confirm that their source well was rarely used. A similar effort should be made to get records from the Washington State Department of Social and Health Services (DSHS) for the Western State Hospital as one or more of their wells could be tapping this aquifer.

4.17.1.3 Recommended Actions

- 1 to 2 years: Review water level hydrograph data and compare with other Aquifer C wells and precipitation records. Request pumping rate and water level data from neighboring users (WDFW hatchery, Western State).
- 1 to 3 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.

4.17.2 Well S-2

Well S-2 (S23) was drilled after completing Well S-1 (see also Well S-2s below) in order to tap Aquifer E.

The pump equipment in Well S-2 is due for replacement in 2020. The well should be inspected when the pump is removed, and benchmark testing accomplished once the new equipment is installed.

4.17.2.1 Key details

Aquifer:	Aquifer E
Size:	20-inch casing; 10-inch, 35-slot screen
Screened zone:	471 to 535 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	79 feet bls
5-year average PWL	127 feet bls

4.17.2.2 Risk Assessment

Table 4.17-2

Criteria	Well age	Pump replacement	Last clean/rehab	Average peak use	Average annual use	Water level trend score	Engineering score
Rank	29	12	14	20	13	10	27
Detail	1987	2005	2005	780 gpm	134 MGY	Stable	

Water level trends are cyclic/stable over the past five years, but slight lowering in the pumping water level can be seen across the record. This may be related to slightly higher average production and/or slight decline in well efficiency. As noted for other Aquifer E wells, additional research is warranted to analyze water levels with precipitation and use records.

4.17.2.3 Recommended Actions

- 1 to 3 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.
- 1 to 5 years: Review water level hydrograph data and compare with other Aquifer E wells and precipitation records.

4.17.3 Well S-2a

Well S-2a was drilled to determine if the shallow aquifer encountered during drilling of Well S-1 could support production. In the end, the quantity of water from the shallow aquifer was not sufficient, and the District declined to place the well into production. The well remains on site but has no equipment. It is of limited utility except as a potential monitoring point. At relatively low cost, this well could be equipped with a transducer and monitored as part of the Abitibi monitoring effort. This may be useful as several other well data sets have become challenging to work with for that report. However, the need for such additional data may not be pressing, given Ecology's lack of response to the monitoring reports.

Draft



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.17-1
Angle Lane Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Angle Lane**

**Facility Type:
Well**

**Description of
Facility:
S-1/S-2 Wells**

**Site Area:
53,662**

1 inch equals 50 feet

5/24/2019

Figure 4.17-2. Well S-1 Water Levels and Monthly Production Volumes

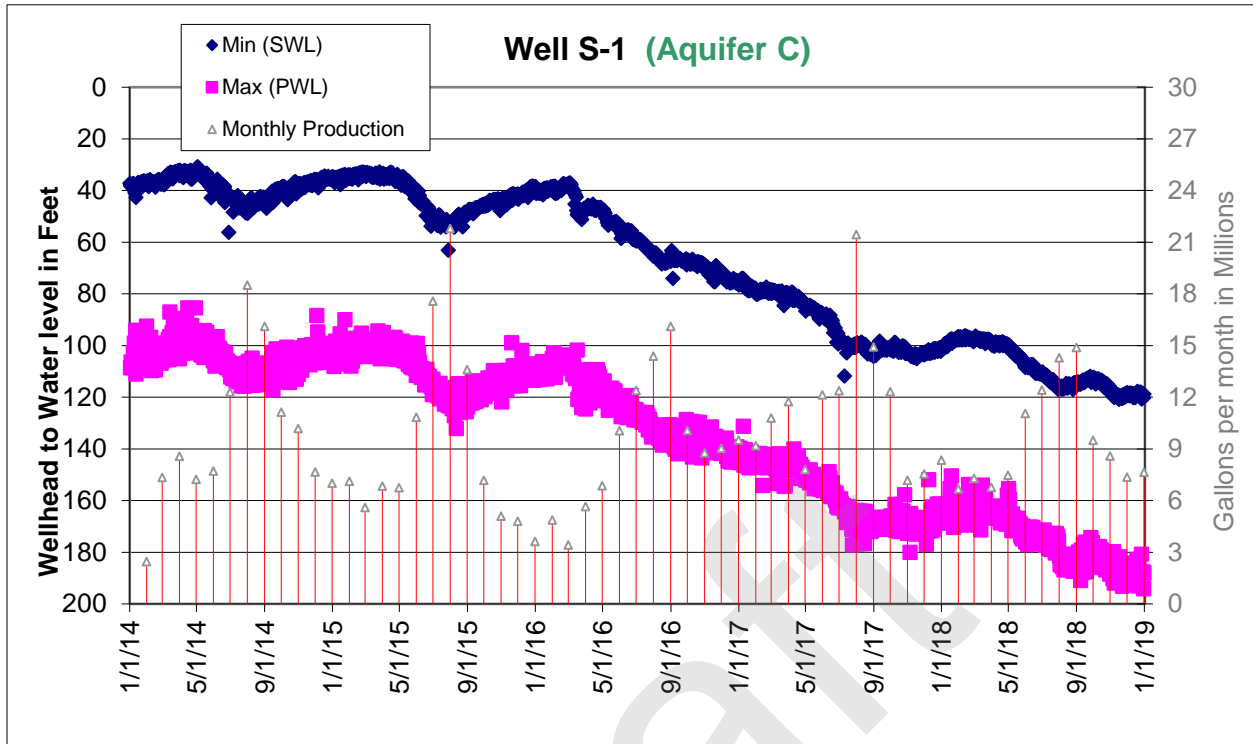
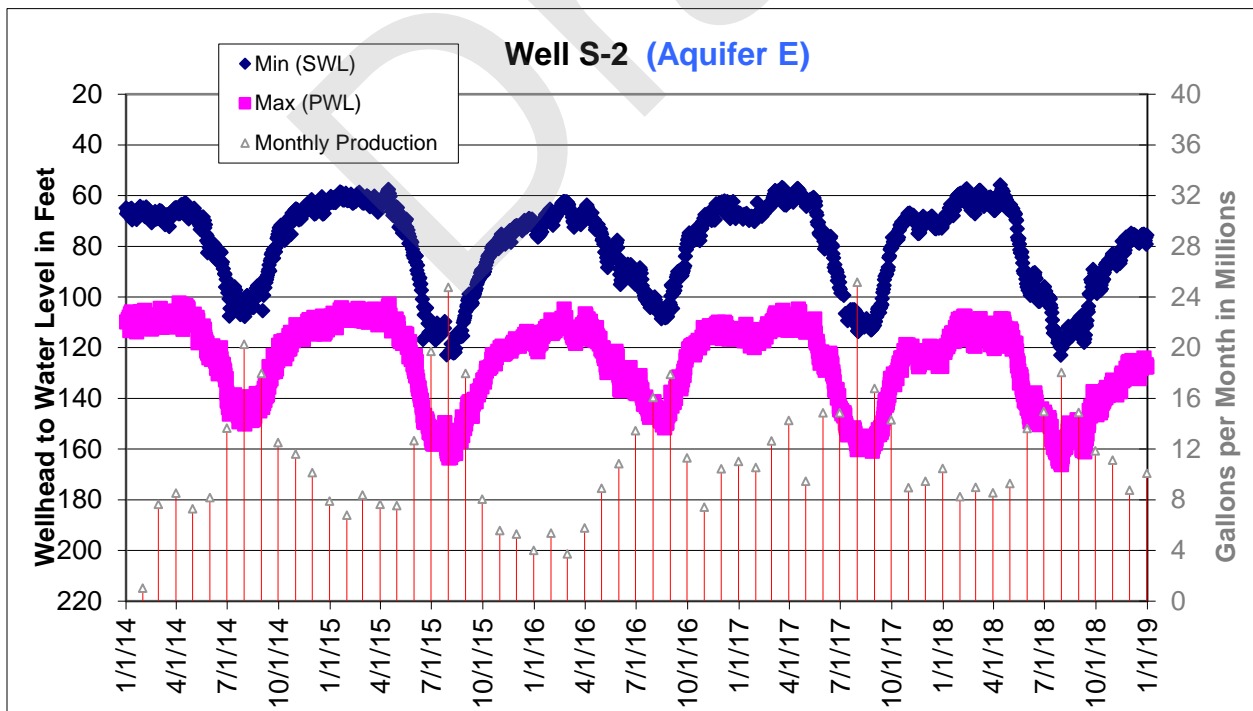


Figure 4.17-3. Well S-2 Water Levels and Monthly Production Volumes



4.18 COUNTRY PLACE

Country Place is the District's youngest wellfield with a test well and production well being drilled at this site in 1993.

The property is too small to expand with an another well. Well replacement or the addition of a treatment facility is also unlikely unless a portion of the surrounding residential development can be acquired.

4.18.1 Well U-1

Well U-1 (S27) was placed on-line in 1995 after a rather long testing and monitoring period needed for water rights purposes. This period also saw an extensive aquifer testing program of the City of Tacoma's South Tacoma Wellfield, which was monitored in Well U-1. Interference by the City's wellfield on this well was documented but did not appear to result in impairment of the District's use.

The well is in regular, year-round use but seasonal patterns dominate the production. The well serves the northeast portion of the 404-Pressure Zone in between the Steilacoom wellfield to the south and the Foster Reservoir to the west. The well's relative isolation on the edge of the system gives the site a relatively high engineering score but the well ranks 25th in the assessment due to its young age and good condition.

4.18.1.1 Key details

Aquifer:	Aquifer C
Size:	16-inch casing; 14-inch, 60- to 100-slot screen
Screened zone:	198 to 293 feet bls
Pump:	Submersible with Soft Start
5-year average SWL	30.5 feet bls
5-year average PWL	119.4 feet bls

4.18.1.2 Risk Assessment

Table 4.18-1

Criteria	Well age	Pump replacement	Last clean/rehab	Average Peak use	Average Annual use	Water level trend score	Engineering score
Rank	30	21	23	19	21	10	4
Detail	1993	2011	2011	795 gpm	86 MGY	Stable	

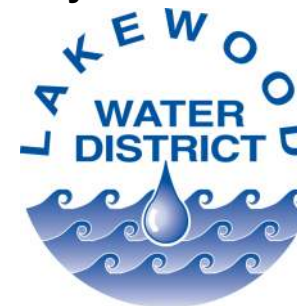
Water levels have remained cyclic/stable since 2009. Older data was not reviewed in detail but appears to show the same general patterns and average levels suggesting that Aquifer C is in good condition at this location. However, the aquifer system may be susceptible to droughts such as in 2015. The lowered static and pumping water levels in 2015 result from a combination of less recharge, increasing pumping at this well, and production from the City of Tacoma's wellfield. It would be worthwhile to understand the level of impacts that result from each of these effects during such low-recharge periods.

4.18.1.3 Recommended Actions

- 1 to 5 years: Compare water level records with precipitation patterns.
- 10 years: Replace or refurbish pump. Verify well conditions with down-hole video. Baseline testing of the well using the new pump equipment is also recommended. Verify monitoring probe performance, settings, and elevations.

Draft

Figure 4.18-1
Country Place Site Map



11900 Gravelly Lake Dr SW
Lakewood, WA 98499
253-588-4423

**Lakewood Water
District
Facility Map
Book**

**Facility Name:
Country Place**

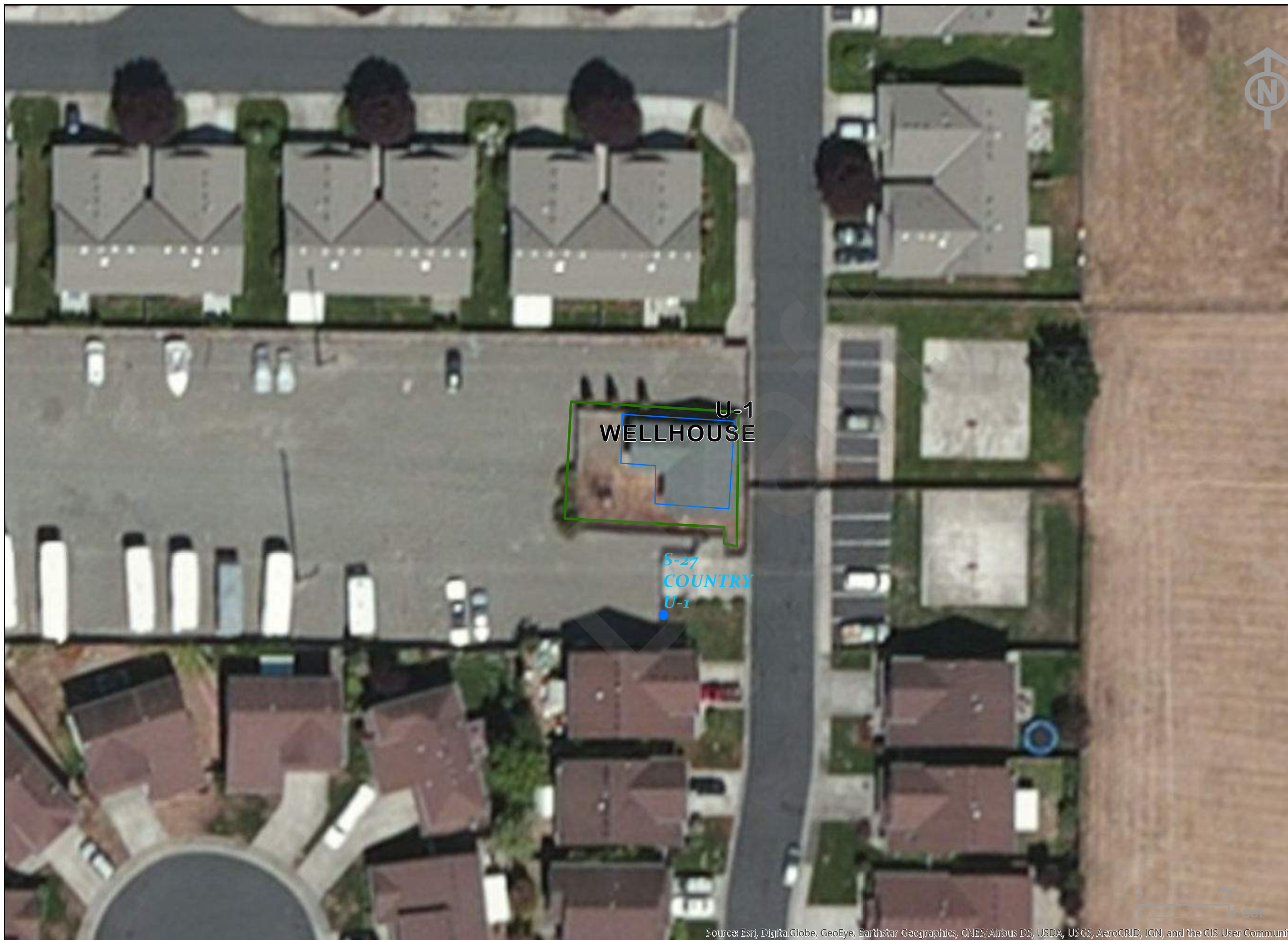
**Facility Type:
Wellsite**

**Description of
Facility:
U-1 Well,
Treatment Facility**

**Site Area:
2,844**

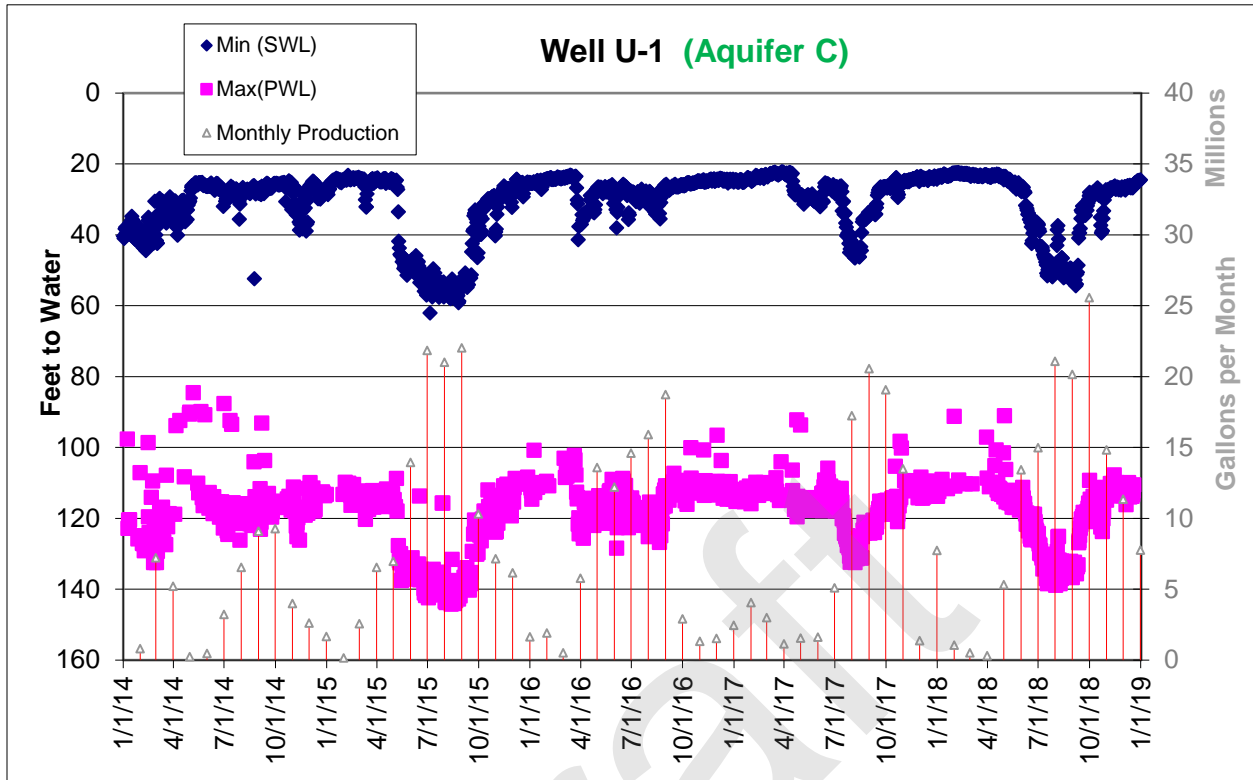
1 inch equals 50 feet

5/24/2019



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.18-2. Well U-1 Water Levels and Monthly Production Volumes



4.19 TEST WELL V

Test Well V (Well V-1) was drilled at the West Pierce Fire Station 22 property along Washington Boulevard. The well is not currently included in the District's inventory and thus was not ranked as part of this assessment. However, the Well V-1 location has long been a potential site for a future production well and was the target of initial water rights investigations in the 1990s. The well is included in order to discuss possible expanded use of the site.

The well is also a monitoring point used for the Abitibi water rights annual management plan. Continued collection of monthly manual water level measurements is anticipated for the foreseeable future.

The fire station property is small, but it may be possible to reach an agreement with the Fire Department that would allow for a production well to be installed. However, adding a treatment facility could be problematic depending on the nature of the treatment needed.

4.19.1 Well V-1

Well V-1 was installed in 1993. The well was drilled to a final depth of 336 feet to explore for Aquifers A3 and C. The only water-bearing zone of interest was found from 73 to 105 feet below ground. The well casing was perforated, and test pumped to determine aquifer capabilities and collect water quality samples.

Based on the testing, a 16-inch production well was recommended and production rates of up to 1,000 gpm were predicted for a successful well. The primary limitation was obtaining a water right for this site.

4.19.1.1 Key details

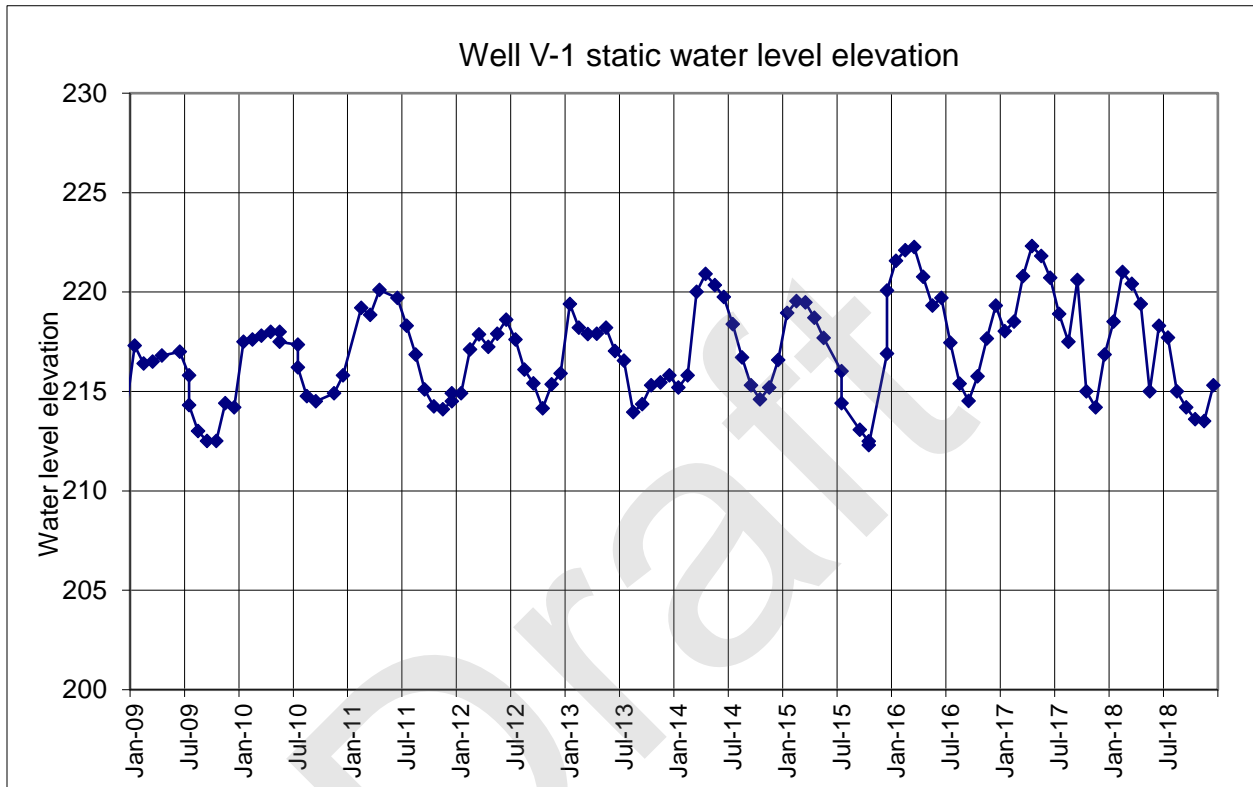
Aquifer:	Aquifer A3
Size:	8-inch casing; perforated
Perforated zone:	75 to 90 feet bls
Pump:	None
5-year average SWL	43 feet bls
5-year average PWL	n/a

Securing a new water right for this site is problematic as the withdrawal would potentially have impacts on the local surface water bodies (the lakes and Chambers-Clover Creek) which are closed by regulation. The original concept for using this site was to identify when surface water conditions were above a certain threshold in the rainy months where the level of impacts would be overwhelmed by the seasonal precipitation. This would lead to an interruptible (seasonal) water right, controlled by the monitoring in the surface water bodies and at the time of the proposal, Ecology and DOH were unsure if they could apply that mechanism to a water purveyor. Since then, approaches in both departments have evolved and the idea could be re-addressed.

In particular, PGG recommends looking at the possibility of a new withdrawal from this site by adding it as another point of withdrawal under existing rights. This would make the new right non-additive to existing rights but would expand the District's withdrawal capability. The well could then be used seasonally

to replace production from deeper wells (such as Wells D-2 or E-2) where an extended period of no production could help preserve aquifer levels. Further investigation of this possibility should be included in the Aquifer E water level analysis recommended for several of the District's wells.

Figure 4.19-1. Test Well V-1 Water Levels



WATER FACILITIES INVENTORY (WFI) FORM



ONE FORM PER SYSTEM

Quarter: 1

Updated: 02/01/2019

Printed: 4/18/2019

WFI Printed For: On-Demand

Submission Reason: Source Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

1. SYSTEM ID NO. 45550 C	2. SYSTEM NAME LAKEWOOD WATER DISTRICT	3. COUNTY PIERCE	4. GROUP A	5. TYPE Comm
6. PRIMARY CONTACT NAME & MAILING ADDRESS RANDY BLACK [MANAGER] PO BOX 99729 LAKEWOOD, WA 98496		7. OWNER NAME & MAILING ADDRESS LAKEWOOD WATER DISTRICT RANDALL M. BLACK PO BOX 99729 LAKEWOOD, WA 98496		8. OWNER NUMBER: 003231 MANAGER
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS 11900 GRAVELY LAKE DRIVE SW CITY LAKEWOOD STATE WA ZIP 98499		STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP		
9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION		
Primary Contact Daytime Phone: xxx xxx-xxxx		Owner Daytime Phone: (253) 588-4423		
Primary Contact Mobile/Cell Phone: xxx xxxx-xxxx		Owner Mobile/Cell Phone:		
Primary Contact Evening Phone: xxx xxx-xxxx		Owner Evening Phone:		
Fax: (253) 588-7150	E-mail: xxxxxxxxxxxxxxxxxxxxxx	Fax:	E-mail: xxxxxxxxxxxxxxxxxxxxxx	
11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)				
<input checked="" type="checkbox"/> Not applicable (Skip to #12) <input type="checkbox"/> Owned and Managed SMA NAME: _____ SMA Number: _____ <input type="checkbox"/> Managed Only <input type="checkbox"/> Owned Only				
12. WATER SYSTEM CHARACTERISTICS (mark all that apply)				
<input type="checkbox"/> Agricultural <input type="checkbox"/> Commercial / Business <input type="checkbox"/> Day Care <input type="checkbox"/> Food Service/Food Permit <input type="checkbox"/> 1,000 or more person event for 2 or more days per year <input type="checkbox"/> Hospital/Clinic <input type="checkbox"/> Industrial <input type="checkbox"/> Licensed Residential Facility <input type="checkbox"/> Lodging <input type="checkbox"/> Recreational / RV Park <input checked="" type="checkbox"/> Residential <input type="checkbox"/> School <input type="checkbox"/> Temporary Farm Worker <input type="checkbox"/> Other (church, fire station, etc.): _____				
13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
<input type="checkbox"/> Association <input type="checkbox"/> City / Town <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> Investor <input type="checkbox"/> Private <input checked="" type="checkbox"/> Special District <input type="checkbox"/> State				26,300,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO. 45550 C	2. SYSTEM NAME LAKEWOOD WATER DISTRICT	3. COUNTY PIERCE	4. GROUP A	5. TYPE 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?)		27754	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	14454		
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	1254		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	13300		
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.	127	127	
28. TOTAL SERVICE CONNECTIONS		27881	

29. FULL-TIME RESIDENTIAL POPULATION
A. How many residents are served by this system 180 or more days per year? 69705

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?												
B. How many days per month are they present?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
* Requirement is exception from WAC 246-290	70	70	70	70	70	70	70	70	70	70	70	70

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:** _____

<u>WS ID</u>	<u>WS Name</u>
45550	LAKEWOOD WATER DISTRICT

Total WFI Printed: 1



Water Facilities Inventory (WFI)

Report Create Date: 4/18/2019
Water System Id(s): 45550C
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 From: ALL **To:** ALL
Owner Number: ALL
SMA Number: ALL
SMA Name: ALL
Active Connection Count From: ALL **To:** ALL
Approved Connection Count From: ALL **To:** ALL
Full-Time Population From: ALL **To:** ALL
Water System Expanding Services: ALL
Source Type: ALL
Source Use: ALL
WFI Printed For: On-Demand



November 20, 2019

Stephanie Ard, P.E.
MurraySmith
1145 Broadway Plaza, Suite 1010
Tacoma, WA 98402

RE: Lakewood Water District Comprehensive Water System Plan (CWSP) Update

Dear Ms. Ard:

Thank you for the valuable time and effort you put toward the CWSP process. We have reviewed your plan and email responses from August 2019 to October 2019 and find that all submittals are consistent with the County's Comprehensive Plan and CWSP.

If you have any questions, please contact me at vaughan.cary@piercecountywa.gov or 253-798-7163.

Sincerely,

A handwritten signature in black ink, appearing to read "VC", written over a light blue circular stamp.

Vaughan Cary
Associate Planner

VC:dw

cc: Jennifer Kropack, Washington State DOH, jennifer.kropack@doh.wa.gov
Debbie Bailey, Pierce County Dept. of Emergency Management, debbie.bailey@piercecountywa.gov
Chrissy Cooley, TPCHD, ccooley@tpchd.org
Warner Webb, Pierce County Fire Marshal, warner.webb@piercecountywa.gov
Washington Water Service Company, customerservice@wawater.com
Northwest Water Systems, Kevin Odegard, kevin@nwwatersystems.com
Tacoma Water, Heather Pennington, hpenning@cityoftacoma.org

Local Government Consistency Determination Form

Water System Name: Lakewood Water District PWS ID: 45550C

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: August 2019

Local Government with Jurisdiction Conducting Review: City of Lakewood

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.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	3-1 to 3-12 & Fig 3.1	yes
b) The <u>growth projection</u> 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.	3-1 to 3-12 & Fig 3.1	yes
c) For <u>cities and towns that provide water service</u> : All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	N/A
d) <u>Service area policies</u> 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.	5-3 to 5-11 & 5-14 to 5-19	yes
e) <u>Other relevant elements</u> 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.	2-3 to 2-5 & 9-1 to 9-13	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.

Courtney Brunell
Signature
Courtney Brunell, Planning Manager

11/15/19
Date

Local Government Consistency Determination Form

Water System Name: Lakewood Water District PWS ID: 45550C

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: August 2019

Local Government with Jurisdiction Conducting Review: Town of Steilacoom

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.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	3-1 to 3-12 & Fig 3.1	yes
b) The <u>growth projection</u> 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.	3-1 to 3-12 & Fig 3.1	yes
c) For <u>cities and towns that provide water service</u> : All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	
d) <u>Service area policies</u> 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.	5-3 to 5-11 & 5-14 to 5-19	yes
e) <u>Other relevant elements</u> 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.	2-3 to 2-5 & 9-1 to 9-13	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.

Mark A. [Signature]
Signature Public Works Director

11/13/19
Date

**SEPA CHECKLIST FOR
LAKEWOOD WATER DISTRICT'S 2019 COMPREHENSIVE WATER SYSTEM PLAN**

A. BACKGROUND

1. Name of proposed project, if applicable:

Lakewood Water District
Comprehensive Water System Plan 2019 (Plan)

2. Name of applicant:

Lakewood Water District

3. Address and phone number of applicant and contact person:

Mr. Randall M. Black, General Manager
Lakewood Water District (253-588-4423)
Physical Address: 11900 Gravelly Lake Drive SW
Mailing Address: P. O. Box 99729
Lakewood, WA 98499-0729

4. Date checklist prepared:

November 14, 2018

5. Agency requesting checklist:

Lakewood Water District (LWD)

6. Proposed timing or schedule (including phasing, if applicable):

The intent is to adopt the Plan as soon as possible. The Plan includes a program of water system improvements to be implemented and constructed between 2019 and 2024.

**7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal?
If yes, explain.**

Yes, each year the capital improvement plan is evaluated and prioritized based upon funding. Also, this Plan will be updated in ten (10) years as required by State regulation.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Additional environmental investigations may be required for capital improvements on a project-by-project basis (See notes).

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.

None known.

10. List any government approvals or permits that will be needed for your proposal, if known.

Washington Department of Health, Washington Department of Ecology, City of Lakewood, Town of Steilacoom, Pierce County (Water Program and County Council).

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 specific information on project description.)

This Plan provides capital improvements, operational improvements, and financial planning for the next six years. The Plan details the service area, various agreements between the District and others, as well as the construction, operation and maintenance requirements for the water system.

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.

See: Attachment A (legal description)

Attachment B (service area map)

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other

All apply except mountainous.

b. What is the steepest slope on the site (approximate percent slope)?

This issue will be addressed at the time of each capital improvement.

c. What general types of soils are found on the site (for 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.

This issue will be addressed at the time of each capital improvement.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

This issue will be 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.

Indicate source of fill.

This issue will be addressed at the time of each capital improvement.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

This issue will be addressed at the time of each capital improvement.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

This issue will be addressed at the time of each capital improvement.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

This issue will be addressed at the time of each capital improvement.

2. Air

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.

This issue will be addressed at the time of each capital improvement.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

This issue will be addressed at the time of each capital improvement.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

This issue will be addressed at the time of each capital improvement.

3. Water

a. Surface Water:

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.

Yes -- American Lake, Gravelly Lake, Lake Steilacoom, Waughop Lake, Lake Louise, Carp Lake, Barlow Lake, Chambers-Clover Creek and its tributaries.

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.

This issue will be addressed at the time of each capital improvement.

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.

This issue will be addressed at the time of each capital improvement.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

None.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

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 proposed.

b. Ground Water:

1) Will ground water be withdrawn from a well for drinking water or other purpose? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

The District is totally reliant on groundwater withdrawal for its water supply. Chapter 2 of the Plan describes each of the existing withdrawal points. Future withdrawal points will depend on water rights and the long-term supply strategy of the District. No water will be discharged to ground water.

- 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.

Not applicable.

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.

This issue will be addressed at the time of each capital improvement.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

No.

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

This issue will be addressed at the time of each capital improvement.

4. Plants

a. Check or circle 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

b. What kind and amount of vegetation will be removed or altered?

Providing water service to this area will require water line installation and maintenance, and other utility activities will require short-term construction activity and some vegetation removal. Most work will occur in improved public or private rights of way or new rights of way if any cleared for roadway improvements.

c. List threatened or endangered species known to be on or near the site.

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Most landscaping activity will not be under the control of the project proponent. LWD will strive to use native plants for landscaping and re-vegetation where possible.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

This region borders Puget Sound and some streams support Puget Sound Chinook Salmon, currently listed as threatened.

c. Is the site part of a migration route? If so, explain.

Some streams may be spawning areas for the Puget Sound Chinook and other salmon species.

d. Proposed measures to preserve or enhance wildlife, if any:

This issue will be addressed at the time of each capital improvement.

e. List any invasive animal species known to be on or near the site:

None known.

6. Energy and Natural Resources

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.

Electricity is used to operate the District's pumps and for other purposes such as lighting and heating.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

Nothing in the Plan would affect the use of solar energy.

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:

A water use efficiency program for the public and LWD is part of all water utility operations. To the extent that this program is successful in reducing overall water usage, the results will be energy savings.

7. Environmental Health

- 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.

Generally, the providing of public water supply does not increase environmental health risks. To minimize health risk to nearby residents, 12.5% sodium hypochlorite is generated on-site, using salt and electricity, for drinking water disinfection.

- 1) **Describe any known or possible contamination at the site from present or past users.**

None known.

- 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.**

On-site generation of sodium hypochlorite is necessary for proper disinfection of the drinking water supply.

- 3) **Describe any toxic or hazardous chemicals that might be stored, used or produced during the projects development or construction, or at any time during the operating life of the project.**

On-site generation of sodium hypochlorite is necessary for proper disinfection of the drinking water supply.

- 4) **Describe special emergency services that might be required.**

In the unlikely event that there is a chemical leak or exposure, the fire department is trained to respond.

- 5) **Proposed measures to reduce or control environmental health hazards, if any:**

The District has an operation and maintenance program to prevent hazards from occurring, but if they do, the Emergency Response Plan is implemented (Refer to the Appendix for the Plan).

b. Noise

- 1) **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

None.

- 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.**

Noise associated with the operation of emergency generators for well sites and pumping stations during power outages and testing. Typical noise associated with construction equipment used for water system construction.

- 3) **Proposed measures to reduce or control noise impacts, if any:**

Insulated enclosures and exhaust mufflers.

8. Land and Shoreline Use

- a. **What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.**

Primarily residential with commercial/light industrial and open space throughout the water service area. Refer to Chapter 3 of the Plan, Land Use and Population. LWD responds to land use needs with water system improvements as necessary.

- 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 non-forest use?**

LWD only responds to the water service needs within the service area and the local jurisdictions (City of Lakewood & Pierce County) determine whether changes in land use will be allowed.

- 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?**

LWD could be affected if there is potential for contaminating the groundwater supply.

- c. **Describe any structures on the site.**

See 8a. above.

- d. **Will any structures be demolished? If so, what?**

No demolition is planned by LWD.

- e. **What is the current zoning classification of the site?**

Generally -- Residential(R1, R2,R3,R4), Air Corridor(AC1, AC2), Open Space & Recreation(OSR1, OSR2), Multi-family(MF1, MF2, MF3), Industrial(I1, I2), Industrial Business Park(IBP), Public Institutional(PI), Neighborhood Commercial(NC1, NC2)

- f. **What is the current comprehensive plan designation of the site?**

Same as those described in item "e." above.

- g. **If applicable, what is the current shoreline master program designation of the site?**

Not applicable.

- h. **Has any part of the site been classified as critical area by the city or county? If so, specify.**

There are "critical areas", such as critical aquifer recharge areas, within the water service area as defined by the Growth Management Act and various jurisdictions. This issue will be addressed for each capital improvement.

- 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:**

No impacts, no mitigation required.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The Plan is consistent with and implements the Pierce County Comprehensive Plan. It is consistent with local jurisdictions for applicability with land use plans.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable.

c. Proposed measures to reduce or control housing impacts, if any:

No impacts, no mitigation required.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

This issue will be addressed at the time of each capital improvement.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Screening with vegetation and fencing.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

This issue will be addressed at the time of each capital improvement. Any future construction of infrastructure that may create light or glare will be subject to future phased environmental review.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

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.

12. Recreation

- a. **What designated and informal recreational opportunities are in the immediate vicinity?**
Fort Steilacoom Park is the largest formal recreational facility in the service area. Numerous other parks and informal recreational facilities are located throughout the service area (See Chapter 3 of Plan).
- 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:**
Not applicable.

13. Historic and cultural preservation

- 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 to be listed or proposed for national registers.
- 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, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.**
None known.
- 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.**
This issue will be addressed at the time of each capital improvement.
- 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.**
This issue will be addressed at the time of each capital improvement.

14. Transportation

- 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.**
The street and road systems are described in the adopted comprehensive plan of the local jurisdictions in and around LWD.
- b. **Is 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?**
Not applicable.
- c. **How many parking spaces would the completed project have? How many would the project eliminate?**
Not applicable.

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).**

Individual capital improvement projects may include work on existing roads. It may be necessary in the future that new roads or streets for infrastructure development be subject to phased review.

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

Not applicable.

- 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 non-passenger vehicles). What data or transportation models were used to make these estimates?**

General construction traffic associated with capital improvement projects.

- 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**

Not applicable.

- h. Proposed measures to reduce or control transportation impacts, if any:**

This issue will be addressed at the time of each capital improvement.

15. Public services

- 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.**

No impacts, no mitigation.

16. Utilities

- a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.**

- 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.**

The Plan identifies water capital improvement projects (See Chapter 9); electricity provided by Lakeview Light and Power, Tacoma Public Utilities, Puget Sound Energy, and the Town of Steilacoom. Sewer is provided by Pierce County. Storm water is provided by the City of Lakewood.

C. Signature

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: Marshall Meyer

Name of signee Marshall Meyer

Position and Agency/Organization Senior Engineer / MurraySmith

Date Submitted: 8/2/2019

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(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.

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?

Capital improvement projects noted in the Plan will result in temporary construction equipment exhaust, dust and noise.

Proposed measures to avoid or reduce such increases are:

Compliance with local noise ordinances and application of water to dry, dusty sites.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Since most of the work proposed in the Plan will occur in already disturbed areas, minimal effects on species are expected.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

This issue will be addressed at the time of each capital improvement.

3. How would the proposal be likely to deplete energy or natural resources?

Implementation of the Plan should not deplete energy and natural resources.

Proposed measures to protect or conserve energy and natural resources are:

Specify energy efficient pump motors, lighting and other fixtures for new and existing facilities.

- 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 will not impact any of the above areas.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Not applicable.

- 5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

Lakewood Water District's water plan is consistent with and supports implementation of adopted and applicable Growth Management Act plans.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Not applicable.

- 6. How would the proposal be likely to increase demands on transportation or public services and utilities?**

The District's Plan is consistent with and supports implementation of adopted and applicable Growth Management Act plans.

Proposed measures to reduce or respond to such demand(s) are:

Not applicable.

- 7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

No known conflicts.

ATTACHMENT A

LAKWOOD
WATER DISTRICT
LEGAL DESCRIPTION
31 MARCH 2003

THOSE PORTIONS OF TOWNSHIPS 19 AND 20 NORTH IN RANGES 2 AND 3 EAST, WILLAMETTE MERIDIAN, PIERCE COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SECTION 31, TOWNSHIP 20 NORTH, RANGE 3 EAST, W.M.; THENCE EAST ALONG THE NORTH LINE OF SAID SECTION TO THE WESTERLY RIGHT-OF-WAY LINE OF INTERSTATE 5; THENCE SOUTHWESTERLY ALONG SAID RIGHT-OF-WAY INTO SECTION 6, TOWNSHIP 19 NORTH, RANGE 3 EAST, W.M. TO INTERSECT A LINE THAT IS PARALLEL WITH AND 500 FEET EAST OF THE WEST LINE OF SAID SECTION 6; THENCE SOUTH ALONG SAID PARALLEL LINE TO THE NORTH BOUNDARY OF MCCHORD AIR FORCE BASE (AFB); THENCE WEST ALONG SAID NORTH BOUNDARY TO THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF SAID INTERSTATE 5; THENCE SOUTHWESTERLY ALONG SAID RIGHT-OF-WAY LINE AND SOUTHERLY FOLLOWING SAID BOUNDARY OF MCCHORD AFB TO AN ANGLE POINT IN SAID BOUNDARY LYING IN SECTION 13, TOWNSHIP 19 NORTH, RANGE 2 EAST, W.M.; THENCE WEST ALONG SAID BOUNDARY OF MCCHORD AFB TO THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF SAID INTERSTATE 5; THENCE SOUTHWESTERLY ALONG SAID RIGHT-OF-WAY LINE AND THE BOUNDARY OF MCCHORD AFB TO THE NORTH LINE OF THE W.N.SAVAGE DONATION LAND CLAIM; THENCE EAST ALONG SAID NORTH LINE AND THE BOUNDARY OF SAID MCCHORD AFB TO WHERE SAID MCCHORD AFB BOUNDARY BEARS SOUTH; THENCE SOUTHERLY AND EASTERLY ALONG SAID MCCHORD AFB BOUNDARY TO INTERSECT THE NORTH BOUNDARY OF FORT LEWIS MILITARY RESERVE (MR); THENCE WEST ALONG SAID FORT LEWIS MR BOUNDARY TO WHERE SAID BOUNDARY BEARS NORTH; THENCE NORTH ALONG SAID FORT LEWIS MR BOUNDARY TO INTERSECT THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF INTERSTATE 5; THENCE SOUTHWESTERLY ALONG SAID RIGHT-OF-WAY LINE AND THE FORT LEWIS MR BOUNDARY TO INTERSECT THE EAST-WEST CENTERLINE OF SECTION 21, TOWNSHIP 19 NORTH, RANGE 2 EAST, W.M.; THENCE WEST ALONG SAID CENTERLINE TO INTERSECT THE NORTHERLY BOUNDARY OF CAMP MURRAY MR; THENCE NORTHWESTERLY ALONG SAID BOUNDARY TO INTERSECT SAID FORT LEWIS MR BOUNDARY IN AMERICAN LAKE; THENCE NORTHERLY ALONG SAID FORT LEWIS MR BOUNDARY TO INTERSECT THE NORTH SHORE OF AMERICAN LAKE AT THE EAST LINE OF SECTION 17, TOWNSHIP 19 NORTH, RANGE 2 EAST, W.M.; THENCE

NORTHERLY AND WESTERLY

Lakewood (cont'd)

two

ALONG SAID LINE OF FORT LEWIS MR BOUNDARY TO THE SOUTH LINE OF THE TOWN OF STEILACOOM IN SECTION 6, TOWNSHIP 19 NORTH, RANGE 2 EAST, W.M.; THENCE EASTERLY AND NORTHERLY ALONG SAID BOUNDARY OF THE TOWN OF STEILACOOM TO INTERSECT THE NORTH RIGHT-OF-WAY LINE OF RIGNEY ROAD IN THE SOUTHWEST QUARTER OF SECTION 32, TOWNSHIP 20 NORTH, RANGE 2 EAST, W.M.; THENCE NORTHEASTERLY ALONG SAID NORTH LINE TO THE MOST EASTERLY CORNER OF PARCEL 4, PEARSON SHORT PLAT AS RECORDED UNDER PIERCE COUNTY AUDITOR FILE NO. 76-55; THENCE WESTERLY ALONG THE NORTH LINE OF SAID PARCEL 4 TO THE SOUTHEAST CORNER OF STEILACOOM GARDENS, A CONDOMINIUM, AS SHOWN ON SHEET TWO OF THREE RECORDED UNDER PIERCE COUNTY AUDITOR FILE NO. 2467090; THENCE NORTH ALONG THE EAST LINE OF SAID CONDOMINIUM AND AN EXTENSION THEREOF TO THE NORTH LINE OF STEILACOOM BOULEVARD; THENCE ALONG SAID NORTH LINE TO THE WEST BOUNDARY OF THE FORMER U.S. MILITARY RESERVE IN SECTION 32, TOWNSHIP 20 NORTH, RANGE 2 EAST, W.M. (WESTERN STATE HOSPITAL, FT STEILACOOM, AND PIERCE COLLEGE); THENCE NORTH ALONG SAID WEST LINE TO THE NORTHWEST CORNER OF SAID RESERVE; THENCE EAST ALONG THE NORTH LINE OF SAID RESERVE TO INTERSECT THE EAST BOUNDARY OF THE TOWN OF STEILACOOM; THENCE NORTHERLY AND WESTERLY ALONG SAID BOUNDARY TO INTERSECT THE CENTERLINE OF CHAMBERS CREEK IN SECTION 29, TOWNSHIP 20 NORTH, RANGE 2 EAST, W.M.; THENCE NORTHERLY AND EASTERLY ALONG SAID CENTERLINE TO INTERSECT THE CENTERLINE OF LEACH THENCE NORTHERLY AND EASTERLY ALONG SAID CENTERLINE TO INTERSECT THE NORTH LINE OF SECTION 26, TOWNSHIP 20 NORTH, RANGE 2 EAST, W.M.; THENCE EAST ALONG SAID NORTH LINE TO INTERSECT THE EAST RIGHT-OF-WAY LINE OF LAKEWOOD DRIVE WEST ; THENCE SOUTH ALONG SAID RIGHT-OF-WAY LINE TO INTERSECT THE NORTH RIGHT-OF-WAY LINE OF SOUTH 74TH STREET WEST; THENCE EAST ALONG SAID RIGHT-OF-WAY LINE TO THE WEST BOUNDARY OF THE CITY OF TACOMA; THENCE SOUTHERLY AND EASTERLY ALONG SAID BOUNDARY TO NORTHWEST CORNER OF SECTION 31, TOWNSHIP 20 NORTH, RANGE 3 EAST, W.M., AND THE POINT OF BEGINNING.

EXCEPT SILCOX ISLAND IN AMERICAN LAKE.
CONTAINING 12,352 ACRES, MORE OR LESS.

Prepared by David A. Berg, PLS No. 11278

Water Use Efficiency Program

WATER USE EFFICIENCY REQUIREMENTS

Per WAC 246-290-800(2) and 246-290-810(2), water providers are required to develop and implement a Water Use Efficiency program as part of their planning documents. The planning requirements for WUE 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 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.

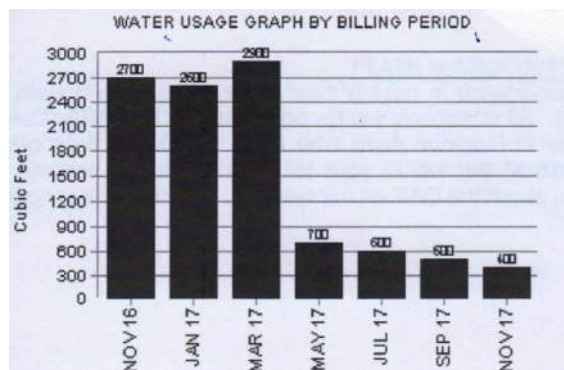
PAST WATER USE EFFICIENCY PROGRAM

Lakewood Water District has had an ongoing WUE program, including leak detection surveys, an annual water main replacement program, bills showing water consumption history and other WUE elements. A summary of the District specific programs is as follows:

Leak Detection Surveys – The District has routinely contracted for leak detection surveys of the water system. Additionally, the District continues to place Permalog sensors in areas of concern to identify potential leaks. There is more frequent effort to identify leaks within older system areas (with asbestos cement and steel pipe) and in areas identified by Permalog sensors as having potential leaks. Once leaks are identified, they are repaired as soon as possible.

Water Main Replacement Program – On average, the District replaces approximately three (3) miles of the distribution system per year.

Bills Showing Consumption History – Customer bills that provide historical water consumption data allow customers to understand how their use varies throughout the year. This information helps customers make informed choices about how they manage their water use, including implementing conservation. The District’s customer bills depict consumption data for the preceding year, in 2-month increments, shown on a simple bar graph (see example below).



School-Based Education – The District participates in school-based education program by providing classroom educational materials and PowerPoint presentations. The classroom educational materials include a broad collection of items such as posters, brochures and other supplies.

Public Outreach – The District engages in general public outreach intended to build and reinforce a water conservation ethic among customers. These efforts include distribution of newsletters, brochures, annual Drinking Water Quality Report, participation in such events as Lakewood Fair, Lakewood Gardens Festival, Lakewood Summerfest, RWA Water Festival, and other regional efforts.

The District plays a role in regional organizations that promote water conservation including being an active member of the **Partnership for Water Conservation**.

Indoor Retrofit Kits – The District has offered free indoor water audits and dye tablets for toilets to residential customers

Outdoor Irrigation Items – The District has offered free outdoor water conservation items such as rain/sprinkler sensors to customers. The items target households with irrigated landscape areas, primarily single family homes that do not have automatic irrigation systems. The items are designed to encourage customers to reduce watering and other outdoor water use.

2018 WATER USE EFFICIENCY GOAL ESTABLISHMENT

- The District will continue the programs to assure that distribution system leakage (DSL) will remain at 10% or less over a three-year rolling average.
- The District will promote conservation by education to its customers to reduce consumption by ¼ of one-percent per year, weather scaled.

2018 WATER USE EFFICIENCY MANDATORY MEASURES

To meet these goals, the District will implement or evaluate the following mandatory measures:

- (1) *Install production (source) meters (WAC 246-290-496(1))* – The District replaced all source meters with more accurate meters within the last 5 years.
- (2) *Install consumption (service) meters (WAC 246-290-496(2))* – The District has meters on all consumption services. The new AMI metering system, fully implemented by 2015, provides nearly real-time water usage of customers. Customers are automatically notified by the system if an apparent leak or over-usage is occurring.
- (3) *Perform meter calibration (WAC 246-290-496(3))* – Meters are selected, installed, operated, calibrated, and maintained following generally accepted industry standards and information from the manufacturer.

- (4) *Implement a water loss control action plan to control leakage (WAC 246-290-820(4))* – The District has a water loss control action plan, under a separate cover, to address its distribution system leakage.
- (5) *Educate customers about how they can use water efficiently (WAC 246-290-810(4)(f))* – The District provides educational materials and other information with water utility bills and other mailings or resources at least once per year.
- (6) *Evaluate rates that encourage water demand efficiency ((WAC 246-290-100(4)(j)(iv) and 246-290-105(4)(l)))* – The City has evaluated and implemented a block rate fee structure, which encourages water demand efficiency.
- (7) *Evaluate reclamation opportunities (WAC 246-290-100(4)(f)(vii))* – The District has evaluated whether reclaimed water from Pierce County Sewer’s Chamber Bay Treatment Plant can be reasonably utilized at this time and has concluded it is not feasible.

2018 WATER USE EFFICIENCY TARGETED MEASURES

Because the District has between 10,000 and 49,999 service connections, it must implement at least nine (9) additional WUE measures that are targeted to the District’s customers (per Table 5.1 of the DOH *Water Use Efficiency Guidebook*, Third Edition (Jan. 2017)). These measures are separated into the following categories: indoor residential measures, outdoor measures, and industrial/ commercial/ institutional measures.

The District’s planned WUE measures are as follows:

Indoor residential measures

- (1) *Block rate fee structure* – In 2016, the District implemented a block rate fee structure. The City will consider changes to its inclining block rate structure as well as seasonal rates in the future.
- (2) *Bills showing consumption history* - The District will continue to provide this information and offer ways for customers to obtain additional information via the city website.
- (3) *Indoor retrofit kits* – The District will consider offering indoor retrofit kits. This measure applies to the single-family and multi-family sectors, both existing and new customers.
- (4) *Toilet leak detection* – On an as-requested basis, the District provides dye tablets for water customers to test their toilets for leaks. This measure applies to single-family and multi-family sectors, both existing and new customers, and businesses with tank-

style toilets. Only tank-style toilets are targeted since most leaks occur in that type of toilet, usually vial flapper leaks.

- (5) *Public Outreach* – The District will continue to participate in public outreach programs including water conservation brochures, distributing water conservation materials at public events and other regional efforts.

Outdoor Measures

- (6) *Outdoor irrigation kits* – The District will continue to distribute gauges for monitoring rain/watering along with brochures on Wise Use of Water and conservation tips on irrigation and rain sensor controllers.

Industrial/ Commercial/ Institutional Measures

- (7) *Block rate fee structure* – In 2011 the District implemented a block rate fee structure. In accordance with MTMC 13.05.150 Utility charges – Commercial and/or industrial. The base charge and rates (billed bimonthly) for water service to other than single-family residences or multifamily structures shall be based on the number of non-irrigation water meter installations and the water delivered through those service meter(s).

RECLAIMED WATER OPPORTUNITIES

Currently, there is no reclaimed water infrastructure in the District’s water service area. As reclaimed water supply becomes available and infrastructure is installed, opportunities will be evaluated based on need, availability and cost.

DISTRIBUTION SYSTEM LEAKAGE

Based on 2017 water consumption records, the overall non-revenue water amount equates to 9.7 percent, with a 3-year average of 10.0 percent average of the total water supplied by the District source meters.

SUPPLY-SIDE WATER USE EFFICIENCY MEASURES

Supply side measures such as leak detection surveys and replacing meters do not count as the minimum required measures. These types of measures must be implemented to reduce water loss and achieve leakage standards. The District implements several of these measures to maintain a healthy system.

- (1) *Leak detection surveys* – The District will continue to survey the water system for leaks.
- (2) *Water main replacement program* – The District will continue this program replacing high priority water mains with newer materials. The replacements are anticipated to reduce leakage caused by older water mains.

(3) *Meter replacement program* – The District began replacement of all water service meters in 2015 and completed replacement of all meters in 2016. The new AMI metering system uses the latest technology to help identify customer side leaks, give more accurate measurements for system planning and hydraulic modeling, and several other benefits.

ESTIMATED ANNUAL SAVINGS

The estimated conservation savings the District anticipates from its conservation program will be at least a ¼ percent reduction in water demand per year on average.

SUMMARY

The District is committed to promoting water use efficiency and reducing its distribution system leakage. The District has partnered with the Regional Water Cooperative of Pierce County and other local water providers in the area to encourage water use efficiency.



COMMISSIONERS
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J. S. Korsmo, Jr.
G. J. Rediske
GENERAL MANAGER
Randall M. Black

Lakewood Water District has an active cross-connection control program in place since 1989 to help protect the public's water system from contamination via cross connections.

During the last six years the program has been active in:

- We have monitored, on a six-year average, 4354 assemblies a year, and by monitoring the assemblies, we mail letters to the customers notifying them that a test is needed. Upon completion of testing, we input and track the results. If any device has a failing test, we then follow up with a second letter for repair and retest. This annual testing is a requirement from the Department of Health, and it is our responsibility to track the assemblies.
- We have also been active in locating and enforcing unregistered backflow assemblies in the District and working with many homeowners and business owners to educate the importance and safety of backflow devices.
- We have been using flyers and information packets to help accomplish the education of the public.
- We have a permitting process for all backflow installation. During the last six years, we have issued, on average, 93 new backflow permits per year. There are two inspections needed and a sign-off process on the final building permit with the City.

The Lakewood Water District's goals for the next six years are as follows:

- Continue to build our cross-connection program.
- Continue to work with the City of Lakewood on matters of cross-connection in respect to premise isolation protection.
- Continue District policy of premise isolation for all commercial accounts and the implementation of such.
- Work towards bringing delinquent accounts up to date and finding non-permitted assemblies in the system.
- Working towards 100% compliance in regard to all Table 9 hazards known and perceived.
- Actively addressing cross-connections as they are identified or come to District attention and/or found through District inspections.

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CROSS CONNECTION CONTROL **POLICY AND PROCEDURES**

The following are the policies and procedures for the Cross Connection Control Department of the Lakewood Water District. These procedures shall be strictly followed unless the Lakewood Water District waives, lessens, or adds to the procedures. Any variance from the procedures must have the consent of the Lakewood Water District Cross Connection Control Department. For purposes of clarification in the following text...the term "the District" will refer to "The Lakewood Water District". The District General Manager reserves the right to change any part of this policy at any time if he feels it is conducive to the best interests of the District's customers.

I. DISCONTINUATION OF WATER SERVICE FOR FAILURE TO COMPLY

The Lakewood Water District reserves the right to discontinue water service to any customer or property who is unable or refuses to comply with Resolution # B-1287, the State Board of Health Drinking Water Regulations, WAC 246-290-490 on Cross Connection Control or when public safety is at risk pertaining to a known high hazard.

II. NEW CONSTRUCTION

All new construction (homes, business, commercial, industrial) shall be required to have an inspection by the District before occupancy will be given by the City of Lakewood Building Dept. We will assess the degree of hazard for each situation. This includes existing premises that are installing new fixtures, irrigation systems, etc. Once the permits are obtained, installation is complete, and backflow test reports submitted, the District will sign off on the project.

III. EXISTING PREMISES

The Lakewood Water District shall inspect existing premises in the following manner: (1) Commercial/Industrial facilities shall be contacted on a degree of hazard basis...beginning with the most dangerous situations with a high potential for water contamination. (2) Residential facilities shall be contacted if it has been established that there is a potential cross connection on the premises, ie: irrigation system, pool, or hot tub. Customers shall be contacted by the order of their account in our meter reading routes.

IV. APPLICATION OF BACKFLOW ASSEMBLIES

The Lakewood Water District reserves the right to decide how or where a backflow prevention assembly(s) shall be installed. The District uses the standards explained in the most current edition of the PNWS-AWWA manual. Each facility is different and it



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will be up to the discretion of the Cross Connection Control Program inspector how a particular hazard is addressed. Any exception to an approved installation will be documented in writing by the Cross Connection Control Inspector.

V. ASSEMBLIES APPROVED FOR INSTALLATION

A backflow assembly(s) is considered an approved assembly(s) only if it appears on the list issued by the Washington State Department of Health Drinking Water Program. If it is not on this list it is not an approved backflow prevention assembly(s) and shall not be used. This list is updated annually and is available to be reviewed at the District for information purposes. If copies are requested, a nominal fee will be charged.

VI. INSTALLATION REQUIREMENTS FOR BACKFLOW ASSEMBLIES

A backflow prevention assembly(s) shall be installed in compliance with the instructions that appear in the latest approved edition of the PNWS-AWWA Cross Connection Control Manual. Only the Lakewood Water District reserves the right to establish variances to this chapter and shall be bases on a case by case basis.

VII. TESTING PROCEDURES

If a backflow test report is filled out properly, with all the information that the Lakewood Water District requires it shall be filed as a completed test report. It is up to the State of Washington to monitor and train the Backflow Assembly Testers in the various test procedures that are available. The testing procedures shall be those methods that are approved and acceptable to the State Department of Health and the Lakewood Water District.

VIII. QUALIFICATIONS FOR BACKFLOW ASSEMBLY TESTERS

Only those that are approved Backflow Assembly Testers may submit tests to the District if they have been state certified to test assemblies. They shall also submit proof that they possess a current Backflow Assembly Tester card (or other approved tester certification accepted by and recognized by the state department of health) for the calendar year in which they are testing. The current Backflow Assembly Testers shall also show proof that the equipment that is being used to test has been calibrated within one year prior to the test they are submitting. If a Backflow Assembly Tester cannot or will not meet these requirements, the test report will be returned to the testers and their customer will be notified.

IX. TESTING OF BACKFLOW ASSEMBLIES

All backflow prevention assemblies required by the District shall be tested upon installation, after repair or relocation, and a minimum of annually. The District does not test any backflow assemblies. It is the customer's responsibility to hire a state certified backflow assembly tester.



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X. ANNUAL TESTING

The District shall send a letter at the beginning of the month to customers whose test is due. The test report is due by the end of the month. If the test is not submitted the District will send a second "reminder" letter. This letter shall allow fifteen days to submit the test. If the test is still not submitted the District shall send a "final certified letter". This letter will have a final due date. If the report still is not received by the District by the final due date, then the District will hang a door hanger stating that water service will be discontinued the following day. Water service will be resumed only when a current backflow test is submitted to the District. This complete process shall not exceed a total of sixty days.

XI. TESTER WAIVERS

Waivers are papers signed by the customer and submitted to the District allowing the annual mailing to be mailed directly to the tester. These waivers will be granted on a case by case basis and only testers on the Lakewood Water District list will be able to add new waivers during the current year and all pre-existing waivers will be grandfathered in.

Waivers signed by the customer and on record with the District only allows for thirty days for test reports to be submitted to the District. After the thirty day deadline, all testers with outstanding waivers will be notified and have seven (7) days after the date of notification to turn in any outstanding test reports. After that time, the District will pull the waiver on the account and notify the customer directly. If a company or tester is continually submitting test reports late with "waiver tests" they run the risk of removal from the Districts tester list.

XII. LIST OF TESTERS

The District shall maintain a list of certified backflow assembly testers to distribute to its customers. The District does not promote one company over another. The requirements for a company to be on the list are (1) has to be a licensed company with the State of Washington, (2) have up to date certified backflow assembly tester(s) employed by your company, (3) have all testing equipment calibrated at least annually, (4) be bonded as a general or specialty contractor, and (5) carry at least \$500,000.00 in liability insurance.

Companies shall be listed in alphabetical order (from A to Z) on our list. Once a company is removed from the list three times they shall no longer be eligible to be a part of the District's list. A company may be removed for failure to submit annual documentation of status, failure to submit test reports on time, failure to obtain permits, poor workmanship, customer complaints, or any other activities deemed harmful to the District or its customers.

Removal for customer complaints shall be reviewed by the District General Manager. He shall ask for a meeting with the company and the Cross Connection Control

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Department Manager. Depending on the outcome of that meeting the District General Manager will then decide if a company is to be suspended for a period of time or completely banned from our list forever. The District takes customer complaints very seriously. If there is a trend in this area one removal could be irreversible. The "three strikes" removal that is listed above pertains more to documentation violations. This list is a privilege for testing companies to be included on. The Lakewood Water District always reserves the right of refusal pertaining to this list.

For unresolved disputes between the Cross Connection Control Department Manager and the tester or testing company, the tester or company has the right to have the District General Manager evaluate and make a final decision on the dispute. A written explanation of the situation shall be submitted to the District General Manager within thirty days of final decision by the Cross Connection Control department. This document shall be submitted by certified mail only.

The District General Manager will then schedule a meeting with the tester/company and the Cross Connection Control department. This meeting shall be scheduled not more than sixty days from receipt date of the certified letter.

XIII. PERMITTING

Permits are required for all installations of backflow assemblies. This includes existing situations where a backflow assembly is removed and another is installed. In other words any time a backflow assembly is installed in any situation a permit is required. Inquire at the Lakewood Water District offices for permit pricing, they are subject to change. Permits can be obtained at the Lakewood Water District in person or by mail. The District does not sell permits in the field.

XIV. INSPECTIONS

The term inspection means to visually look at the installation of a backflow assembly. The Lakewood Water District shall inspect all backflow installations. Usually, a forty-eight hour notice is required. Inspections are by appointment only with the Cross Connection Control Department. An inspection cannot be scheduled prior to obtaining a permit (if applicable). Lakewood Water District reserves the right to inspect all points of Connection even if this means delaying the backfilling of a ditch until inspection is completed.

XV. CUT AND CAPPED SYSTEMS

When an irrigation system is not in use the backflow assembly will still be required to have an annual test. The only way to avoid the test is to physically sever the system. The Lakewood Water District will inspect the point where the system is severed and photograph it. The District will periodically check on cut and capped systems. If they are found to be in use the customer shall receive notice from the District. The District will then give the customer the option of installing a backflow assembly or severing the line again. The District reserves the right to discontinue water service if the problem cannot be resolved.



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The same rules would apply for certain fixtures in a commercial/industrial situation. The fixture not in use would have to be severed and possibly removed from the premises if the District deems it might be connected and used. This would always be evaluated on the potential degree of hazard involved.

XVI. FINAL STATEMENT

The Lakewood Water District has developed this Program to be in compliance with State WAC 246-290-490, Resolution B-1287 and with the goal of reducing or eliminating Cross Connections, to the extent possible, to prevent contamination of the public water system. This also includes protecting the District's customers by reducing any chances of backpressure and backsiphonage which cause potable and non-potable water to form cross connections.

Sometimes situations may arise where in the best interest of the District and their customer(s) where direction from District personnel may be needed in guiding a customer(s) in the selection of a tester or installer in order to avoid problems for the customer. This shall not be construed as a conflict of interest on the District's part.

All final decisions to do with the implementation of this policy, the settling of unresolved disputes and any other structural changes to this policy shall be at the discretion of The Lakewood Water District General Manager.

Randy Black,
Lakewood Water District General Manager
April 22, 2019



LAKEWOOD WATER DISTRICT

**DEVELOPER'S EXTENSION AGREEMENT
AND
DESIGN/CONSTRUCTION
SPECIFICATIONS & STANDARDS**

2019

Board of Commissioners:

L. R. GHILARDUCCI, JR.
President

J.S. KORSMO, JR.
Vice President

G.J. REDISKE
Secretary

Lakewood Water District:

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Lakewood Water District

**Developer's Extension Agreement
and
Design/Construction Specifications & Standards
2019**

Adopted by the Board of Commissioners on the 17th day of January, 2019

A handwritten signature in black ink that reads "Randall M. Black".

Randall M. Black, General Manager



Lakewood Water District
**Developer's Extension Agreement
and
Design/Construction Specifications & Standards
2019**

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LAKEWOOD WATER DISTRICT
DEVELOPER'S EXTENSION AGREEMENT PROGRAM
2019

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NOTE: Please use the checklist below as a guide. Documents to be submitted by the Developer to LWD are in bold print.



DEVELOPER'S CHECKLIST

Developer:

Name

Address

Telephone

Email:

A. Preliminary

- _____ 1. Complete the "**Application for Development**" (Page 8) and meet with LWD Staff about improvements and requirements anticipated by the proposed development
- _____ 2. Submit two sets of **preliminary engineered drawings** showing all proposed water system improvements proposed for the development. (The District will provide red-line comments on the drawings until final plans are stamped approved by the LWD General Manager.
- _____ 3. One set of approved plans will be returned to the Developer with a Contract Letter itemizing LWD's responsibility and cost, plus other requirements of the developer.
- _____ 4. Execute (sign) the original **Contract Letter** and return it to LWD with the required payment for the items listed in the Letter. There can be no exceptions to payment of these charges before work begins. Construction scheduling will be prioritized by who pays first.

B. Required Before Extension Is Staked In Field:

- _____ 1. Standards and Specifications (guidelines) reviewed (Developer)
- _____ 2. **Plot plan and legal description** to Water District Manager (Developer)
- _____ 3. **Performance Bond** (Contractor/Developer)
- _____ 4. Obtain approval of design by Fire Marshal (Developer)
- _____ 5. **Right-of-way permit** (Developer or Developer's Engineer)
- _____ 6. **Water District approved engineered drawings.** The final plan shall also be stamped approved by the Fire Marshal. (Developer's Engineer)
- _____ 7. Execution of all above documents required by the Water District (Developer) (approval by Water District and its attorney)

C. Required Before Beginning Construction:

- _____ 1. Pre-Construction Meeting with LWD, other utilities & permitting agencies at least 3 days prior to construction (Contractor)
- _____ 2. **Payment** of General Facilities Charges, Connection Charges, estimated inspection costs, permit fees, testing costs, etc. outlined in the *Contract Letter*.
- _____ 3. Basic control survey to establish control points (Contractor/Developer)
- _____ 4. Request water main to be staked at least three working days prior to construction (Contractor/Developer)
- _____ 5. Submit complete construction schedule in enough detail to determine and major activities and durations. Detail Scheduled days off and holidays.

D. During Construction:

- _____ 1. Three working days' notice to the Water District required prior to connection to the LWD water system under Water District supervision (Contractor)
- _____ 2. Assure that the LWD Inspector is present during any water system construction – contact the District's Project Manager (Contractor)
- _____ 3. Schedule updates as required. If project is delayed by more than two weeks an updated schedule will be required reflecting the delay and the downstream effects. This timeframe does not apply to scheduled delays.

E. Required for Acceptance of Title:

- _____ 1. All fees paid, including cut-in fees, engineering fees, connection charges, permit fees, etc. paid at the time of the service order (Developer)
- _____ 2. Pressure test (Contractor/Engineer/Water District Inspector or Manager)

- _____ 3. Purity test (Water District)
- _____ 4. Approval of all construction (Water District Manager)
- _____ 5. **Cost breakdown of construction costs** to Water District (Developer)
- _____ 6. Provide Water District with **easements**, (Developer)
- _____ 7. Provide Water District with **Bill of Sale** (Developer)
- _____ 8. Provide Water District with **Maintenance Bond** (Developer)
- _____ 9. Water District accepts title (Bill of Sale) for water mains (Water District)

F. To Be Done One Year After Acceptance:

- _____ 1. Release of Maintenance Bond (Water District)

INSTRUCTIONS FOR DEVELOPER: EXTENSIONS TO THE WATER SYSTEM

The Lakewood Water District General Manager has the right to require, add, modify, or delete any requirements he deems necessary.

It is the policy of the Lakewood Water District that the cost of water distribution mains and fire hydrants shall be paid for by the property to be benefited. Insofar as possible, the Water District will provide the water supply, storage, large size feeder mains, and booster pumps. Extensions are normally installed through direct construction by the Developer. To be eligible, it is necessary that the territory to be served is within the boundaries of the water supply franchise, the area presently served by the Water District. If the territory is not currently within the boundaries of the Lakewood Water District's franchise and service area boundaries, extensions of franchise boundaries would need to be made prior to any applications for such extension. Approvals of changes in service area and franchise boundaries need to be accomplished through the Tacoma-Pierce County Health Department, the Pierce County Council, the Coordinated Water Service Program of Pierce County, and City of Lakewood and Town of Steilacoom where applicable.

Note: Developer Extension Agreement forms are available on-line through the District's website --- <http://www.lakewood-water-dist.org/publicationsforms>

Extension by Developers:

If a Developer or property owner desires to extend the water system, he may do so at his own expense, provided he/she complies with the standards and other requirements of the Water District. In the majority of the cases, it has proven to be more efficient in terms of time and money for the engineer contracted by the Water District to perform all necessary engineering tasks. Such services include preparation of basic plans, cost estimates, specifications, obtaining of permits, and inspection of construction. Special circumstances may make it desirable for a Developer to utilize the services of another engineer for certain of these tasks. However, in order to ensure that the Water District's standards are satisfied, the Water District requires that the Water District's Manager check all plans, provide inspection during the construction process, monitor the pressure and purity tests, conduct a final inspection, and see that all required bonds and other paperwork are properly provided. With this latter arrangement, the Water District requires a fee for these services computed on an hourly basis. Under this latter arrangement, all Developers must obtain the Water District's conditions and standards document.

The following steps are necessary for any extension to the water system:

1. At the time that the preliminary plat or Master Application is filed with City of Lakewood/Pierce County, a letter requesting the availability of water should be submitted to the Water District for approval. A preliminary plat or other application materials should accompany this request.
2. Prior to the installation of water mains, an Application for Permission to Construct Extensions to the Distribution System of the Water District must be signed by the Developer. At this time, if the Developer wants the engineer contracted by the Water District to perform all engineering tasks, the Developer should authorize the Engineer to proceed with design work and furnish him two (2) copies of the final plat or other final approval documents. Along with the application, a cash bond is required as evidence of good faith.

3. After the plans are approved and the Developer wishes to proceed with calling for bids, the Water District may assist in securing a suitable contractor, but without showing favoritism for any particular contractor. The Water District may maintain a list of contractors who have done adequate work in the District. If a contractor not previously experienced in the District is selected by the Developer, the contractor must apply to be placed on the LWD Small Works Roster so that the Manager will have time to interview the contractor regarding qualifications to perform the contract. A performance bond is required of the Developer. Only licensed contractors shall be employed by the Developer.
4. The Water District Manager shall be notified not less than three (3) working days in advance of beginning work. Any work that is performed without proper notification to the Water District's Manager will be summarily rejected.
5. Before any work can begin, payment must be made to the District for General Facilities Charges, Connection Charges, estimated inspection cost, permit fees, testing costs, etc. outlined in the **Contract Letter**. There can be no exceptions to payment of these charges before work begins.
6. During the progress of the work, full-time inspection is required by LWD. Inspection by Lakewood Water District will be at contractor's expense.
7. After completion of construction, a standard pressure test to 200 psi shall be performed. A Lakewood Water District Inspector needs to be present.
8. After the pressure test, water samples shall be taken by the District, Upon approval of purity in writing is received, connections to the water system may occur.
9. At this point, the Developer and the Contractor should ask for an inspection and acceptance of the mains. This inspection should be performed by the Water District's Inspector or Manager in the presence of the Contractor and Developer.
10. The Developer shall furnish the Water District with a cost breakdown showing the total cost of construction.
11. The Developer shall furnish the Water District any permanent easements necessary to cross other property.
12. When water service is needed, the Developer may order and secure meters from the Water District. In any areas where excessive pressure exists (in excess of 80 pounds per square inch static pressure), the Developer is responsible for the installation of individual pressure reducing valves on the service connections.
13. Before acceptance of the water mains by the Water District, the Developer must convey to the District a notarized bill of sale deeding these mains to the Water District.

The conditions and standards which correspond to the specifications on all of the Developer's jobs are on file at the Water District's office. It is the responsibility of the Developer and his contractor to familiarize themselves with the specifications prior to starting work.

**APPLICATION FOR PERMISSION TO CONSTRUCT
EXTENSIONS TO DISTRIBUTION SYSTEM OF
LAKEWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON**

(ENGINEER SELECTED BY DEVELOPER)

The undersigned hereby makes application to the Lakewood Water District, Pierce County, Washington, for permission to construct and install water mains in the _____ development utility easement(s) and in the public right-of way under the District's franchise, and connect to the District's water system, and makes the following representations and promises, to-wit:

1. The proposed mains and/or improvements will be installed in approved locations on described property which is owned by Applicant or other persons who are contributing to the cost thereof, or within appropriate easement areas.

Legal Description of Property:

Parcel Number:

Common Description/Address:

2. The proposed mains, to be approximately a total of _____ lineal feet, shall be installed in accordance with plans approved by the Water District's Manager and in accordance with the Water District's standards and conditions for constructing extensions to the water system, a copy of which has been made available to Applicant.
3. The Developer will select his own engineer and be responsible for his payment. Said Developer shall prepare the proposed plans. The Water District shall be paid at the current standard hourly rate, plus costs, and will require a cash bond (in an amount determined by the Manager, in his sole discretion) before work can be initiated. The Water District's Manager shall be responsible for the following items:
 - a. General consultation with the Developer regarding the requirements of the Water District, including review of the proposal, bill of sale and easement or easements, if any, to be prepared by the Developer or his agents.
 - b. Verify Fire Marshal's approval of the project plans (plans to be submitted to Fire Marshal by Developer or his engineer).
 - c. Reviewing the plans of the Developer for compliance with the conditions and standards of the Water District.
 - d. Verify receipt of permits from the state, Pierce County and/or the City of Lakewood (application to be performed by Developer/Engineer).

- e. Inspection of the field layout of the Developer's design for compliance with the contract plans.
- f. Inspection of the construction in progress for compliance with the conditions and standards of the Water District. Inspection by Lakewood Water District will be at contractor's expense.
- g. Review of the pressure test results and obtaining water purity samples. (Sampling to be done by the Lakewood Water District and charged to the Developer.)
- h. Final inspection of the completed water main extension for acceptance by the Water District.
- i. Providing administrative documentation for Water District records as required.

If, after authorizing the Water District's Manager to commence these tasks, the Developer decides not to complete the proposed project, the Water District shall receive payment from the Developer computed on an hourly basis for all services performed.

- 4. The Developer agrees to install the improvements in accordance with the standards prescribed by the District. The Developer is also responsible for the installation of water mains and appurtenances as set forth in the drawings and specifications.
- 5. The Developer's extension is directed to certain areas in the District where pressures are relatively high. It is his responsibility to provide individual pressure reducing valves in these areas on the services or engineered in the system.
- 6. Upon completion of the improvements, and upon the approval thereof by the Water District, a bill of sale approved or furnished by the District, together with a valid deed to any easement required in connection therewith, cost documentation and maintenance bond (in the amount of 5% of the cost of the improvement) shall be delivered to the District. Upon acceptance by the Water District, such facilities shall be subject to the control, use and operation of the Water District, which may apply thereto all regulations, conditions of service, and make such charges as the Board of Commissioners of the District deems reasonable and proper.
- 7. Water will not be furnished to any new development until all requirements are completed and all bills connected with construction and approval of the facilities have been paid.

DATED at _____, Washington, this _____ day of _____,
20____.

DEVELOPER _____

ADDRESS _____

PHONE _____

E-Mail _____

Upon compliance with the above terms and conditions of the contract documents furnished by the Water District to the above-named Applicant, Lakewood Water District will accept said extension and furnish water service thereto.

LAKWOOD WATER DISTRICT

By: _____
Randall M. Black, General Manager

DEVELOPER'S EXTENSION AGREEMENT

THIS AGREEMENT entered into this _____ day of _____, 20____, between Lakewood Water District, organized under the laws of the State of Washington (hereinafter referred to as the "District") and _____ and _____ (hereinafter) referred to as the "Contractor" and the "Developer").

R E C I T A L S

WHEREAS, the Contractor and Developer have proposed to install, at the Developer's cost estimated to be \$_____, a water distribution main and related operating equipment and appurtenances (hereinafter "improvements") to District standards and specifications at the following described property:

Legal Description:

Common Address:

the details of which are further referred to on Drawing No. 1 attached hereto as Exhibit A and by this reference incorporated herein, and to furnish a bond to the District, holding it harmless from negligence of the Contractor or subcontractor, liens, third-party liability and defective material or equipment, a copy of which is attached hereto as marked Exhibit B and by this reference incorporated herein; and

WHEREAS, at the completion of said work, the Developer proposes to convey all of the improvements to the District by fully executed bill of sale, a copy of which is attached hereto as Exhibit C and by this reference incorporated herein;

NOW, THEREFORE, in consideration of the mutual benefits to be derived by all parties hereto, it is agreed as follows:

1. The Contractor shall proceed to furnish said Performance and Payment Bond and, at the cost hereinabove provided for, to construct the improvements in accordance with the District's Standards and Specifications, a copy of which is attached hereto as Exhibit D and by this reference incorporated herein.

2. Upon completion of the work by the Contractor and upon acceptance of the improvements by the District for the purpose of providing maintenance and operation, Developer shall furnish all necessary conveyances, such as the Bill of Sale and the Maintenance Bond, in a form to be approved by the District, including a duly executed easement providing access to the improvements for purposes of maintaining, repairing or replacing, if necessary, the proposed improvements, a copy of which is attached hereto as Exhibit E and incorporated herein by this reference.

3. From the date of acceptance, the District shall maintain and operate the improvements conveyed and provide water service to the property.

4. The District reserves the right to install, if necessary, any and all of the improvements on Exhibit A hereto, with all costs of construction to be paid by Developer.

5. Prior to the start of construction, all proposed deviations from the specifications shall be submitted in writing to the Manager of the District and approved by the District.

6. Prior to the start of construction, all "approved equal" materials shall be submitted in writing to the Manager of the District, and cannot be substituted for specified materials without his prior written approval.

LAKWOOD WATER DISTRICT

By: _____
General Manager

CONTRACTOR:

By: _____
Its _____

DEVELOPER:

By: _____
Its _____

LWD
 Superintendent
 Approval
 Date _____
 Int. _____

LAKESIDE WATER DISTRICT
P. O. BOX 99729
Lakewood WA 98499-0729

BILL OF SALE

KNOW ALL MEN BY THESE PRESENTS in consideration of the sum of one dollar (\$1.00) and other good and valuable consideration, receipt of which is hereby acknowledged, the undersigned grantor(s) does by these presents hereby grant, bargain and convey, set over, assign, transfer and sell to the Lakewood Water District, Pierce County, Washington, a municipal corporation, the following described water mains and appurtenances hereto, situated in Pierce County, Washington.

ALONG	FROM	TO	SIZE	LENGTH
-------	------	----	------	--------

The said grantor(s) hereby certifies that he/she/they/it is/are the sole owner(s) of all the property described above, that they have full power to convey the same and that they will defend the said titles of said Water District against any and all persons lawfully making claim thereto.

The total cost of installing the above described extension(s) to the present Water District system including labor and materials, is _____ dollars (\$_____).

IN WITNESS WHEREOF, this Bill of Sale is executed this _____ day of _____, _____.

GRANTOR:

STATE OF WASHINGTON)
)ss.
 COUNTY OF PIERCE)

On this day personally appeared before me _____ to me known to be the individual or individuals described herein and who executed the within and foregoing instrument, and acknowledge that he/she/they executed said instrument as his/her/their free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this _____ day of _____, _____.

 (Print Name)
 NOTARY PUBLIC in and for the State of
 Washington, residing at _____
 My Commission expires: _____

After Recording, Return to:
Lakewood Water District
Post Office Box 99729
Lakewood, WA 98496-0729

EASEMENT FOR WATER UTILITIES (WATER PIPELINE)

*NOTE: "Document must meet the Pierce County Auditor requirements posted at:
http://www.co.pierce.wa.us/pc/abtus/ourorg/aud/Recording/recording_requirements.htm*

The Grantor, _____, does hereby grant to Lakewood Water District, Pierce County, Washington, a municipal corporation, Grantee, its successors and assigns, an easement over, through, under, across, upon and in the following described real property situated in Pierce County, Washington, as depicted in Exhibit A, to wit:

Parcel # _____ being described as follows:

An easement over, under and across the above parcel as described:

for construction, operation, maintenance, repair, and/or replacement of a water pipeline and appurtenances thereto, together with all rights of ingress and egress to and from said easement for all purposes necessary and related thereto. Grantor, its heirs and assigns, agree to refrain from constructing or maintaining any structures (such as buildings and appurtenances, sheds, carports, above or underground vaults or manholes, or large utility lines), allow substantial vegetation, or allow any items or debris in the easement that would prohibit Grantee the full use and enjoyment of said easement.

DATED this ____ day of _____, _____.

GRANTORS:

(document continued)

Easement for Water Utilities
Lakewood Water District and _____ Parcel # _____
Page 2

STATE OF WASHINGTON)
)ss.
COUNTY OF PIERCE)

On this day personally appeared before me _____ to me known to be the individual or individuals described herein and who executed the within and foregoing instrument, and acknowledge that he/she/they executed said instrument as his/her/their free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this _____ day of _____, _____.

(Print Name) _____

NOTARY PUBLIC in and
for the State of Washington,
residing at _____

My Commission expires: _____

PERFORMANCE AND PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That we, the undersigned, _____, as principal, and _____, a corporation organized and existing under the laws of the State of Washington, as a surety corporation, and qualified under the laws of the State of Washington to become surety upon bonds of contractors with municipal corporations, as surety, are jointly and severally held and firmly bound to Lakewood Water District in the penal sum of \$_____, (100% value of materials, equipment & time of water improvements installed by principal) for the payment of which sum on demand we bond ourselves and our successors, heirs, administrators and/or personal representatives, as the case may be.

This obligation is entered into pursuant to the statutes of the State of Washington.

DATED this _____ day of _____, 20 ____.

THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT:

WHEREAS, Lakewood Water District has executed or is about to execute a certain contract with the above bonded principal and providing for installation of a water distribution main and related operating equipment at the location referred to on Exhibit A attached to the contract, which contract is incorporated herein by reference; and

WHEREAS, the said principal has executed or is about to execute the contract and undertake to perform the work therein provided for in the manner and within the time set forth;

NOW, THEREFORE, if the said _____ shall faithfully perform all of the provisions of said contract in the manner and within the time herein set forth or within such extension of time as may be granted under said contract, and shall pay all laborers, mechanics, subcontractors and material men and all persons who shall supply said principal or subcontractors with provisions and supplies for the carrying on of said work and shall hold said Lakewood Water District harmless from any loss or damage occasioned to any person or property by reason of any carelessness or negligence on the part of said principal or any subcontractor in the performance of said work, and shall indemnify and hold Lakewood Water District harmless from any damage or expense by reason of failure of performance as specified in said contract, or from defects appearing or developing in the material or workmanship provided or performed under said contract within a period of one year after its acceptance by Lakewood Water District (and agrees to correct or replace any defective work or material discovered

within such year), then and in that event this obligation shall be void; but otherwise it shall be and remain in full force and effect.

AND FURTHER, we, the undersigned Developer, as principal, and _____, a corporation organized and existing under the laws of the State of Washington and duly authorized to do business as a surety in the State of Washington, are jointly and severally held and firmly bound to Lakewood Water District in the sum of _____ Dollars (\$_____) for the payment of which we do jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns by these presents.

WITNESS our hand this _____ day of _____, _____.

PRINCIPAL:

By: _____
Its _____

SURETY, ATTORNEY-IN-FACT:

By: _____
Its _____

Address: _____

Approved:

LAKWOOD WATER DISTRICT

By: _____
General Manager



MAINTENANCE BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS

That _____ as Principal, hereinafter called Contractor, and _____, as Surety, hereinafter called Surety, are held and firmly bound unto **Lakewood Water District** as Oblige, hereinafter called Owner, in the penal sum of fifteen percent (15%) being \$_____, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____, 20____ entered into a contract with Owner for **Water Service** in accordance with the General Conditions, the Drawings and Specifications, which contract is by reference incorporated herein, and made a part hereof, and is referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if Contractor shall remedy any defects due to faulty materials or workmanship which shall appear within a period of **One (1)** year from the date of substantial completion of the work provided for in the Contract, then this obligation to be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that Owner shall give Contractor and Surety notice of observed defects with reasonable promptness.

SIGNED and sealed this _____ day of _____, 20____.

IN THE PRESENCE OF:

(Contractor)

By: _____
Witness

By: _____
(Seal)

Title

(Surety)

By: _____
Attorney-in-Fact

**LAKWOOD WATER DISTRICT
GENERAL PROVISIONS AND DESIGN STANDARDS FOR
DEVELOPER AND DISTRICT CONTRACTS
2019**

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GENERAL PROVISIONS AND DESIGN STANDARDS FOR THE WATER DISTRIBUTION SYSTEM

The Lakewood Water District General Manager has the right to require, add, modify, or delete any requirements (s) he deems necessary.

1. GENERAL

These provisions cover the construction of water distribution mains of 24-inch and smaller diameter for privately financed projects in which the developer shall make all necessary arrangements to pay the construction costs directly to the Contractor. The developer must complete Lakewood Water District's "Developer Extension Agreement" if applicable, and have it approved by the Manager before any work is started. However, if these provisions are part of a "Public Works Contract", they must be approved by the District's Board of Commissioners. The "notice of award" signed by the District Manager followed by a "notice to proceed" must be completed before any work can commence.

Please note that if not specifically covered in this DEA, then the *WSDOT Std. Specifications for Roads, Bridges, and Municipal Construction 2008* or current edition shall govern; Provided that the General Manager has the right to modify if (s) he deems necessary.

All pipe, fittings, valves, hydrants and other materials installed under these specifications are intended to form a durable section of the distribution system of ample strength capacity and provide the highest quality potable water. All materials must meet the Districts standards as described within this document.

Payment for Services—the Lakewood Water District's policy applies to all owners, contractors and developers that are petitioning the District to install water service connections, main extensions, and setting of meters, shall pay all costs prior to installation or scheduling of work activities. You will then be placed in a rotation on a first paid, first serve basis as work allows. The Lakewood Water District usually schedules the work activity within two weeks, however, circumstances out of the District's control may prevent it from meeting this goal, and it may result in a longer period of time for commencement of work activities. The Superintendent or Manager will make every effort to schedule the work as soon as possible on behalf of the owner, contractor or developer's schedule.

It is our Policy to eliminate dead end water mains wherever possible. All water mains must be looped or tied together from at least two directions to provide equal flow of water. This will increase the gallons per minute available for fire flow and help eliminate chlorine residual problems along with improving water quality.

There shall be no unauthorized use of District fire hydrants during construction. Please see page 54 for hydrant meter regulations.

2. WORK QUALITY

All the work shall be performed in a responsible, serious and skillful manner. First class work according to the true intent of the Drawings and Specifications as interpreted by the Water

District Inspector is required. The Inspector's decision as to the true intent of the Drawings and Specifications shall be final.

3. SUPERVISION OF CONTRACTOR'S EMPLOYEES

The Contractor shall keep a competent person at his/her work site, as required under W.A.C. 296-155-650, to inspect the work and to supervise the conformance of the Contractor's operations within the regulations of the W.A.C.

4. CHARACTER OF CONTRACTOR'S EMPLOYEES

The Contractor shall employ only competent and skillful persons to do the work and whenever the Inspector administering the contract shall notify the Contractor in writing that any person on the work is, in his/her opinion incompetent, disrespectful to other workers District staff or the public in general, or otherwise unsatisfactory, the Contractor shall forthwith discharge such persons from the work and shall not again employ them on this contract.

5. QUALITY AND CARE OF MATERIAL

Any and all material necessary for the construction of any part of the improvements specified herein shall be of domestic manufacture and comply with the "The Buy America Act", and "The Buy American Act" and shall be new and of high quality and acceptable to the Water District Inspector. The Contractor shall take care of, and be responsible for, any loss or damage from any cause to any materials delivered at or in the vicinity of the work to be used by him/her thereon in connection with this contract prior to its completion.

6. INSPECTION

A) THE WORK

All materials furnished and work done shall be subject to inspection.

The Inspector monitoring the contract shall at all times have access to the work wherever it is in progress or being performed, and the Contractor shall provide proper facilities for such access and inspection. Such inspection shall not relieve the Contractor of the responsibility of performing the work correctly, utilizing the best labor and materials in strict accordance with the Specifications of this Contract. All material or work approved and later found to be defective shall be replaced without cost to the Lakewood Water District.

B) INSPECTOR'S AUTHORITY

The District Inspector shall have power to reject materials or workmanship, which does not fulfill the requirements of these Provisions or Specifications, but in case of dispute, the Contractor may appeal to the Superintendent of the Water District monitoring the contract, whose decision shall be final.

Nothing herein contained, however, shall be taken to relieve the Contractor of his obligations or responsibilities under this Contract.

7. ASBESTOS CEMENT PIPE

When the contract drawings specify or it is otherwise necessary for the contractor to come into contact with or work on asbestos cement pipe, he/she shall comply with the procedures as required by W.A.C. 296-62 and W.A.C. 296-65. For information and notifications forms on the proper removal and packaging of asbestos materials contact the Puget Sound Air Pollution Control Authority in Seattle at 206-344-7330 or 1-800-552-3565. For information on how to transport and dispose of the asbestos materials, contact the Pierce County Environmental Health Department in Tacoma, Washington at 253-798-6528.

Should you have any questions concerning this matter, or require information in regard to the requirements of W.A.C., please call our Safety Officer/Inspector at 253-588-4423.

8. SAFETY AND HEALTH PROVISIONS

The Contractor shall at all times have sole responsibility for the safety and health standards at the work site and the District assumes no responsibility. The Contractor shall exercise adequate precautions for the safety and health of all persons, including employees, and Subcontractor's employees, in the performance of this contract and shall comply with all applicable provisions of federal, state, county, and municipal safety and health laws and regulations. It is the Contractor's responsibility to furnish safety equipment or to contractually require Subcontractors to furnish adequate safety equipment to properly perform their work responsibilities.

If the Water District's Inspector witnesses a safety violation, he will advise the contractor first. It is the Contractor's responsibility to make any necessary corrections. Failure to correct safety violations shall be grounds for the District to notify the appropriate State or other authority to stop work on the project.

Any of the above actions by employees of the Lakewood Water District shall in no way relieve the Contractor of his/her responsibility to provide for the safety and health of all persons, including his/her employees and the employees of the Subcontractor.

9. INDEMNIFICATION

The Contractor acknowledges that pursuant to the terms of this agreement, the Contractor is totally responsible for the safety of persons and property in the performance of this Contract. To the greatest extent allowed by law, the Contractor assumes the risk of all damages, loss, cost, penalties and expense and agrees to indemnify, defend and hold harmless the Lakewood Water District, from and against any and all liability which may accrue to or be sustained by the Lakewood Water District on account of any claim, suit or legal action made or brought against the Lakewood Water District for the death of or injury to persons (including Contractor's or subcontractor's employees) or damage to property involving contractor, or subcontractor(s) and their employees or agents, arising out of and in connection with or incident to the performance of the Contract except for injuries or damages caused by the sole negligence of the District. In this regard, Contractor recognizes that Contractor is waiving immunity under Industrial Insurance Law, title 51 RCW. This indemnification extends to the officials, officers and employees of the District and also includes attorney's fees and the cost of establishing the right to indemnification there under in favor of the Lakewood Water District. Provided, however, this provision is intended to be applicable to the parties to this agreement and it shall be interpreted to allow a Contractor's employee to have a claim or cause of action against Contractor except insofar as may be necessary to effectuate the indemnification

herein given.

10. PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

The Contractor shall procure and maintain, during the life of this contract, a policy of public liability insurance and property damage insurance with an insurance carrier satisfactory to the District in such form as is satisfactory to the District to protect the District from loss from liability imposed by law for damages (1) on account of bodily injury including death resulting therefrom accidentally suffered or alleged to be suffered by any person or persons whatsoever that may be caused directly or indirectly by the performance of the contract and (2) on account of injury to or destruction of any property whatsoever including the resultant loss of use that may be caused directly or indirectly by the performance of the contract or resulting from any act of commission or omission by the Contractor or by any subcontractor or by anyone employed directly or indirectly by either of them.

The Lakewood Water District shall be designated in said policy of insurance, as additional insured and said policy shall be primary over any other insurance policy the District may have. The insurance policy, together with all endorsement thereon, shall be deposited with such officer of the Lakewood Water District as the District may designate. Said public liability insurance shall be in amounts of not less than \$1,000,000.00 for one person injured in one accident or not less than \$1,000,000.00 for more than one person injured in one accident, and said property damage insurance shall be in an amount of not less than \$1,000,000.00 for any one accident.

A certificate outlining the above insurance requirements and stating the policy premium has been paid shall be submitted to the District for review and approval by the Lakewood Water District Manager and filing thereafter.

11. OBSTRUCTION OF PUBLIC THOROUGHFARES

Whenever, during the course of construction, it becomes necessary because of the nature of the work, for the Contractor to barricade any street, or any part thereof, or to place any obstruction which will impede the flow of traffic in any public thoroughfare, then the Contractor shall be required to give notice of the intended interruption at least (3) working days prior to such barricading or obstruction of any thoroughfare.

Such notice shall be given to, but not limited to, the following departments of governing authority (City of Lakewood, Pierce County):

Department of Transportation and/or Traffic Division
Fire, Police and/or Sheriff
Lakewood Water District

Where such obstruction or interruption to traffic interferes with normal usage of thoroughfares along scheduled routes of local transit companies, then such notice shall also be given to the companies, citing the thoroughfares to be affected, the nature of the obstruction and the period of time involved. The Contractor shall maintain during all phases of construction the access for local traffic and emergency vehicles.

The posting of flagmen, advance warning signs, barricades, traffic cones, flashers, etc., shall be the responsibility of the Contractor and shall be in accordance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" as accepted by the Washington

State Department of Transportation.

The Contractor shall be responsible for all necessary detour signs and cones, and shall provide and place flashers and barricades within the project area and shall coordinate with the District Inspector all matters pertaining to the movement of vehicular and pedestrian traffic past the project area. In addition, the District Inspector shall be notified a minimum of three (3) working days in advance of the date and time that implementation is to be made for all detours, closures, and other activities involving the disruption of travel of pedestrian or vehicular traffic.

There shall be safe walkways provided and maintained at all times for pedestrians, subject to the approval of the Inspector.

Whenever, in the opinion of the Inspector, traffic conditions dictate, a uniformed officer shall be employed to control traffic until the Inspector determines that there no longer exists any traffic problem.

12. WORKING DAYS AND NON-WORKING DAYS

A working day shall be Monday through Friday, 8:00 AM TO 4:30 PM. Inspection rates for working days during working hours will be \$100.00 Per Hour. Any changes to this must have prior approval from the District Manager or Superintendent. A non-working day is Saturday, Sunday, or legal District holidays.

13. WORK ON NON-WORKING DAYS

Work on a non-working day will require that the District have three (3) full working days notice.

All work on a non-working day will require a Water District Inspector and other District personnel, depending on the nature of the work, at their overtime rates of pay the overtime rates of pay are \$125.00 per hour.

The District will give the final approval for work on a non-working day based on the availability of personnel.

14. CLAIMS AND PROTESTS

If the Contractor considers any work required of him/her to be outside the requirements of the contract, or considers any record or ruling of the Inspectors of the District as unfair, he/she shall ask for written instructions or decision immediately, and then file a written protest with the District against the same within five (5) days thereafter. Otherwise, the Contractor will be considered as having accepted the required work record or ruling.

15. EXTRA WORK

No charge to the Water District for extra work or any other charge in the contract will be allowed unless the extra work or change has been authorized in writing by the Water District Manager and unless the compensation or method of determining the compensation is stated

in such written authority and agreed upon by all parties prior to completion of the extra work.

The District reserves the right to furnish any necessary materials, which were not included in the Drawings or Specifications as it deems advisable. The contractor shall have no claims for costs and profit on materials furnished by the District.

The Contractor's cost records pertaining to work paid for by the District shall be open to inspection or audit by representatives of the Lakewood Water District during the life of the contract and for a period of not less than three (3) years after the date of acceptance thereof. The Contractor is required to retain such records for that period. Where payment for materials or labor is based on the cost thereof to forces other than the Contractor, the Contractor expressly guarantees that the cost records of such other forces shall be open to inspection and audit by representatives of the Lakewood Water District on the same terms and conditions as the cost records of the contractor. If an audit is to be commenced more than sixty (60) days after the acceptance of the contract, the Contractor will be given a reasonable notice of time when such audit is to begin.

16. PLANNING THE WORK

The Contractor shall have a plan and schedule of his/her work. This plan and schedule must be approved by the Water District Inspector. A minimum of three (3) working days notice shall be given by the Contractor to the Water District Manager/Superintendent prior to commencing work.

Such a plan shall cover but not be limited to the following points:

- a. The work shall be divided into sections in such a manner as to permit each section to be completed and cleaned up in the shortest time possible. The water main construction, once started shall continue until completed in its entirety without delay.
- b. The plan shall provide for the least interference with normal street traffic and access to abutting property.
- c. A study shall be made of the points at which heavy flushing flows may be disposed of. Such flows in the new mains shall be in the amounts 100 GPM in four-inch mains, 220 GPM in six-inch mains, 400 GPM in eight-inch mains and 900 GPM in twelve-inch mains. The Contractor shall provide tees and temporary blow-off valves and piping or temporary hydrants if necessary to discharge such flows at suitable points at no charge to the District
- d. Where a new main is replacing an existing main, all existing hydrants and customer services must be kept in use until the new main has passed the sanitary tests. The services can then be transferred to the new main and the new hydrants placed in service and the existing line abandoned.
- e. The Contractor shall verify the location and elevation of all other utilities, including the existing water main to be connected to, sufficiently in advance of approaching them with the water main construction so that corrections in vertical and/or horizontal alignment may be accomplished if necessary.

If extreme weather conditions or other unforeseen circumstances are deemed by the Inspector to be unsuitable for proper installation of water mains in accordance with these provisions, the work shall not start or shall be interrupted until conditions have improved sufficiently as to allow the work to progress without delay until completed.

Contractor delays resulting from work required to be completed by District personnel, such as shutdown or tapping of existing mains, or installation of water services before street repairs, shall be considered by the Contractor in his/her schedule.

17. WORK DONE BY THE LAKEWOOD WATER DISTRICT

Lakewood Water District shall perform or contract all work within the public rights-of-way of the City of Lakewood and/or Pierce County. The District will provide the Points of Connection for the Developer's Contractor to match depth and grade. The connection shall not be made by the Contractor until all District provisions have been satisfied.

The Contractor will furnish all material and labor necessary to provide the required taps for testing and sterilizing. Water for testing and sterilizing will be furnished without charge to the Contractor.

Purity samples shall be collected and submitted to the testing lab by the District at the developer/contractors cost.

18. COORDINATION

The Contractor shall diligently comply with the following requirements:

- a. Cooperate in planning and layout of the work well in advance of operations.
- b. Inform other Contractors of job requirements at proper time to prevent delay or revisions.
- c. Be informed of the requirements of other Contractors and the District and check his/her own work for conflicts with the work of other Contractors and that of Lakewood Water District crews.
- d. Insure delivery of materials and performance of work on coordinated schedule with other Contractors.

19. INSTRUCTIONS TO CONTRACTOR

All instructions will be given by the Lakewood Water District Manager or his authorized agents (Superintendent or Inspectors). No other instructions shall be recognized.

20. EXAMINATION OF DOCUMENTS AND SITE

The Contractor shall exhibit that he/she has carefully examined all contract documents and site conditions, and understands the character, quality and quantity of work called for and all conditions of the contract. The Contractor shall carefully compare and check all documents for omissions and discrepancies. This coordination shall proceed each phase of the work and omissions and discrepancies shall be reported promptly to the Water District Manager or

Inspector.

21. DRAWINGS

The Contractor understands and agrees that the work herein described and shown on the Drawings shall be complete in every detail, even though the specifics of each required procedure or item is not explicitly mentioned. The Contractor will be liable to provide all labor and materials necessary for the completion of the work intended to be included and described in this contract. The Contractor shall not avail himself/herself of any unintentional errors or omissions that may exist herein or on the Drawings and shall notify the District of any perceived errors or omissions.

Anything mentioned in the Specifications and not shown on the Drawings and anything on the Drawings and not mentioned in the Specifications shall be of like effect and shall be understood to be shown and/or mentioned in both. In case of differences between Drawings and Specifications, the Specifications shall govern. In addition, in the event of any conflict between the Special Provisions and the Technical Provisions, the Special Provisions shall control. In case of discrepancy of figures between Drawings, Specifications or both, the matter shall immediately be submitted to the Lakewood Water District Manager for his decision. Discrepancies shall not be adjusted by the Contractor, save only at his/her own risk and expense. The Manager shall furnish from time to time such detailed drawings and other information, as he/she may consider necessary.

22. EXISTING UTILITIES AND FACILITIES

All design drawings for new facilities, and the requirements for notification, locating/marketing, protection and repairing of existing utilities and facilities shall be in accordance with RCW 19.122. As provided in the law, the contractor is responsible for maintaining all utility locate marks for 45 days before placing a call for renewed locate marks.

The developer/engineer shall contact all private and public utilities and show on the Drawings only those utilities within the project limits indicated as existing by the various utilities. When other utilities are replacing their existing utilities, Lakewood Water District requires two to three feet clearance from its utilities.

It shall be the Contractor's responsibility to locate or have located in the field all existing underground utilities. Dial Before you dig "811"

Existing utilities shown on the Drawings are not necessarily all utilities in the area and are only a guide. Exact locations must be determined in the field by the Contractor.

Once the utilities have been located, it shall be the Contractor's responsibility to maintain locations throughout the duration of the contract.

If the Contractor damages a utility, which has been properly located, the Contractor shall be responsible for all costs associated with the repair. Should the Contractor accidentally damage an underground facility, which is incorrectly located (as defined by Chapter 19.122 RCW) by the Lakewood Water District, then the damage will be repaired at no cost to the Contractor. If requested, the contractor shall be required to dig up and expose utility. The Contractor shall have no claim for additional compensation or time against this contract due to improper location of utilities.

The Contractor shall not install any water facilities closer than ten (10) feet horizontally from sanitary sewers, five (5) feet from power lines and three (3) feet from all other utilities. All utility crossings shall have one (1) foot vertical clearance, with the exception of sanitary sewers, which shall only be crossed over by water mains with a minimum vertical clearance of 18 inches. Any variance of the above will require prior approval of the Water District Manager or his representative and be in accordance with the State's *Pipeline Separation Design and Installation Reference Guide*.

The Contractor shall assume all responsibility and expense for damage to existing improvements on or adjacent to the work site caused by his/her operation. The Contractor shall provide for the protection of poles, overhead and underground lines, concrete curbs, and existing structures at his/her own expense and shall be responsible for the expense of all necessary repairs.

The risk of loss resulting from changed or differing site conditions as defined in Revised Code of Washington Section 19.122.040 is the responsibility of the Contractor or his/her successors in interest.

When boring under an existing asbestos cement (AC) water main the following requirements will apply: 1) a section of the AC main will be replaced with either ductile iron or C900 PVC main of the same size if the vertical clearance from the top of the bore hole to the AC pipe is less than two (2) feet for Class A soil, less than three (3) feet for Class B soil or less than four (4) feet for Class C soil, 2) the length of the replacement pipe shall be at least 12" each side of the crossing bore hole, 3) a minimum of four (4) feet of replacement pipe.

23. CLEARING AND GRUBBING

This item shall consist of clearing and grubbing, ahead of trench excavation, all areas with trees, stumps, brush, roots, vegetation, rubbish, and other objectionable material.

The limits of clearing as well as grubbing operations, are dependent to a considerable degree upon the Contractor's operations and it shall be his/her responsibility to determine these limits providing he/she does not go beyond right-of-way or easement lines. The clearing and grubbing shall be at least the width of the trench plus that needed for placement of material excavated from the trench.

Trees, shrubbery, and flower beds designated by the Inspector shall be left in place and care shall be taken by the Contractor not to damage or injure such trees, shrubbery or flower beds by any of his/her operations. If the Contractor damages or destroys said items which he/she has been directed to preserve, he/she shall replace it in kind acceptable to the Inspector, and guarantee the item to live for a period of one (1) year.

The refuse resulting from the clearing and grubbing operation shall be hauled to a waste site secured by the Contractor and shall be disposed of in a legal manner as to meet all requirements of state, county and municipal regulations regarding health, safety, and public welfare.

24. ALIGNMENT AND GRADE

The proposed pipe alignment and grade is detailed on the accompanying contract Drawings.

Alignment and grade shall be taken from survey stakes provided by the developer's engineer, and placed at a maximum of 50 feet apart by a licensed professional surveyor or at his/her

direction. Stakes shall be offset and shall have a lath guard stake showing the cut or fill to flowline of the pipe and finished grade. The Water District Inspector will check the staking prior to construction. A cut sheet shall be provided showing cuts to flow-line grade, finished grade and all other applicable information

Each installed pipe shall be checked for line and grade before proceeding with the next pipe.

Line and grade may be taken from curb or pavement when such structures parallel the work and shall conform to elevations and distances shown on the Drawings.

Revision of pipe alignment and/or grade may be required by the Inspector in the field should obstructions or unsuitable conditions be encountered, or an obviously more suitable location is evident.

25. INTERFERENCE

The Contractor shall inform the railroads of any possible interference to insure that their facilities are properly protected during the water main construction.

All shrubbery, trees and private improvements adjacent to the work shall be carefully protected from damage.

Where the pipe is to be laid in a non-surfaced area, shrubbery and private improvements shall be removed, properly cared for and replaced upon completion of the work.

Where lawns are destroyed, four inches of topsoil shall be placed, rolled, and sod laid, all in accordance with the Inspector's approval. Arrangements shall be made by the Contractor with the Inspector to insure the success of the lawn. In lieu of the above, allowances can be made for grass seeding or hydro-seeding with prior approval of the Water District Manager.

26. TRENCH EXCAVATION

All trenches shall be sufficiently true to line and grade to permit accurate alignment of pipe and shall clear the side of the pipe to permit proper tamping of the pipe bedding.

The minimum trench width shall be the nominal pipe diameter plus 16 inches. The maximum trench width shall be as required in Section 7.09.1 of the most recent WSDOT/APWA Standard Specifications.

The Contractor shall provide sloping-benching, or shielding for trench protection in accordance with WAC 296-155. This includes excavations that require entry by District crews to perform construction-related work. See Section 8, Safety and Health, of these technical specifications.

Pavement cuts shall be held to the minimum width required by the work and shall present uniform lines. T-cut needed before permanent paving per City of Lakewood's, WSDOT's or Pierce County's specification requirements whichever jurisdiction is applicable.

If the Water District Inspector deems the trench bottom to be unsuitable for supporting the pipe, the unsuitable material shall be removed and disposed of and bankrun sand and gravel or crushed rock placed for pipe bedding as directed by the Inspector.

Excavation at pipe joints shall be of ample size to permit inspection of all joints.

Pipe laying operations in certain areas may necessitate temporary removal of mail boxes, private driveways, drains, service lines, conduits, etc., to facilitate construction. In the event that the Contractor finds it necessary to remove the above mentioned items, it is to be particularly understood that it will be his/her responsibility to restore these items in a manner equal to their original condition and satisfactory to the Inspector. The Contractor shall maintain adequate temporary provisions for domestic deliveries, utility service and access to firefighting equipment.

The preceding requirement will be the same for any temporary removal of road culverts, whether under State, County, City, or private jurisdiction.

The Contractor shall keep the dust from his operations under control at all times to prevent a nuisance.

All stumps within four feet of the pipe shall be entirely removed.

Boulders and rocks shall be entirely removed or cut to full trench width and twelve inches below grade.

Where pipe is to be laid on fill, all topsoil and debris shall be removed from the existing ground and the fill made of suitable material thoroughly compacted to pipe grade by methods approved by the Inspector.

The Contractor shall provide all necessary bridges for the proper handling of traffic over the trench and shall provide access to private property where required.

The Contractor shall provide adequate cross drainage and prevent flooding of the trench.

27. MATERIALS

All materials shall be new, free from defects, of current approved manufacture, and of the quality specified or shown below.

DISTRICT FURNISHED MATERIALS (if applicable)

Materials supplied by the District will be furnished to the Contractor and will be picked up by the Contractor at the District office or, if approved by Manager, the District shall make arrangements to have materials delivered. The Contractor will be required to sign a receipt for all materials supplied to him/her by the Lakewood Water District.

Once the Contractor has received the materials, he/she will be fully responsible for control and security of the materials until formal final acceptance of the contract.

A. PIPE

All ductile iron pipe shall conform to the latest revision of the ANSI/AWWA C151 and ANSI/AWWA C104 Specifications, Class 50 (CL52 for fire hydrant and fire line), except as these Specifications may be modified in the Special Provisions.

Only ductile iron pipe manufactured by U.S. Pipe and Foundry Company, Pacific States Cast Iron Pipe Company, Griffin Pipe Company, or American Pipe Company are acceptable.

SPECIAL NOTE: All gaskets furnished with pipe shall be styrene butadiene rubbers (SBR), unless specified otherwise by the Manager. When deemed necessary, "Nitrile" (NBR) gaskets will be required. When NBR gaskets are required they must be color-coded and/or marked in color so as to be easily identifiable as nitrile. All gaskets must conform to ANSI/AWWA C111-72 or the latest revision thereof. The gasket requirements for the specific project will be indicated on the face of the plan for the project.

B. DOMESTIC DUCTILE OR EPOXY-COATED DUCTILE IRON FITTINGS:

All domestic (USA-made only) ductile iron fittings shall conform to the latest ANSI/AWWA C110 Specifications or ANSI/AWWA C153 for Mechanical Joint Compact Ductile Iron Class 350 fittings. All fittings shall be epoxy-coated ductile iron or have cement-mortar lining conforming to ANSI/AWWA C104. Mechanical joint glands supplied with the above domestic "ductile iron" fittings shall be ductile iron in accordance with the above specifications

SPECIAL NOTE:

See note above under subsection A.

The end flanges of flanged gate valves shall conform in dimensions and drilling to the Standard ANSI B16.1 for cast iron flanges and flanged fittings, Class 125 unless specifically provided otherwise in plans or supplementary specifications. The bolt holes shall straddle the vertical centerline.

Gate boxes, manhole rings and covers and special castings shall be in accordance with drawings attached or as specified herein.

Fire hydrants and other restrained joints will be restrained by the use of "Megalugs" as manufactured by EBAA Iron, Inc., or approved equal, or where installation calls for FIELD LOK gaskets for 4" to 12" pipe as approved by District Inspector.

C. GATE VALVES

All gate valves shall conform to ANSI/AWWA Standard C509 or latest revision, Gate Valves for Ordinary Water Service, as manufactured by Mueller or AVK only with the following modifications:

1. All gate valves shall be Mueller or AVK resilient wedge gate valves.
2. All gate valves shall be non-rising stems, furnished with O-Ring stem seals. Number, size and design shall conform to Section 3.12 of the AWWA Standards for gate valves.
3. All gates shall have square operating nut which operates left (counter clockwise) to open.

4. All gates, 20-inch or larger, shall be horizontal stem, equipped with machine cut cast steel gears, extended type grease case, position indicators and bypass, all in accordance with the AWWA Specifications.

D. BUTTERFLY VALVES

All butterfly valves shall conform to AWWA C504-80 for Rubber Seated Butterfly Valves, Class 150B. The butterfly valves shall be Mueller or AVK "Linesal III". Butterfly valve installation must be approved for use on project by LWD.

E. VALVE BOXES AND COVERS

Cast iron valve boxes and lids shall be as indicated on the attached Water District drawing. USA—Seattle/Tacoma style. All buried valves shall be provided with a valve box and lid with an extension of cast iron soil pipe as necessary. The Contractor shall maintain the location and provide access to all valves within the project. No valve shall remain buried during construction. The fire lines require a locking valve box type Tyler 6855.

F. TAPPING SLEEVES

Tapping sleeves shall be mechanical joint type or stainless steel (Romac, Smith Blair or Ford is acceptable), whichever type is specified on the plan.

The cast iron, mechanical joint sleeves shall be Model H-615 or H-619 manufactured by Mueller Company, or approved equal, and only when approved by Lakewood Water District Manager to be used if the above cannot be used.

G. MECHANICAL JOINT RESTRAINT

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of the latest revision. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250-PSI with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG or approved equal.

Restrained joint PVC pipe (Diamond Lok-21, Eagle Loc 900), mechanical joint restraints ("megalug" by EBBA Iron or equivalent), and restrained joint ductile iron pipe (US Pipe Field Loc 350 gaskets or equivalent) shall be used in lieu of thrust blocks where feasible.

H. T-HEAD BOLTS

Unless specified otherwise, all T-head bolts and nuts supplied for mechanical joint fittings, valves, sleeves, couplings, hydrants, tapping sleeves, etc., shall be made of high-strength, low alloy steel, conforming to ANSI/AWWA C111 Corrosion-resistant steel ("Cor-Ten"), or ductile iron of ASTM A536 specially alloyed and heat treated conforming to ANSI/AWWA Standard C111/A21.11.

I. TIE RODS

Tie rods and nuts for hydrant laterals, etc., shall be made of high strength, low alloy steel conforming to ANSI/AWWA C111 ("Cor-Ten"), unless specified otherwise in the Drawings or Special Provisions.

J. CONCRETE WORK

All work shall be completely "formed" except where otherwise noted on the Drawings, and all concrete shall have a strength of not less than 1800 PSI at seven days and 3000 PSI in 28 days. No concrete shall contain less than six sacks of cement per cubic yard.

The size of concrete thrust anchors will depend upon existing soil conditions and shall be as determined by the Water District Inspector. Concrete for anchoring up to 8-inch pipe fittings and valves shall be thoroughly mixed in clean containers at the job site or mixed at a batch plant. Concrete for anchoring fittings and valves 12 inches and greater shall be supplied from an acceptable batch plant.

All thrust anchors shall be supported by bearing satisfactory to the Inspector before any concrete is poured.

28. CONNECTIONS

The contractor shall furnish temporary bracing material and incidental material as well as labor for trenching, backfilling and making connections to existing pipe lines.

The Contractor shall provide written documentation that 1) flushing has occurred and samples taken are satisfactory, 2) disinfection has been performed and bacteriological samples are negative, 3) a pressure test has been completed and accepted by the LWD inspector, and 4) any other requirement by the LWD Inspector prior to LWD allowing the Contractor to make connection to the public water system under the observation of the LWD Inspector.

Where the connection to an existing water main requires interruption of service to the area, the customers affected shall have a minimum of **48 hours advance notice, no connection shall commence after 12:00 p.m.** The Contractor and Water District Inspector shall set the connection date. All fittings and materials necessary to complete the connection must be available at the job site for inspection and approval prior to setting the connection date.

The Contractor shall have all material and equipment required on the site of the work and crews organized to carry each connection through as a continuous operation before shutting down any pipe in service.

Should the Contractor cancel or fail to show for a mutually agreed upon scheduled work, he/she shall pay the District for cost incurred resulting from preparation and response for that work.

In all cases, operations of valves on mains in service and notification of customers will be done by the Water District or as directed by the Water District Inspector.

Where connections are made to existing asbestos cement (transite) mains, sand shall be placed

under the A.C. main before backfilling the trench. The connecting ductile iron pipe shall be properly supported to prevent settlement.

The Contractor shall notify affected customers of any water shut-downs.

29. INSTALLATION INSTRUCTIONS FOR PUSH-ON JOINT PIPE

Any foreign matter in the gasket seat shall be removed; the gasket shall be wiped clean, flexed and then inserted in the socket in accordance with the manufacturer's recommendations.

As the gasket fits snugly in the gasket seat, it may be necessary to smooth out the entire circumference to remove any bulges, which would interfere with the proper entry of the spigot end. A thin film of lubricant shall be applied to the surface of the gasket after it is in place, and to the spigot end of the pipe to be joined. Excess lubricant shall not be used beyond where the pipe will contact the gasket and only lubricant, as supplied and labeled for potable use by the pipe manufacturer, shall be used. The lubricant shall be stored in a container with a tight fitting cover and shall be applied to the gasket with a small sponge or brush. The container shall be kept closed and if the lubricant becomes contaminated with foreign material, it shall be discarded.

The spigot end of the pipe shall be clearly marked to indicate the depth of the bell socket and wiped clean, lubed and placed in approximate alignment with the bell of the pipe to which it is joined. The pipe shall then be inserted into the bell until the spigot end is in contact with the bottom of the bell socket.

Field cut pipe may be used; however, the outside of the cut end should be tapered back about 1/4-inch at an angle of 30 degrees with the center line of the pipe, care being used to remove any sharp edges which might injure or roll the gasket. All pipe must have a minimum of 36" of cover and a maximum of 48" of cover.

Where possible, US Pipe Field Lok 350 Gaskets or approved equal shall be used in accordance with LWD's Standard Plans rather than using concrete thrust anchors. Concrete anchors will normally be needed when connecting to the existing LWD system and where the LWD Inspector determines they are necessary. The project plans shall show where concrete anchors are required.

30. LAYING OF PIPE

The Contractor shall provide all tools and equipment required in quantity and capacity sufficient to carry out the work promptly and safely.

The interior of all pipe, fittings, valves, and hydrants shall be cleaned of all foreign matter before they are laid in place and special attention be given to spigot ends and bells to see that no matter that will adversely affect the jointing is present.

The work shall be so arranged that bells are laid in the direction of progress, and on any appreciable slope, bells shall face up grade.

Pipe in and out of fittings shall be at least 10 feet long unless shown otherwise on the drawings or as required by the Inspector.

The interior of the pipe shall be protected from the entrance of trench water at all times, maintaining pumps at the bell holes if necessary until the joints are made up.

At all times when no laying is in progress, or other conditions warrant as determined by the Water District Inspector, open ends of pipe and fittings shall be plugged watertight to prevent the entrance of foreign matter or water into the pipe.

31. TESTING

As each valved section is completed, all points where pressure reaction and movement may occur, shall be properly anchored, braced or shackled prior to pressure testing.

The Contractor shall furnish and assemble all testing equipment including measuring devices and shall furnish all labor required for testing. The District will not furnish test gages.

Upon completion of construction, the line shall be filled slowly by the Contractor under the direction of the Inspector, allowing an adequate amount of time for the disinfection of the newly constructed main. The pressure test shall be conducted a minimum of 24 hours after the filling of the pipe. The test pressure shall be 100 PSI over static (150 PSI minimum) shall be for a duration of one hour unless specified otherwise in the Special Provisions. There shall not be an appreciable or abrupt loss in pressure during the test period. The allowable leakage shall be specified in A Guide for the Installation of Ductile Iron Pipe published by the Ductile Iron Pipe Research Association.

While under test pressure, the entire installation shall be carefully examined for defective material and joint leaks.

Prior to the pressure test, the line will be flushed and purity and chlorine residual tests will be administered. Following the pressure test, another purity test will be administered. Purity samples shall be collected and submitted to the testing lab by the District at the developer/contractors cost.

Local distribution pressure or test pressure shall not be applied to the newly installed water main unless the Inspector is present.

Defective material furnished by the Contractor or furnished in good condition by the District and damaged after acceptance by the Contractor shall be replaced by the Contractor at his own expense.

Defective material furnished by the District and discovered before final acceptance will be replaced with sound material by the District, but the Contractor shall remove the defective material and install the new material at his own expense.

If it is necessary to replace defective material, the pressure test shall be rerun after such replacement.

After the steps listed above have been completed, the District will schedule a fire flow test at its convenience.

32. DISINFECTION

In laying of distribution pipelines, care shall be taken to insure that the interior of the pipe is kept

free of foreign matter or trench water. As the pipe is laid in the trench, dry calcium hypochlorite shall be placed in each length of pipe in quantity sufficient to produce a chlorine residual of no less than 10 PPM in the filled line after the required 24-hour retention period.

The Inspector may require the Contractor to swab the inside of each pipe length with a chlorine solution prior to laying the pipe. This requirement will depend on the time of year, usually May through September, or condition of piping interior.

Upon completion of construction, the line shall be filled slowly under the direction of the Inspector and a pressure test conducted. The chlorinated water resulting from the initial filling shall be retained in the line for a period of not less than 24 hours, after which the contractor, under the direction of the Water District Inspector, will remove the chlorinated water, de-chlorinate the water by approved methods, and thoroughly flush the line. The first set of bacterial test samples will be taken 24 hours after the initial flushing. A second set of bacterial test samples may be taken after a minimum of 48-hour retention period of the water remaining in the pipe after the initial flushing.

Should the samples not test free of coliform bacteria, the line shall be disinfected again and re-flushed, at the expense of the Contractor, until two successive satisfactory samples are obtained.

Forty-eight hours is the minimum time required by the bacteriological laboratory to process samples.

33. SALVAGED MATERIAL

By the request of the Lakewood Water District, Contractor may be required to deliver to the District yard those materials requested, at no expense to the District.

34. SERVICES AND SAMPLE STATIONS

Corporation stops with brass pipe stubs will be installed by Water District crews at selected points along the mains for use as sample stations, air release, and points to apply test pressure. The sample stations will be removed by Water District crews after bacterial tests and pressure tests are completed unless the stations can be used for new water service laterals.

The water main Contractor shall provide the necessary excavating required for removal of all the corporations and stubs not designated for services.

Where existing services are to be transferred from old to new mains, the work of the Contractor shall be so planned and coordinated with the District's work such that customers will be shut off as briefly as possible. Contractor is also required to notify customers **48 hours in advance** of water outage.

Where water service lines are installed by the Contractor, the lines shall include all work from the tap on the water main to and including the connection to existing property side service pipe. If existing property side service exists, the service line shall terminate at the tail of the meter setter. The work includes the service corp, pipe, fittings, meter, meter riser and meter box. If any adjustments are required to the service installation because of surface grade changes or other conflicts, the work shall be performed by the Contractor at no cost to the District.

35. TRENCH BACKFILL

General

Prior to backfilling all form lumber and debris shall be removed from the trench.

Backfill shall be selected excavated material free of rocks over six inches, wood, trash, concrete, asphalt or other unsuitable material.

Excavated material, which will not readily compact to form solid, dense backfill, will be rejected by the Inspector.

Surplus suitable material from other parts of the job can be used as backfill when available.

Bankrun sand and gravel shall be furnished to make up any deficiency in the available excavated material. Bankrun sand and gravel shall be specified by Section 9-03.12(2) of the 1988 WSDOT/SPWA Standard Specifications, or as approved by the Inspector.

Backfill between bell holes or joints may be started as soon as the joints are made up, but all joints shall be left exposed until after the inspection and pressure test or approved by Inspector.

Under Private Improvements

Private driveways, road entrances, etc., shall immediately be backfilled and compacted as required herein to provide access to residents at all times.

Backfill materials to be placed where private roads, shoulders, driveways, parking lots, sidewalks, etc., will be constructed or reconstructed over the trench shall be full depth bank run sand and gravel or crushed rock, as specified by the most recent WSDOT/APWA Standard Specifications, Section 7.09.3.

Inside State, City or County Right-of-Way

The Contractor shall inform himself/herself of the requirements of the State, City or County with respect to backfill material under roadway surfaces, shoulders, etc.

36. COMPACTION OF TRENCH BACKFILL

The Contractor shall compact the backfill by use of approved methods. Water main trenches backfill may be compacted in successive layers of loose materials not more than 24 inches in depth by use of a tractor mounted compactor such as a "Hopak" or the equivalent. When portable, hand operated air or gasoline driven compactors are used, the backfill shall be placed in successive horizontal layers of loose material not more than 6-inches in depth and regardless of the method used by compacted to at least 95 percent of maximum density. Maximum density shall be determined by The Washington Densometer Method or as required by the Inspector.

The Contractor shall provide the District with compaction test results for all trench backfill at points along the construction as designated by the Inspector. The compaction tests shall be performed by the Washington State Certified Testing Laboratory.

The Contractor shall inform himself/herself of the additional or different methods of compaction inside State, County or City dedicated rights-of-way.

Hand operated mechanical tampers shall be impact type air or gasoline driven as approved by

the Water District Inspector.

The Contractor will be required to adjust gate valve boxes to the finished paving grade upon completion of the paving. These will include existing boxes affected by the water main construction and/or new paving and new boxes installed by the Contractor or the Water District which lie within the water main construction and/or new paving. Where gate valve boxes are located in the unpaved areas of the project, the Contractor will be required to adjust the boxes to the final contour of the ground. Meters, yokes and boxes shall be adjusted by the District at the expense of the developer or as directed by the Inspector with the District Manager's approval.

Where hydrants do not conform to final paving grades or ground contours in accordance with Water District Drawings, the developer will be required to have his Contractor remove said hydrants and install the proper bury hydrants or extensions, as determined by the Water District Inspector.

37. OFF-SITE CLEAN UP

All loose surface-stones two inches in diameter or larger shall be removed from the top of the trench and roadway after the backfill has been firmly compacted.

Shrubbery, fences, private improvements, lawns and surfaces disturbed shall be restored to a condition equal to or better than its original condition.

Surplus excavation, pipe line material, tools, temporary structures, and rubbish shall be removed and disposed of by the Contractor, and the construction area shall be left clean at the end of each day to the satisfaction of the Water District Inspector.

All the off-site clean up and repair work shall be completed prior to placing the new water mains into service.

38. ROADWAY REPAIR

No pavement shall be cut unless shown on the prints. A copy of the right-of-way permit from Pierce County or the City of Lakewood will be available per contractor's request. Any cutting of the pavement will only be permitted when granted permission by the local authority.

After backfilling, a temporary patch of cold mix asphalt shall be placed on road or street crossings and driveways until the permanent paving patch can be placed.

All roadway or traveled surfaces shall be restored to their original condition or better to the extent required by local authority.

The Contractor shall inform himself of the requirements for street surface repairs in public roadways and shall make all necessary arrangements with the proper authority for such repairs.

All public and private roadways shall be permanently repaired prior to placing the new water mains into service. Pavement restoration will include alligator cracking, etc., not ditch line of new water main only.

The City has a 5-year moratorium of no cuts into new roadway pavement. The Owner/Developer

shall be responsible for any penalty cost if it is required by the City for road cuts prior to 5 years.

The City of Lakewood has established a Pavement Degradation Fee for all cuts made into street pavement. The Owner/Developer shall be responsible to pay the District the cost of the fee determined by the City. The District will then pay the fee to the City as required in the right-of-way permit.

39. USE OF PORTION OF IMPROVEMENT

The Lakewood Water District reserves the right to use for service and distribution purposes, any portion of this improvement which has been sufficiently completed. Such use shall not be construed as acceptance of any part of the work or as a waiver of any claim the District may have against the Contractor.

40. GENERAL SERVICE INSTALLATION REQUIREMENT FOR NEW PLATS

No service installations shall be started until the bacteriological samples are approved. The heavily chlorinated water from the new main(s) shall be de-chlorinated by the Developer.

The Developer shall complete grading of the right of ways to within 6" of the sub-grade, prior to service installation. All roadways and easements required for access to the service locations shall be maintained to be passable by automobile traffic.

Disposal of all soils removed from service & meter trenches is the responsibility of the Developer. They are to be left on site, at a location to be coordinated by the Lakewood Water District and the Developer.

The Developer is responsible for **marking** underground utility lines and conduits on the project. The Developer is responsible for **repairing** any unmarked underground utility structures damaged in the course of installing services or meters.

When excavating around, or exposing any Water District structure in a new plat, the Water District Inspector in charge of the project shall be notified, to ensure that the integrity of the installations are maintained.

The Developer shall, upon request by the Water District, excavate the sample station locations for removal by Water District personnel.

The Developer shall coordinate with the Lakewood Water District Manager or the Water District Inspector to determine appropriate service stub locations.

41. WATER SERVICE LOCATIONS

Service locations shall be marked with the following staking plan:

A hub & stake at the meter location, marked with the letters W-MTR, the lot number it will serve, and the finished grade. The top of the stake shall be painted blue, or marked with a blue ribbon.

A hub & stake, offset no less than 5 feet and no more than 10 feet behind the water meter location, marked with the letters W-MTR, the finished grade at the meter and the lot number it will serve.

Lot lines shall be indicated with a lot corner stake, and a 10 foot offset stake, marked with the lot

numbers.

Radius hubs shall be installed for all Cul-de-sacs, and left in place until service installations are complete.

42. PLACEMENT OF METERS

Water meters shall be located in the right of way, in front of the lot being served. Meter locations that cannot meet this requirement must be approved by the Water District Manager.

All meters installed on adjacent lots shall be positioned the same distance from the edge of the pavement.

If property corners are used by other utilities, the service may be located in the center of the lot.

Meter line-setter service splitters, whenever possible, shall be used at property corners in order to be able to serve two properties. When a fire hydrant is set at a property corner, water service shall have five-feet of separation.

Meters shall be laterally offset a minimum of 2 feet from the lot corners and 5 feet from Fire Hydrants.

Where possible, the meter shall be located between the road and the sidewalk. When the sidewalk meets the curb or roadway, meters shall be located behind the sidewalk.

Whenever possible, to reduce the amount of trenching, services shall be installed in common trenches that serve adjacent lots.

Avoid locating meters in proposed driveways, or other paved areas.

Water service pipes shall not be located parallel with and within 10 feet of any existing or proposed sanitary sewer line, manhole, transformer, vault, or utility pedestal. Water service pipes shall not be located parallel with and within 5 feet of any existing or proposed electrical conduits, cables, street lighting poles, gas pipes, or communication cables.

Meter locations shall be placed no closer than 3 feet to any other utility trench running perpendicular to the water service line.

Developers are responsible for mis-marked lots, incorrect grades, incorrect meter locations, and **will be charged for** any changes made after installation is complete. Developers are also responsible for changes in grade made by landscaping contractors or any other sub-contractor.

Developers are responsible for damages to LWD property by Contractor or subcontractors after installation.

43. LANDSCAPING AND CLEARANCE REQUIREMENTS

GENERAL

- No improvements (building, wall, fence, rockery, tree, bush, structure, etc.) will be allowed that block, restrict or impede access to the water facilities.
- The ground around the water facilities needs to remain at the original grade unless approved by the District.
- No trees can be planted over or within 5 feet of water mains. Large trees at full growth need to be planted over 8 feet away from water mains.
- Where trees will be large (over 20 feet tall) at full growth and are planted near water facilities as described below, vertical root barriers need to be placed.

WATER METERS

- Meter box is to be placed at the property line.
- Meter box is to be set level at final grade.
- Keep grass, gravel, beauty bark or other landscape materials off of the meter box.
- Low growing shrubs need to be planted and kept trimmed to allow a minimum of 3 feet of clearance from the meter box.
- Larger shrubs and trees need to be planted no closer than 8 feet from the meter box.
- All structures, plants, fences, etc. need to be installed or trimmed to allow a minimum of 6 feet of overhead clearance in a 3-foot radius around the meter box.
- Fences near the meter box may only be adjacent to one side of the box. The remaining 3 sides need to maintain a minimum 3-foot clearance.
- Keep objects such as trash cans, flower pots, bird baths, etc. off of and away from the meter box.
- Any change to customer grade or landscaping at the meter box may require Lakewood Water District inspection and approval.

FIRE HYDRANTS

- Fire hydrants are to be placed in accordance with the Fire Marshal's requirements.
- Fire hydrants need to be set with the breakaway flange at or slightly above final grade.
- Landscaping around hydrants must maintain a minimum of 18 inches between the discharge ports and ground level.
- All structures, plants, fences, etc. need to be installed or trimmed to allow a minimum clearance of 3 feet around the hydrant, and larger plants or trees need to be planted at least 8 feet away.
- All structures, plants, fences, etc. need to be installed or trimmed to allow a minimum of 6 feet of overhead clearance in a 3-foot radius around the hydrant.
- No shrubs, trees, fences or obstructions can be on the street side of the hydrant.
- There is to be no parking or obstructions within 10 feet of the hydrant on the street edge.

VALVE BOXES

- Valve box is to be set level at final grade with "ears" facing in the same direction as the water main.
- Keep grass, gravel, beauty bark or other landscape material off of the valve box.
- Low growing shrubs need to be planted and kept trimmed to allow a minimum of 3 feet of clearance from the valve box.

- Larger shrubs and trees need to be planted no closer than 6 to 8 feet from the valve box depending on the anticipated full growth size.
- All structures, plants, fences, etc. need to be installed or trimmed to allow a minimum clearance of 3 feet around the valve box.
- All structures, plants, fences, etc. need to be installed or trimmed to allow a minimum of 6 feet of overhead clearance in a 3-foot radius around the valve box.
- Keep objects such as trash cans, flower pots, bird baths, etc. off of and away from the valve box.
- Do not landscape in a manner that will block the view of the valve box from the street.

44. General Building Plumbing Requirements

- Expansion tanks on hot water tanks are currently required in all new home/building construction or home/building remodels. Expansion tanks are necessary because the new requirement for a check valve at the meter could allow pressure to build in the home/building water system causing leaks or other damage. It is highly recommended for older homes that expansion tanks be added if they do not have them.

LAKWOOD WATER DISTRICT

DESIGN AND CONSTRUCTION SPECIFICATIONS FOR DEVELOPERS & CONTRACTORS 2019

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LAKWOOD WATER DISTRICT DESIGN AND CONSTRUCTION SPECIFICATIONS FOR DEVELOPERS & CONTRACTORS

1. DEVELOPER PLANS

The Lakewood Water District General Manager has the right to require, add, modify, or delete any requirements he deems necessary.

PLANS MUST BE PRESENTED FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK

- A) Right-of-way lines and widths for proposed road and side streets.
- B) Label all streets, adjoining subdivisions, and easements with dimensions.
- C) Water main line locations shall clearly show dimensions from street center lines or from property lines.
- D) Show existing and proposed fire hydrants. The Fire Marshall shall designate the location of all new and relocated fire hydrants. Final design drawings shall have the Fire Marshall's signature of approval before construction can start.
- E) Include size, type, and pipe classification for each run of pipe.
- F) All pertinent fixtures shall be identified with size and type.
- G) All blow-offs for sampling will be charged to the Contractor. It will be the Contractor's responsibility to disconnect.

2. INSPECTION & INSPECTORS

- A) The cost of all Lakewood Water District Inspectors will be at a rate of \$ 100.00 per hour straight time and \$125.00 overtime. The Inspector shall be present during all phases of the installation of the water system; any overtime shall be at a two-hour minimum.
- B) A **Pre-Construction Meeting** will be required prior to the commencement of the work. This meeting will include introduction of District project staff including the Inspector, discussion with the project staff, contractor, utility companies and permitting agencies of any concerns, and a general walk through of the proposed job.
- C) The District's Inspector is not a safety inspector, however, if he determines that inspection is needed in any areas, he can make the contractor meet safety requirements.
- D) A 48-hour notice shall be given to the District before a District Inspector is needed on-site of the project. If a District Inspector is scheduled to the project site by the developer

or contractor and a last minute cancellation for his services is made, a \$100 charge will be applied to the developer or contractor, whichever is appropriate.

- E) As-built measurements must be taken daily and a copy given to the Lakewood Water District Inspector.

3. SURVEYING

Survey control and field staking shall be established by the Developer/Contractor or the District's Engineer depending on whether the water system work is under a Developer or District contract. Water main alignment offset stakes or marks shall be set at no more than 50-foot intervals. Water main grades may be required to be shown on the offset stakes/marks, and intermediate stakes as needed, for large water main installations or where known utility line conflicts exist.

The Contractor shall provide all other intermediate measurements; horizontal, vertical and construction or control staking as needed for his operation.

4. WATER MAIN DESIGN

Capacity: Minimum design capacity for water mains serving single family residential areas shall be 1,000 GPM over and above average maximum demands at the farthest point of the installation.

Policy to eliminate dead end water mains: During new construction main extensions, whenever possible, all water mains must be looped or tied together from at least two directions to provide equal flow of water. This will increase the flow rate needed for fire flow and help eliminate chlorine residual problems, improving water quality and providing reliability to the water system infrastructure. If a new dead-end main is installed, where a loop is not possible, then an automatic flushing station must be installed at the end of the main with adequate drainage provided. (See Standard Drawings) The flushing system shall include a meter and the water used be paid for by a home owners association (HOA), The HOA will also be responsible for maintaining the flushing station.

Minimum design capacity for fire flows serving buildings other than single family dwellings shall be determined by the fire marshal.

Minimum pipe size is 8-inch. Pipe shall be ductile iron of domestic manufacture, Class 50 pursuant to ANSI A21.50 and AWWA C-150.

Maximum design velocity during fire flows shall not exceed 7.5 feet per second during peak day demand.

Whenever possible, maximum deflection by fitting is 45°. Successive bends shall be separated by straight runs not less than ten (10) diameters in length.

5. CONNECTION TO THE EXISTING WATER SYSTEM & SYSTEM MATERIALS

All connections to the existing water system shall be accomplished by Lakewood Water District unless approved otherwise by the District

(a) Water Mains: Water mains shall be constructed and tested in accordance with Section 7-11.1 through 7-11.5 (02) of the Standard Specifications. Bacteriological test samples will be taken by the District, but at the Contractor's expense. Purity samples shall be determined as acceptable by the testing lab before connections are made to the existing water system. All of the following will be inspected by Lakewood Water District Inspectors after the successful installations are completed.

(b) Pipe for Water Mains: Pipe for water mains 6-inch and larger shall be ductile iron and shall be thickness Class 50 or greater, with Tyton or approval equal joints. Pipe shall be cement lined in accordance with A.S.A. Specification A 21.4-1964. All fire lines and fire hydrant pipe shall be Class 52.

(c) Pipe Fittings for Water Mains: Pipe fittings for water mains shall be short body, ductile iron, for 150 PSI working pressure. They shall be mechanical joint conforming to AWWA Specifications C153.

(d) Valves: Gate valves shall be the standard used in this District. A by pass line may be required in certain instances on valves larger than 8-inch.

(e) Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves should be located at not more than 300-foot intervals in commercial areas and at approximately 600-foot intervals in other areas.

(f) Approvals for purity sample tests shall be delivered to the District before any connection to the water system is made.

6. GATE VALVES

Gate valves shall conform to the latest AWWA standards.. Rated for cold water, 200 P.S.I. working pressure. They shall be non-rising stem, counter clockwise opening, mechanical joint ends (except 6-inch valves on fire hydrant lines, which shall be M.J. joint by flange) valve stems shall be provided with o-ring seals and shall be as manufactured by the Mueller Company or AVK. Lakewood Water District requires that all valves smaller than 12-inch shall be R.S.G.V. Twelve inch and larger will be R.S.G.V. or Butterfly R.S.V. B3211. Approval of materials must be obtained from LWD for each job before commencing work.

7. VALVE BOXES

Valve boxes shall be installed over valve operators. Boxes shall be two-piece, adjustable, cast iron (with extension pieces, if necessary). Top Section 045/046 lid. Commonly called Seattle or Tacoma top and lid.

The letters "ww" shall be cast in relief in the top. Valve operating nut deeper than 40 inches must use valve nut extension.

Fire Systems must have locking top & lid (Tyler) 6855.

8. VALVE MARKERS

Shall be placed on the pavement curbing where valves are located outside of the surfaced area.

9. WATER SERVICES

Installation shall be the sole responsibility of Lakewood Water District and charged at the current established rates. Exception to this being a certified contractor who must be approved by Lakewood Water District.

All domestic and fire system services three (3) inches and above will be charged at “time and materials” and include the General Facilities Charge.

Where possible, water services shall not exceed one-hundred (100) feet in length between the water main and the structure or appliance receiving water. Water service lengths greater than 100 feet shall require approval of the District Superintendent or General Manager. Additionally, service lengths between 150 and 225 feet shall require permitting and installation of a RPBA (reduced pressure bypass assembly) and annual testing; service lengths between 225 and 350 feet shall require installation of the RPBA and automatic flushing system with drainage system; service lengths greater than 350 feet shall require installation of a looped water main (minimum 8-inch ductile iron) adequate for future fire flows, an automatic flushing system, and a water sample station on all dead end mains longer than 225 feet. All water services over 150 feet in length shall require a Temporary Service Agreement between the owner and the District prior to installation of the water service. All required private easements shall be the responsibility of the property owner not the District.

Water services shall be 1-inch IPS, SIDR 7, 200 PSI, ASTM D2239 polyethylene pipe with a meter riser installed per the Lakewood Water District standard single water service detail drawing. 1-1/2 inch and 2-inch water services shall be CTS, SDR9, 200 PSI, ASTM D2737 polyethylene pipe with a meter riser as shown on the District’s standard water service detail drawing.

The water service piping shall be one continuous piece, without joints, between corporation stop to meter riser assembly. All connections to plastic tubing type services shall be made by using 3/4” and 1” Mueller Instatite fittings or Ford brass fittings. The 1½ inch and 2-inch service connections shall be made with Mueller 110 compression fittings or Ford Brass fittings. All service material shall be brass.

Water services shall be installed a minimum of three (3) feet below finished grade. Service pipe shall be wrapped with 12-gauge copper tracing wire, extending from the main to the meter box. Tracer wire shall be attached to the saddle and extend a minimum of 12 inches into the meter box. Water Services shall extend to the property line, and be fitted at that point with a meter setter and vault. Connections to existing water mains shall be wet taps through a tapping saddle and tapping valve and shall be made by the District:

10. CONCRETE THRUST BLOCKING AND MECHANICAL JOINT RESTRAINTS

Mechanical joint restraints (“megalugs” by EBBA Iron or equivalent) shall be used in lieu of thrust blocks on all mechanical joint fittings (bends, tees, crosses, pipe ends). However, when connecting to existing water mains, thrust blocks will likely be required because lock joint gaskets may not be installed in the joints of the connected water main. The District’s engineer

or inspector will make the determination if thrust blocks are required and the blocking will normally be shown on the project plans.

Concrete thrust blocking shall be in accordance with the details shown on the Plans. Place 4 mil plastic between concrete blocking and fittings. No concrete is to get on bolt threads. Concrete shall be cured for at least two days prior to any pressure test of the pipe.

For pipe adjoining the mechanically restrained fittings, field lock gaskets shall be installed in pipe joints in accordance with the District's Standard Details 1 through 4.

Full sized concrete ecology blocks are acceptable where temporary thrust blocking is required.

11. FIRE HYDRANTS

General: All hydrant lateral pipe shall be Class 52 or greater ductile iron with mega lugs on the valve follower and hydrant follower. Place one-inch washed rock around hydrant weep hole, then place 6 mil plastic sheeting over the washed rock before placing the backfill around the hydrant. All fire hydrants shall be buried to grade within three (3) inches of the marked bury line on the hydrant.

a.) Mueller A423 Super Centurion 250

Fire hydrants shall comply in all respects with latest A.W.W.A. (502), UL (246), & FM (1510) specification [removed "C-502."] Having a working pressure of 250 pounds P.S.I. and a hydrostatic test pressure of 500 pounds P.S.I. Hydrants shall be – 5-1/2 inch main valve opening, two 2-1/2 inch N.S.T. Hose Nozzles, one 4-1/2 inch N.S.T. Pumper Nozzle, fitted with Storz adapter, 4 foot bury, 6 inch M.J. Bottom Connections or flange connection, 1-1/4 inch operating nut. Open left, painted X-3472 CASE YELLOW (high grade alkyd-type, high gloss enamel intended for use on primed exterior and interior wood or metal). Repainting of hydrants may be required by the District Inspector.

They shall be of a compression type design with the main valve opening against the pressure and closing with the pressure. Hydrants shall be of dry top design complete with weather seal on one-piece bronze operating nut, self lubricating sealed oil reservoir to provide positive continuous lubrication. Reservoir to be factory pre-filled with the proper type and amount of oil. All threaded and bearing parts metal to metal, metal to rubber in the bonnet section shall be automatically and fully lubricated each time the hydrant is cycled, full opened to full closed. The bonnet casting of the fire hydrant shall be a one-piece casting forming an integral lubricant reservoir with a minimum of two "O-RING" seals at the base of the bonnet. Lubrication of the hydrant shall be through a filler plug located in the bonnet of the hydrant, through which level of the lubricant can be checked. Lubrication shall not be through a fitting in the Operating Nut. All hydrants shall be of the traffic type, and shall be provided with a two-piece breakable Flange and with a Breakable Stem Coupling.

The Breakable Stem Coupling shall be made of stainless steel and shall be of the Torque-Diverting Type. Breakable flanges shall be of the 8-bolt design. Breakable bolts or Breakable Lugs are NOT ACCEPTABLE. Breakable stem couplings made of CAST IRON or of ALUMINUM are NOT ACCEPTABLE. A main valve Travel Stop shall be provided in the Shoe as an integral part of the Shoe. The internal ferrous surfaces of the Shoe shall be epoxy lined with a two-part Thermo setting epoxy. All hydrants shall be furnished with a

minimum of two drain valves and the drain valve facings shall be made of either rubber or a polyethylene material.

The drain valve facings shall be retained in position by stainless steel screws. The Seat Ring shall thread into a bronze drain ring forming an all-bronze drainway. All pressure seals shall be rubber "O-Rings". The area of the lower stem, which is reduced in diameter, shall be sealed away from moisture by means of compression of the rubber main valve "O-Rings". All barrel flanges shall be an integrally cast part of the upper and lower barrels with the exception of those breakable flanges which are designed to break on traffic impact. All lower Bury castings shall be one piece up to and including a 6-foot Bury Fire Hydrant. The operating nut, Thrust collar, and Treaded Stem drive shall be one piece bronze. A friction reduction agent shall be located between the Thrust collar and hold down nut in the Bonnet section. All internal bronze parts shall contain less than 16% ZINC. All bolting material below ground shall be of full 3/4 inch diameter. If the bolt is less than 3/4 it shall be made of Silicon Bronze or 303 Stainless steel. If the lower barrel is made of Ductile Iron, then all below ground connecting parts, including the shoe, shall be of Ductile Iron. A raised bury line shall be integrally cast on the lower barrel to indicate ground line for proper hydrant setting.

There shall be no springs used in the internal construction of the hydrant.

For all Fire Hydrants, the finished landscaping must match the bury line just below the flange as indicated on fire hydrants. All hydrants must be cleaned and painted if necessary.

Lakewood Water District will perform hydrant flow tests unless otherwise agreed to by LWD. The District shall designate the hydrant(s) that will be tested.

b.) American AVK High Pressure—250 PSI

Fire hydrants shall comply in all respects with latest A.W.W.A. (502), UL (246), & FM (1510) specification [removed "C-502."] Having a working pressure of 250 pounds P.S.I. and a hydrostatic test pressure of 500 pounds P.S.I. Hydrants shall be – 5-1/2 inch main valve opening, two 2-1/2 inch N.S.T. Hose Nozzles, one 4-1/2 inch N.S.T. Pumper Nozzle, fitted with Storz adapter, 4 foot bury, 6 inch M.J. Bottom Connections or flange connection, 1-1/4 inch operating nut. Open left, painted Sherwin Williams PPG-95-8002. Repainting of hydrants may be required by the District Inspector.

Stainless Steel Stem—The stem is made of stainless steel, having optimum elongation and tensile resistance capabilities.

The stainless steel stem threads are rolled in a separate cold pressing process in order to maintain the stainless steel structure and increase its strength. Furthermore, this method ensures smooth thread edges and consequently low operating torques.

The stainless steel stem is 100% lead free.

Body and Bonnet Assembly—The effective assembly of the valve body and bonnet ensures a durable tightness. A round rubber bonnet gasket fits into a recess in the valve bonnet preventing it from being blown out by pressure surges.

Stainless steel (304) bonnet bolts are countersunk into the valve bonnet and body of the valve. Encircled by the bonnet gasket and sealed with hot melt. Thus, there is no risk of corrosion, as the bolts are not exposed to the medium or soil. Furthermore, the bonnet bolts do not require re-torquing to ensure a proper seal of the bonnet and valve assembly.

Warranty--Ten-year warrant that covers both the cost of the defective valve and the reasonable cost to either repair or replace the defective valve.

12. SINGLE FAMILY RESIDENTIAL

All new single family dwellings shall have a public fire hydrant within three hundred fifty feet of its normal access from public right-of-way; maximum spacing shall be six hundred feet.

13. RESIDENTIAL ESTATES

Residential estate zone, which shall have a public hydrant within three hundred feet of its normal access from public right-of-way maximum spacing, shall be six hundred feet.

14. BUILDINGS

All new building in commercial, industrial and apartment (including duplex) shall have a public hydrant within two hundred feet of its normal access from public right-of-way.

15. LATERAL SPACING

Lateral spacing of fire hydrants shall be approved by the fire marshal, and predicated on hydrants being located at street intersections.

16. SPECIAL REQUIREMENTS

All buildings other than single family dwellings, which are located such that any portion is more than one hundred fifty feet in vehicular travel from a street property line, shall provide fire hydrants connected to the water system. The lead from the service main to the hydrant shall be no less than six inches in diameter. Any hydrant leads over fifty feet in length from water main to hydrant shall be no less than eight inches in diameter. Provisions shall be made wherever appropriate in any project for looping all dead end or temporarily dead end mains.

17. WATER METERS

All primary meters will be provided by the District as part of the GFC fees and charges. All meter installations larger than 3" will require an isolation valve to be installed immediately downstream of the meter, and enclosed in the meter enclosure.

18. WATER METER YOKES

Yokes with check valve assembly, for 5/8 x 3/4 inch meter shall be the standard. 1 inch meters shall be fitted with angle stops and angle checks. 1-1/2 and 2 inch, fitted with angle stops and angle checks. Mueller manufactured. The meter box shall be made of concrete or plastic and

shall be of sufficient depth to expose the bottom pipe and allow a minimum of 10 inches from the top of the meter to the bottom of the lid.

19. VAULT COVERS

Valve box and vault covers shall be designed to carry the appropriate traffic loadings. When located in the street section, they shall be designed to carry H-20 loading.

20. BLOW OFF ASSEMBLY

Blow off assembly shall be installed as per the Lakewood Water District standard 2-inch blow off-assembly detail drawing. No assembly shall be installed closer than 18 inches from or further than three feet from the end of the pipe.

21. BEDDING

Bedding material shall be placed a minimum of four inches under, around and to a level of six inches above the top of the pipe. Where in the opinion of the District existing backfill material may be used. Where the excavation is required below the normal grade line because of poor soil conditions, the base shall be course sand or crushed rock. Bedding material shall be course sand. Compaction of the trench backfill must be by mechanical tamping to a density of 95% as required by the Lakewood Water District. All road crossings must conform to City of Lakewood specifications.

22. UNDERMINING OF ASBESTOS CEMENT WATER MAIN

Lakewood Water District requires that when an existing asbestos cement (A.C.) water main is undermined by more than 3 lineal feet, one full stick of A. C. pipe from joint to joint must be replaced with ductile iron or C900 PVC pipe with Smith Blair or Romac compression couplings. This is and has been a requirement by Lakewood Water District since the U.L.I.D. sewer construction projects in the early 1980s.

A District Inspector shall be on-site when an AC main is exposed and during any AC main replacement. When AC main is undermined and not replaced with ductile iron or PVC pipe, the backfill shall be controlled density fill (CDF); otherwise, sand or crushed rock backfill can be used. All new water main has to be disinfected before it is placed in service.

When the work is being done by the District, any costs associated with replacing the disturbed AC pipe shall be estimated by LWD and collected as a deposit prior to commencement of construction. Any difference between actual costs and the deposit shall be collected or refunded.

When other utilities are replacing their existing utilities, Lakewood Water District requires a minimum of two feet of vertical clearance from its facilities.

23. GENERAL REQUIREMENTS & PROJECT COMPLETION

Finishing and cleanup shall be accomplished without additional compensation. All manholes and catch basins shall be kept clean during the entire period of construction. The contractor shall provide dust control at all times.

Upon completion, the Lakewood Water District will make a final walk through inspection after all the landscaping and paving has been completed. Checks will be made to see that all the valves are open, properly placed to final grade with operating nuts within 40 inches of the surface. (Note on As-built the length of extensions used). Finishing and cleanup shall be accomplished without additional compensation.

All fire hydrants set to bury line grade. All services set to grade, boxes intact and to grade. Pressure test and purity samples have passed and the hydrant flow test completed. Lakewood Water District will need a total of six copies of the final As-built.

Existing asphalt, concrete payments, or bituminous surfacing disturbed by the work shall be replaced as per City of Lakewood specifications.

The District will not accept new water facilities as having been completed until final inspection and acceptance by the District.

24. MINIMUM UTILITY LINE SEPARATION REQUIREMENTS

Minimum Utility Separation Requirements

		Separation (feet)*							
		Electric U/G	Gas	Water Main	WW Force	WW Gravity	Storm Sewer	Structure	Major Vegetation
District Water Main		5	3	2 to 3	7 to 10	10	4	10	10

* Horizontal distance from District water main for parallel utility lines or objects

WW = waste water

Vertical separation from all utilities shall be not less than 12 inches unless approved by the District.

25. FIRE SYSTEMS

The Lakewood Water District General Manager has the right to require, add, modify, or delete any requirements he deems necessary.

The District allows two types of fire protection systems.

- Separate dedicated fire system connected independently to the water system and detached from any other water service.
- Residential fire sprinkler systems

It is not the responsibility of the District to determine the fire system connection and pipe sizes. The fire system sizes must be determined by a fire sprinkler designer or the Fire Marshall's office. All fire systems must be approved by the Fire Marshall's office before installation of the system. Once the fire flow requirements are provided to the District, a meter size and cost will

be determined for the fire service line installation from the water main to and including the meter box.

A. Dedicated Fire Systems

All fire suppression water systems are required to have:

1. A separate connection and service to the distribution system
 - a. Each fire suppression system shall be connected to the public water system with service lines the same size as the system feed line;
 - b. Fire connections are dedicated to suppressing fire only and no other use is authorized and violators penalized;
 - c. Valves shall be provided at the tap onto the supplying water main which shall have a complete valve box providing access to operate the valve with a lockable lid.

2. A backflow assembly commensurate with the degree of hazard
 - a. All fire suppression water system connections to the Lakewood Water District (LWD) mains shall be protected with a backflow assembly. Fire protective systems shall be protected with a Double Check Detector Assemblies (DCDA) or with a Reduced Pressure Detector Assemblies (RPDA) based on the degree of hazard at the discretion of Lakewood Water District, who's decision is final;
 - b. Backflow assemblies protecting fire systems shall be installed in a meter box (2" or less in size) or concrete vault (larger than 2") at the property line or easement line;
 - c. Fire sprinkler systems shall have a pipe-length distance of one hundred (100) feet or less between the supplying water main and the (Christmas tree) riser distribution point;
 - d. Backflow assemblies shall be placed on private property and are owned and maintained by the owner of said property;
 - e. It is the responsibility of the property owners to properly maintain the backflow assembly and comply with the State of Washington and LWD standards.

3. Protection of the Backflow Assembly
 - a. Fire suppression service line meters 2" and smaller shall be in a meter box providing minimum clearances specified herein;
 - b. Fire suppression service line meters larger than 2" shall be enclosed in an approved enclosure providing minimum clearances specified herein. Vault installations shall conform to LWD standards;
 - c. Vented assemblies (RPBA's & SRPVB's) require drains below the assembly piped or mechanical pumped to atmosphere with pipe capable of exceeding 120% of the maximum flow available through the service line without flooding or affecting the assembly;
 - d. Backflow assemblies larger than 2" shall be firmly supported from a stable floor;
 - e. Backflow assemblies located higher than five feet from level ground surface shall have a platform constructed to L&I standards with an applicable building permit for purposes of testing and maintenance of the valve;

- f. All enclosures of backflow assemblies shall have access through doors that swing away from the valve and are wider than the assembly is long.

4. Use Meters

- a. Fire suppression systems 2" and smaller shall have a meter on the service line before and within 18" of the backflow assembly;
- b. The meter shall be located at or as near as possible to the property line or easement line;
- c. Meters shall be Sensus© SR II® Radio-Read meters that reads in cubic feet with the capability to easily transmit the reading to the public street;
- d. Systems over 3" may use approved proportional detection meters for fire suppression only. These proportionate meters shall be a part of the assembly;
- e. Proportionate meters shall be the nominal size as the bypass and mounted on and within the bypass;
- f. Where radio reads are not possible, such as within buildings, accessible meter touch pads shall be provided at an elevation of 5 feet above the floor.

5. Permits and Inspection during installation

- a. A permit to install a fire suppression system and/or a fire suppression system is required by and obtainable from the front counter of the corporate offices of the Lakewood Water District;
- b. Lakewood Water District will provide an inspector at the owner's expense to observe the fire suppression system installation up to and including the Post Indicator Valve (PIV). The PIV is to be located as directed and approved by the Fire Marshal of the appropriate jurisdiction.

6. General requirements

- a. Post indicator valve (P.I. valve) shall be at least 20-feet away from a flammable building. Non-flammable building P.I. valve may be installed in wall. Note: Contractor must obtain approval from Lakewood Fire District. The installations must have a valve off the water main flanged to the tee; also all fire systems must use approved backflow protection, commensurate with the degree of the hazard. This should be taken into consideration when designing fire sprinkler systems. All pipe shall be Class 52.
- b. Fire line responsibility:
 - All 1"-3" fire lines with Water District meters—maintenance responsibility ends at the meter.
 - All 4"-12" fire line connections maintenance responsibility ends 10' from main line tee or at right-of-way property line. If P.I. valve is located nearer than 10' to tee, then maintenance responsibility ends District side of P.I. valve.
 - All gate valves must have a valve box with locking lid (Tyler 6855 spec).
- c. Fire systems are to be protected with double check detector assemblies or with reduced pressure detector assemblies, both are required to have a bypass meter -- Sensus Iperl meter with one cubic foot increments and approved radio read. The touch pad is required to be installed in the vault lid. If the system is in a building the pad must be installed in an outside wall no higher than 5'.

B. Residential Fire Sprinkler Systems

- Single-family homes and duplexes

Voluntary residential (single-family homes and duplexes) fire sprinklers systems were encouraged through House Bill 1295 effective in 2011. The District prefers installation of a multipurpose, flow-through system for residential customers but will consider variations to the concept of a dedicated fire sprinkler system (Refer to *Washington Water Utilities Council, Guide for Water Utility Managers and Governing Bodies on Residential Fire Sprinkler Systems, October 2008*).

The District favors the use of a multipurpose, flow-through system that uses the same water service and household plumbing to supply the fire sprinklers and the various domestic water uses in the home. The District will have final approval of what system and configuration is allowed. Minimum requirements for a flow-through system are:

Flow-Through System

1. The standard service will involve a 1-inch service line and a full ¾-inch meter. The service and meter size will be determined by the fire flow demand as provided to the District and other factors such as system pressure, length of the service line, elevation change from water main to the home and available fire meters.
2. All in-home fire sprinkler piping must terminate at a fixture getting regular domestic use to insure flow through all parts of the in-home system.
3. Backflow prevention will not be required except in special circumstances.
4. All system components must be UL and NSF approved. The District is currently using an NSF approved Sensus Iperl meter for this application. The applicant must pay the District's published cost for the required service & meter installation.
5. District staff must have access to the residence to verify that these requirements are met and confirm that all system inspection fees are paid.

- Multi-family

The provisions stated above for Single-Family and Duplexes will apply for multi-family flow through fire systems where each living unit is separately metered. Some circumstances, such as multiple story buildings may require backflow prevention devices in the flow through system.

All applicable provisions under Dedicated Fire Systems above, such as meter, meter box and permit requirements, still apply to these flow-through systems.

26. HYDRANT METER REQUIREMENTS

1. Lakewood Water District requires a \$200 deposit and a signed hydrant meter permit and regulations form.

2. If a deposit is paid before 12:00 noon; the hydrant meter will be delivered the same day. If the deposit is paid after 12:00 noon; the hydrant meter will be delivered no later than the next business day.
3. Lakewood Water District requires a copy of a current backflow assembly test report. The customer will need to provide a copy of the current backflow assembly test report for each assembly when the meter is delivered.
4. Lakewood Water District will hook up the hydrant meter for the customer when it's delivered to make sure the hydrant and meter are in good working condition.
5. The customer will need to provide all necessary fittings, hoses, and supports.
6. General Backflow applications include; Approved air gap – pools, hot tubs, or any application where an approved air gap will work to protect the water. Also required on trucks that will be filled with water. Trucks will be visually inspected and the license numbers recorded. Double check valve assembly – Ditch settling, dust control, filling of new water mains, etc. Also, for filler trucks with no approved air gap that is not being used in a high hazard situation. Reduced pressure backflow assembly – Required for high hazard situations where an approved air gap is not feasible or available. This may include filler trucks using chemicals, pools, sewers, etc. Reduced pressure backflow assembly and approved air gap – Is required on all sewer or sewer related applications.
7. Removal of water will be allowed during the hours of 8:00 a.m. till 5:00 p.m., unless authorization is given by a representative of the Lakewood Water District.
8. Once a hydrant has been designated, you cannot hook up to another hydrant without expressed permission from Lakewood Water District. Failure to comply will result in a \$500 fine.
9. The meter permit is good for 6 months. However, the terms may be extended up to one year with prior authorization from the Lakewood Water District; otherwise, the customer will need to complete a new permit every 6 months. A current copy of a backflow test assembly report will also be required in order to extend hydrant meter permit terms.
10. The first hydrant meter permit is free of charge; each additional 6 months renewal (or extension) will cost \$50 and must be paid before the new permit will be issued or an extension on the initial permit can be extended.
11. The Lakewood Water District will check all hydrant meters and hydrants on an annual basis to be sure that they are in good working condition. The District will also check for a current backflow test assembly report on an annual basis.
12. The hydrant meter permit needs to be on site at all times during the use of the said hydrant.
13. The permit must be surrendered to an official of the Fire District, the Lakewood Water District, or Law Enforcement if requested.
14. When work is completed, the customer is responsible for calling (253) 588-4423 within 24 hours to schedule a final inspection of the meter and hydrant. District personnel will inspect the meter, hydrant, and also take a final read off the meter.
15. The \$200 deposit will be applied to the customer's final invoice. If a balance is due after the deposit has been applied, Lakewood Water District will issue an invoice.

16. If the District owes a refund after the deposit is applied, Lakewood Water District will issue the customer a refund check within 30 days after the return of the meter.
17. Lakewood Water District reads hydrant meters at the end of each month, and the customer is billed for the consumption used. There is a minimum rate of \$40 plus \$5/day rental fee for the meter.
18. Lakewood Water District reserves the right to refuse water from any hydrant if the above regulations are not met to the District's satisfaction.

27. CROSS CONNECTION CONTROL

A. BACKFLOW PREVENTION

1. GENERAL

Backflow Prevention, or Cross Connection Control is for protection of water quality and is regulated by WAC 246-240-290 and administrated and enforced by the Lakewood Water District. The policies, procedures, and criteria for determining appropriate minimum levels or protection shall be in accordance with the Accepted Procedure and Practice in Cross Connection Control Manual – Pacific Northwest Section American Waterworks Association, Sixth Edition or any superseding edition.

All irrigation systems, new commercial water services, commercial services for building remodels and special residential services must have approved backflow assembly protection, commensurate with the degree of the hazard.

Fire sprinkler systems shall have backflow protection commensurate with the degree of the hazard, but a minimum of a Double Check Detector Check Assembly is required on all new fire systems.

NOTE: All Backflow protection must be checked for flow as needed for sprinkler system designs.

The Lakewood Water District General Manager has the right to require, add, modify, or delete any backflow protection requirements (s)he deems necessary.

2. PERMIT INFORMATION

1) A permit is required for every backflow assembly installation. The District will no longer waive a permit for having an existing assembly which is not up to code.

2) Permits are only available at the front counter of the Lakewood Water District office during regular business hours.

3) If we find a job in progress without a permit, we will give one working day to obtain the required permit.

3. PERMITS

1) All new construction, new irrigation system, or any required backflow assembly must have a permit.

- 2) All existing buildings or irrigation systems need to have a permit.
- 3) Permits are currently \$30.00 for one backflow assembly, plus \$ 5.00 for each additional assembly on the same property. Assemblies with detector checks are \$35.00 because of the check on the bypass line is a second assembly.

4. INSPECTIONS

- 1) All Backflow Assemblies installed are to be inspected by Lakewood Water District.

5. TESTING

- 1) All backflow assembly installations will be the customer's responsibility to have the assembly tested by a Backflow Assembly Tester (BAT) certified in Washington by the state Department of Health.
- 2) All backflow assemblies require testing within a twelve month period conducted by a current and valid Backflow Assembly Tester (BAT) certified in the State of Washington by the Washington State Department of Health using proper equipment calibrated within the last twelve months of test date.
- 3) Waivers signed by the customer and on record with the District only allows for thirty (30) days for test reports to be submitted to the District. After the thirty-(30)-day deadline, all testers with outstanding waivers will be notified and have seven (7) days after the date of notification to turn in any outstanding test reports. After that time, the District will pull the waiver on the account and notify the customer directly. If a company or tester is continually submitting test reports late with "waiver tests" they run the risk of removal from the Districts tester list.

6. REPAIRS

- 1) All Backflow assemblies failing a Backflow Assembly Tester's (BAT) exam shall be repaired by a certified plumber with a backflow assembly endorsement by Washington State Labor and Industries.

B. **BACKFLOW ASSEMBLIES**

A backflow assembly permit must be obtained from Lakewood Water District before any work requiring protection commences. Current prices (subject to change) are: \$30 for the first assembly and \$5 for each assembly thereafter per permit on the same property. Permits are obtainable at the front counter of the corporate offices of Lakewood Water District.

Reduced Pressure Backflow Assembly (RPBA) and Reduced Pressure Detector Assembly (RPDA)

1. Shall be installed in a horizontal configuration; unless approved for alternate configuration by State of Washington Department of Health.
2. Shall be installed a minimum of twelve (12) inches above atmospherically drainable grade.
3. An assembly installed more than five (5) feet above floor or ground level must have a permanent platform under it for the tester and/or the maintenance person to stand on. The platform must comply with all applicable safety standards and codes in effect and be covered by a properly executed building permit.
4. These valves do drip or spit from time to time. Adequate air gapped drain basket shall be installed and properly directed to a daylight drain or pumped drain capable of flows equal to the capacity of the service.
5. If anchoring to wall is necessary, there must be that at least six (6) inches of clearance between the wall and the assembly unless the testers or maintenance position is designated on that side, when a minimum 36" is required with clear access to and from the designated position.
6. All backflow assemblies shall be accessible for testing and maintenance.

Double Check Valve Assembly (DCVA) and Double Check Detector Assembly (DCDA)

1. Shall be installed in a horizontal configuration unless approved for alternate configuration by State of Washington Department of Health and the approval of the Cross Connection Control Department of the Lakewood Water District.
2. Isolation valves and test cocks shall be accessible for testing and maintenance.
3. On fire systems double check detector assemblies or reduced pressure detector assemblies are required. Please check with the cross connection control department before installing.

Spill Resistant Pressure Vacuum Breakers (SRPVB)

1. Installation shall be approved by the LWD Cross Connection Control Department
2. Shall be installed in the approved orientation only
3. Isolation valves and test cocks shall be accessible for testing and maintenance.

Atmospheric Vacuum Breaker (AVB)

1. AVB's are not an approved assembly for backflow prevention except in specific applications which must be reviewed and approved by the LWD Cross Connection Control Department prior to installation.

C. INSTALLATION REQUIREMENTS FOR BACKFLOW ASSEMBLIES

1. Landscape Irrigation systems using Double Check Valve Assemblies (DCVA) in-ground for irrigation systems or Spill-Resistant Vacuum Breaker Assembly (SRVBA)/ irrigation systems
 - a. Shall be installed in an approved configuration;
 - b. Adequate space is required for DCVA's installed in a box below ground. Adequate room for both testing and maintenance shall be provided;
 - c. The following are the recommended minimum sizes for a box for below-ground DCVA installation:
 - i. $\frac{3}{4}$ " to 1" Assemblies 10"x13"
 - ii. $1\frac{1}{4}$ " to 2" Assemblies 14"x20"
 - d. The DCVA shall be installed with the test cocks facing up or to the most available side;
 - e. DCVA's shall have six (6) inches of clearance below the valve. There shall be adequate drainage material below the valve (drain rock, gravel, pea gravel);
 - f. DCVA shall not be more than twelve (12) inches from the top of the box;
 - g. Three (3) inches of room shall be provided on the ends of the valve so that shut off ball valve can be accessed.
2. Pressure Vacuum Breaker Assemblies (PVBA)
 - a. A PVBA shall only be installed in a vertical configuration a minimum of twelve (12) inches above the highest downstream piping
3. Atmospheric Vacuum Breaker (AVB) – special approval required
 - a. An AVB shall be installed only in a vertical configuration, at least six (6) inches above all downstream piping (highest point of use);
 - b. No control valve shall be installed on the downstream side of an AVB. The AVB shall be pressurized for no more than twelve (12) hours in any twenty-four (24) hour period.



Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.

Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.

Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.

Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program.

See [Ecology Policy 2030](#) for information on how Ecology administers the Municipal Water Law.



If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See [Ecology Policy 1040](#) for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See [Ecology Policy 1040](#).

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as “supplemental.” Your water rights may use the old terminology. See [Ecology Policy 1040](#) for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the “quantity, type of use, period of use” section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It’s usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as “supplemental.” Your water rights may use the old terminology. See [Ecology Policy 1040](#) for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the “quantity, type of use, period of use” section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you’ll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in [ECY Policy 2030](#). For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

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 # <small>*If water right is interruptible, identify limitation in yellow section below</small>	WFI Source # <small>If a source has multiple water rights, list each water right on separate line</small>	Existing Water Rights <small>Qi= Instantaneous Flow Rate Allowed (GPM) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold</small>				Current Source Production – Most Recent Calendar Year <small>Qi = Max Instantaneous Flow Rate Withdrawn (GPM) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold</small>				10-Year Forecasted Source Production (determined from WSP) <small>Qi = Max Instantaneous Flow Rate Withdrawn (GPM) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold</small>				20-Year Forecasted Source Production (determined from WSP) <small>Qi = Max Instantaneous Flow Rate Withdrawn (GPM) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold</small>			
		Primary Qi <small>Maximum Rate Allowed</small>	Non-Additive Qi <small>Maximum Rate Allowed</small>	Primary Qa <small>Maximum Volume Allowed</small>	Non-Additive Qa <small>Maximum Volume Allowed</small>	Total Qi <small>Maximum Instantaneous Flow Rate Withdrawn</small>	Current Excess or (Deficiency) Qi	Total Qa <small>Maximum Annual Volume Withdrawn</small>	Current Excess or (Deficiency) Qa	Total Qi <small>Maximum Instantaneous Flow Rate in 10 Years</small>	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa <small>Maximum Annual Volume in 10 Years</small>	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi <small>Maximum Instantaneous Flow Rate in 20 Years</small>	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa <small>Maximum Annual Volume in 20 Years</small>	20-Year Forecasted Excess or (Deficiency) Qa
1. C-0148-D *	S03 (D-3), SO5(E-3)	400		520		1,620	2,080	533	879	2,620	1,080	575	837	3,520	180	1,122	290
2. C-0149-D *	S03 (D-3), SO5(E-3)	600		732													
3. C-1370-A*	(I-2)	1500			1193												
5. C-7320-A*	S09 (I-3)	1200		160													
5. C-0146-D**	S01 (A-3)	380		410		0	380	0	410	0	380	0	410	0	380	0	410
6. C-3751-A**	S01 (A-3)	750		1200		0	750	0	1,200	0	750	0	1,200	0	750	0	1,200
7. C-5573-A**	S01 (A-3)	1500			2400	1,065	435	824	N/A	930	570	887	N/A	930	570	1,193	N/A
8. 299-A*7	Abitibi	1187.5		1971		0	1,188	0	1,971	0	1,188	1,971	0	0	1,188	1,971	0
9. C-0717-A	S07 (G-1/G-2)	3000		3000		2,290	710	1,013	1,987	2,250	750	1,110	1,890	2,250	750	1,673	1,327
10. C-1289-A	S08 (H-1)	2000		32	2468	1,144	856	420	(388)	1,200	800	452	(420)	1,200	800	608	(576)
11. C-1305-A***	S11 (J-1), S41 (J-3)	1500		2000		1,114	1,886	600	1,400	2,160	840	936	1,064	2,160	840	1,258	742
12. C-4184-A***	S12 (J-2), S41 (J-3)	1500			2400												
13. 4585-A*7	Abitibi	2945		4750		0	2,945	0	4,750	0	2,945	4,750	0	0	2,945	4,750	0
14. C-5541-A	S13, S34, S35 (K-1/K-2)	2600			4160	1,797	803	833	N/A	2,000	600	945	N/A	2,000	600	1,271	N/A
15. C-0601-A	S02 (D-2)	2000		706		966	1,034	488	218	980	1,020	391	315	1,300	700	453	253
16. C-3831-A	S08 (H-2)	800		1080	200	919	(119)	255	825	800	0	275	805	800	0	370	710
17. L-3830-A****	S14, S36 (L-1)	900		1520		679	1,721	499	1,021	750	1,650	537	983	750	1,650	723	797
18. C-4183-A****	S14, S37 (L-2)	1500			2400												
19. C-4447-A*5	S15 (N-1), S16 (N-2)	3000			4800	0	3,000	0	N/A	0	3,000	0	N/A	0	3,000	0	N/A
20. C-4485-A	S04 (E-2)	1200		1920		717	483	398	N/A	925	275	429	N/A	925	275	576	N/A
21. C-5194-A	S26 (O-1)	800		1280		0	800	0	N/A	0	800	0	N/A	0	800	0	N/A
22. C-5574-A	S06 (F-2)	1000		1600		1,048	(48)	467	N/A	1,000	0	503	N/A	1,000	0	677	N/A
23. C-5540-A	S17 (O-2)	1100		1760		683	417	172	N/A	740	360	186	N/A	740	360	250	N/A
24. C-7319-A	S14 (L-3)	900		720		0	900	0	720	400	500	0	720	400	500	0	720
25. G2-21391C	S19 (Q-1)	2500		870	1130	617	1,883	482	388	1,200	1,300	519	351	1,200	1,300	698	172
26. G2-23869C*6	S10 (I-4)	1500		1200		0	1,500	0	N/A	0	1,500	0	N/A	0	1,500	0	N/A
27. G2-26246C	S25 (O-3)	1000		490	310	1,003	(3)	288	202	970	30	310	180	970	30	417	73
28. G2-26833C	S21 (R-1)	1500		812	388	1,547	(47)	1,095	(283)	1,400	100	698	114	1,400	100	761	51
29. C-6840-C	S18, S39, S40 (P-1/P-2)	3000			2400	1,451	1,549	601	N/A	2,390	610	949	N/A	2,390	610	1,276	N/A
30. G2-27158C	S22 (S-1), S23 (S-2)	1850			1480	980	870	773	N/A	1,250	600	833	N/A	1,850	0	939	N/A
31. G2-27280-C*6	S24 (Q-3)	350			280	0	350	0	N/A	0	350	0	N/A	0	350	0	N/A
32. G2-28431A	S27 (U-1)	880			710	790	90	418	N/A	820	60	409	N/A	820	60	453	N/A
33. G2-00890C	S15 (N-1) & Steilacoom 4	1500		672		985	515	1,018	(346)	1,050	450	1,097	(425)	1,050	450	1,475	(803)
Subtotal Retail		42,710		14,252	34,479	20,429	22,281	10,159	4,093	24,785	17,925	10,946	3,306	26,605	16,105	14,718	(466)

Subtotal Abitibi		4,133		6,721		0	4,133	0	6,721	0	4,133	6,721	0	0	4,133	6,721	0
Subtotal Steilacoom		1,500		672		985	515	1,018	(346)	1,050	450	1,097	(425)	1,050	450	1,475	(803)
TOTALS =		48,343		21,645		21,415	26,928	11,178	10,467	25,835	22,508	18,764	2,881	27,655	20,688	22,914	(1,269)

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
G2-30571	New	04/01/2011	2,200		3,550	

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	Maximum Qa		Maximum Qi	Current Excess or (Deficiency) Qi	Maximum Qa	Current Excess or (Deficiency) Qa	Maximum Qi	Future Excess or (Deficiency) Qi	Maximum Qa	Future Excess or (Deficiency) Qa	Maximum Qi	Future Excess or (Deficiency) Qi	Maximum Qa	Future Excess or (Deficiency) Qa
	Instantaneous Flow Rate	Annual Volume		Instantaneous Flow Rate		Annual Volume		10-Year Forecast		10-Year Forecast		20-Year Forecast		20-Year Forecast	
1															
2															
3															
TOTALS =															

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:

POU

STATE OF WASHINGTON
 DEPARTMENT OF ECOLOGY
 APPLICATION FOR CHANGE
REPORT OF EXAMINATION
 TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology)
- Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology)

PRIORITY DATE April 1, 1943	APPLICATION NUMBER 136	PERMIT NUMBER N/A	CERTIFICATE NUMBER 146D
NAME Lakewood Water District			
ADDRESS (STREET) 11900 Gravelly Lake Drive SW	CITY Tacoma	STATE Washington	ZIP CODE 98499-0729

PUBLIC WATERS TO BE APPROPRIATED

SOURCE Well A-1		
TRIBUTARY OF (IF SURFACE WATERS)		
MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 380	MAXIMUM ACRE FEET PER YEAR 410
QUANTITY, TYPE OF USE, PERIOD OF USE 410 Acre-feet per year	Municipal supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
 100 feet North and 850 feet West of the Southeast corner of Section 16.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) SE 1/4 SW 1/4	SECTION 16	TOWNSHIP N. 19	RANGE, (E. OR W.) W.M. 2E	W.R.I.A. 12	COUNTY Pierce
--	---------------	-------------------	------------------------------	----------------	------------------

RECORDED PLATTED PROPERTY

LOT 1	BLOCK 30	OF (GIVE NAME OF PLAT OR ADDITION) Plat of American Lake
----------	-------------	---

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lakewood Water District and through interties to other municipal water systems within central Pierce County. The place of use of this water right is the service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS

Well A-1

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	WATER PUT TO FULL USE BY THIS DATE
Started	Completed	In-use

REPORT

BACKGROUND:

On September 26, 1997, Randy Black on behalf of the Lakewood Water District filed 28 *Applications for Change of Water Rights* to change the place of use of the company's water right certificates. The intent of this request was to reflect the development of interties for the wholesale delivery of water to neighboring water purveyors.

Public notice of the proposed changes was published in the Lakewood Journal on November 27 and December 4, 1997. No protests were received as a result of the public notice.

Since the filing of these *Applications for Change*, revisions have been made to Washington State water law that changes how place of use and service areas are viewed by the Departments of Ecology and Health.

Chapter 90.03 RCW was revised by Second Engrossed Second Substitute House Bill (2E2SHB) 1338 which became effective on September 9, 2003. Changes to the water code mean that for public water systems that are in compliance with the terms of a water system plan that has been approved by the Washington State Department of Health (DOH), the place of use of the municipal supply water right includes the place of use on the water right and the service area approved by DOH. (The statute defines municipal water supply as the beneficial use of water for fifteen or more residential connections, which is consistent with DOH's definition of Group A Water Systems.) This is done as a matter of law and thus, a water right change application is not necessary.

Consequently, requests such as Lakewood Water's, to expand or modify a water systems service area to reflect interties and other wholesale water agreements, can be addressed through the water system planning process or a small water system management program, rather than by filing an *Application for Change of Water Right* through the Department of Ecology's Water Resources Program.

It is our finding that it is no longer necessary for a Group A municipal water system to file an Application for Change for the sole purpose of modifying its place of use. Accordingly, I recommend the issuance of superseding water right documents that describe the purpose of use as "municipal supply", and describe the place of use as:

Area served by the Lakewood Water District and through interties to other municipal water systems within central Pierce County. The place of use of this water right is the service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

INVESTIGATION:

The Lakewood Water District is among the largest water purveyors in central Pierce County, serving a population of 71,000 people and over 16,000 service connections. The District's service area is within the Chambers-Clover Creek basin, Water Resource Inventory Area 12.

The intent of these *Applications for Change* was to allow for the wholesale distribution of water through interties between neighboring water purveyors, specifically, the Water Cooperative of Pierce County.

The Water Cooperative of Pierce County is organized under Chapter 24.06 RCW State of Washington. Current members include the Lakewood Water District, Fruitland Mutual Water, Spanaway Water Company, Summit Water and Supply Company, Mount View Edgewood, Parkland Light and Water, Valley Water District, City of Puyallup, and Rainier View Water. Future members may include Graham Hill Mutual Water, Firgrove Mutual, Town of Steilacoom, and other public water supply entities identified in the Pierce County Coordinated Water Supply Plan. In general, the service areas of these water systems fall within Townships 19 and 20 North and Ranges 2, 3, and 4 E. W.M.

Interties are interconnections between public water systems that allow for the exchange or delivery of water, when the exchange is within the instantaneous and annual withdrawal rate specified by a system's existing water rights, and results in better management of public water supplies consistent with existing rights and obligations.

Under the provisions of 90.03.383 interties may be permitted when the intertie;

- Improves overall system reliability,
- Enhances the manageability of the systems,
- Provides opportunities for conjunctive use,
- Delays or avoids the need to develop new water sources.

Report-Continued

Withdrawals from the Lakewood Water System are authorized by the following water rights:

WR #	Well(s)	GPM	Ac-ft	
			Primary	Supplemental
148-D	A-1	380	410	0
148-D	D-3	400	520	0
149-D	D-3	600	732	0
601-A	D-2	2000	706	0
717-A	G-1,G-2	3000	3000	0
1305-A	J-1	1500	2000	0
1289-A	H-1	2000	32	2468
1370-A	I-2	1500	0	1193
3830-A	L-1	900	1520	0
3751-A	A-2	750	1200	0
3831-A	H-2	800	1080	200
4183-A	L-2	1500	0	2400
4184-A	J-2	1500	0	2400
4447-A	N-1,N-2	3000	0	4800
4485-A	E-2	1200	0	1920
5194-A	O-1	800	0	1280
5573-A	A-3	1500	0	2400
5574-A	F-2	1000	0	1600
5540-A	O-2	1100	0	1760
5541-A	K-1,K-2	2600	0	4160
6840-A	P-1,P-2	3000	0	2400
7319-A	I-3	900	720	0
7320-A	I-3	1200	160	0
G2-21391	Q-1	2500	870	1130
G2-23869	I-4	1500	0	1200
G2-26246	O-3	1000	490	310
G2-26833	R-1	1500	812	388
G2-27158	S-1,S-2	1850	0	1480
G2-27280	Q-3	350	0	280
G2-28431	U-1	880	0	710
Total		42,710	14,252	34,479

* The intent of the "supplemental" or "Alternate" designation is to provide the purveyor with flexibility in deciding which wells to operate, within the total primary allocation. The annual quantity of these Supplemental/Alternate rights are not additive and it is the responsibility of the purveyor to operate the wells so that the total annual primary allocation is not exceeded.

The total annual quantity of water allocated to the Lakewood Water District under existing permits and certificates is 14,252 acre-feet per year. Supplemental annual quantities in excess of that figure have been approved for augmentation of the water system supply.

FINDINGS AND CONCLUSIONS:

- Changes to the water code (Chapter 90.03 RCW) made pursuant to 2022SB 1338, mean that for public water systems that are in compliance with the terms of a water system plan that has been approved by DOH, the place of use of the municipal supply water right includes the place of use on the water right and the service area approved by DOH. While this is done as a matter of law and thus, a water right change application is not necessary, the Lakewood Water District has requested that superseding documents be issued.
- These certificates represent valid water rights in good-standing, and as such are eligible to be changed as requested.
- The original findings drafted for these certificates found that water was available for appropriation, the modifications reflected by the issuance of superseding documents does not change our original determination.
- Water will continue to be used for a beneficial purpose, the supply of public water to a municipal population.

In accordance with RCW Chapter 90.03 and 90.44, I find that these changes are for a beneficial use and will not impair existing rights or be detrimental to the public welfare.

RECOMMENDATIONS:

Superseding certificates should be issued for the following ground water certificates:

146-D, 148-D, 149-D, 601-A, 717-A, 1289-A, 1305-A, 1370-A, 3751-A, 3830-A, 3831-A, 4183-A, 4184-A, 4447-A, 4485-A, 5194-A, 5540-A, 5541-A, 5573-A, 5574-A, 6840-A, 7319-A, 7320-A, G2-21391, G2-23869, G2-26246, G2-26833, and G2-27158.

The purpose of use will be designated as Municipal Supply, and the proposed service area will be:

Area served by the Lakewood Water District and through interties to other municipal water systems within central Pierce County. The place of use of this water right is the service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

The Superseding Certificates are subject to the following provisions:

PROVISIONS:

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

Water use data shall be recorded daily. The maximum monthly rate of diversion/withdrawal and the monthly total volume shall be submitted to Ecology by January 31st of each calendar year. Ecology is requiring submittal of daily meter readings to collect seasonal information for water resource planning, management and compliance.

Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements".

The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, WRIA, Permit/Certificate/Claim No., source name, annual quantity used including units, maximum rate of diversion including units, monthly meter readings including units, peak monthly flow including units, Department of Health WFI water system number and source number(s), well tag number and period of use. In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the waters of the state in the best public interest. Use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

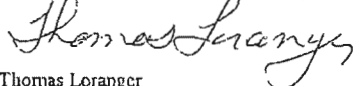
REPORTED BY: Jim E. Walsh Date: May 4, 2004

FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the requested Application for Change have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a superseding certificate be issued under Water Right Number 146D, subject to existing rights and indicated provisions, to allow appropriation of public water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 4th day of May, 2004.



Thomas Loranger
Water Resources Section Manager
Southwest Regional Office

CERTIFICATE RECORD No. 1 PAGE No. 146-D UNDER DECLARATION OF CLAIM No. 136

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That LAKWOOD WATER DISTRICT
of TACOMA, Washington has filed
in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No. 136
to withdraw ground waters of the State from a PUMP WELL,
located within Lot 1, Block 30 of Plat of American Lake, in the town of
Tillicum. (Sec. 16, Twp. 19 N., Rge. 2 E.W.M.)

for the purpose of Municipal supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 1 of Ground Water Certificates at page 146-D; the right approved has a priority of April, 1943; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed 380 gallons per minute; 410 acre-feet per year; and is appurtenant to the following described lands or place of use:

Lakewood Water District, County of Pierce, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 26th day of July, 1948.

By: RODNEY RYKER
State Supervisor of Hydraulics.
Charles J. Hutchins

C. + G.

7.6

"A"

1419550

Declaration of Claim No. 136

CERTIFICATE OF GROUND WATER RIGHT

Recorded in the office of State Supervisor of Hydraulics, Olympia, Washington, in Book No. 1 of Ground Water

Right Certificates on page 346-D on the 26th day of July, 1946

RECORDED OF REQUEST STATE OF WASHINGTON, County of Pierce ss.

I certify that the within has been received and duly recorded by me in Volume of Book of Water Right Certificates, page

on the day of

F. W. Schwartz, Mgr. Lakewood Water Dist.

STATE PRINTING PLANT, OLYMPIA, WASHINGTON

Box 674

Jan 9

REPORT OF FINDINGS ON GROUND WATER Declaration #136

NAME Lakewood Water District
TYPE OF WORKS: Well Date of Examination July 3, 1945
Dimensions: 12" x 257' Progress of Works: Completed April 1945
LOCATION: Lot 1, Block 30 of Plat of American Lake, Tillicum
QUANTITY Claimed or
~~applied for~~ 380 g.p.m. 410 acre feet
per year
USE: Municipal supply
Irrigation-acreage: Present _____ Planned _____ Feasible _____
Municipal: Population _____ as of _____
Industrial: _____
Time Pump will Be Operated: Daily
Other Water Rights of Applicant: Ground Water Declarations 157, 158
and 159
Proximity to existing works, springs or streams: Well under Ground Water
Application #175 being drilled 150' away.
Estimated effect of withdrawal of water on existing water rights:

Water Bearing Zone: _____

RECOMMENDATIONS

Approved for 380 g.p.m. 410 acre feet
per year, subject to existing water rights.

The water requirements from this well are met by the pump running
at 380 g.p.m. for two-thirds of the time, or 410 acre-feet per year.
(See Declaration 136 for summary).

Signed this 19th of July, 1945

Fred B. Roberts
Fred B. Roberts
Ground Water Geologist
Division of Hydraulics

A2 NOV 8 1960

CERTIFICATE RECORD No. 8 PAGE No. 3751-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 268, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT of Tacoma, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well located within Lot 1, Block 30 of Plat of American Lake Sec. 16, Twp. 19 N., R. 2 E. W. M., for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 5206 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 8 at page 3751-A; that the right hereby confirmed dates from February 2, 1960; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 750 gallons per minute; 1200 acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources:

The total annual withdrawal under all rights is limited to 11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Area served by Lakewood Water District, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

26th day of October, 1960.

[Signature]

State Supervisor of Water Resources.

ENGINEERING DATA

O.K. sh

Filed for record Oct 31 1960 109 Request of Lakewood Water Dist JACK W. SCRNIFAG, Pierce Co. Auditor

COPY

CERTIFICATE RECORD No. 12 PAGE No. 5573-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT

of Tacoma, Washington, has made proof

to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well

located within Lot 1, Block 30, of Plat of American Lake, within Tillicum Townsite (SE 1/4 SE 1/4)

Sec. 16, Twp. 19 N., R. 2 E. W.M.,

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 7636 issued by the State

Supervisor of Water Resources and that said right to the use of said ground waters has been perfected

in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water

Resources of Washington and entered of record in Volume 12 at page 5573-A;

that the right hereby confirmed dates from October 29, 1965; that the quantity of ground

water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually

beneficially used for said purposes, and shall not exceed 1500 gallons per minute; 2400 acre-feet

per year, to supply the area served by Lakewood Water District.

Special provisions required by the Supervisor of Water Resources: Annual withdrawal shall be limited to 2400 acre-feet less any amount in excess of 4320 acre-feet withdrawn under existing rights.

A description of the lands to which such ground water right is appurtenant:

116

Area served by Lakewood Water District.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

16th day of November, 1966

[Signature] State Supervisor of Water Resources.

AUDITOR'S NOTE: Seal Omitted

(121)

Filed for record Nov 18 1966 12 36 pm. Request of Robinson Roberts + Associates JACK W. SOHNLAG, Pierce Co. Auditor

*Li-1
Abandoned. 1454*

CERTIFICATE RECORD No. 2 PAGE No. 601-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the
ground waters of a well
located within the NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec. 10, Twp. 19 N., Rge.
E. W. M.

for the purpose of municipal supply
under Ground Water Permit No. 567 issued by the State Supervisor of Hydraulics, and that said
right to the use of said ground waters has been perfected in accordance with the laws of Washington,
and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record
in Volume 2 at page 601-A; that the right hereby confirmed dates from
October 9, 1947; that the quantity of ground water under the right here-
by confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said
purposes, and shall not exceed 2000 gallons per minute; 706 acre-feet per year.
~~XXXXXXXXXXXXXXXXXXXX~~

A description of the lands to which such ground water right is appurtenant, and the place where
such water is put to beneficial use, is as follows:

Lakewood Water District, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 8th day
of May, 1951.

Chas. Brockhart
State Supervisor of Hydraulics

ENGINEERING DATA
D.K. *[Signature]*

Filed for record May 10, 1951 203
Record of Lakewood Water Dist.
JACK W. SCOTT, JR., Sec. Auditor

WJm
101

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT
of Tacoma, Washington has filed
in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No. 138
to withdraw ground waters of the State from a PUMP WELL,
located within the SE $\frac{1}{4}$ of SW $\frac{1}{4}$ of SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 10, Twp. 19 N., Rge. 2 E.W.M.

for the purpose of Municipal supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 1 of Ground Water Certificates at page 148-D; the right approved has a priority of the year 1925; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed 400 gallons per minute; 520 acre-feet per year; and is appurtenant to the following described lands or place of use:

Lakewood Water District, County of Pierce, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 26th day of July, 1946

By: Rodney Ryker
State Supervisor of Hydraulics

CERTIFICATE RECORD No. 1 PAGE No. 149-D UNDER DECLARATION OF CLAIM No. 159

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That LAKEMOOD WATER DISTRICT
of Tacoma, Washington has filed
in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No. 159
to withdraw ground waters of the State from a pump well
located within the SE $\frac{1}{4}$ of SW $\frac{1}{4}$ of SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 10, Twp. 19 N., Rge. 2 E., W.M.

for the purpose of Municipal supply

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is hereby entered of record in Volume 1 of Ground Water Certificates at page 149-D; the right approved has a priority of the year 1925; the amount of water which the Declarant is entitled to withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed 600 gallons per minute; 732 acre-feet per year; and is appurtenant to the following described lands or place of use:

- Lakewood Water District, County of Pierce, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 26th day of July, 1946.

By: Rodney Ryker
State Supervisor of Hydraulics.
Chas. J. ...

APR 24 1963

E. Wash
E-2

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT

of Tacoma, Washington, has made proof

to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of

the ground waters of a well

located within SW 1/4 NW 1/4,

Sec. 10, Twp. 19 N., R. 2 E. W. M.,

for the purpose of Municipal supply

under and subject to provisions contained in Ground Water Permit No. 6140 issued by the State

Supervisor of Water Resources and that said right to the use of said ground waters has been perfected

in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water

Resources of Washington and entered of record in Volume 9 at page 4485-A;

that the right hereby confirmed dates from November 5, 1962; that the quantity of ground

water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually

beneficially used for said purposes, and shall not exceed 1200 gallons per minute; 1920 acre-

feet per year for Municipal supply.

Special provisions required by the Supervisor of Water Resources: "This Certificate is issued for 1200 gallons per minute; 1920 acre-feet per year as a totally supplemental right.

The total annual withdrawal under all rights shall not exceed 11,200 acre-feet."

A description of the lands to which such ground water right is appurtenant:

Area served by Lakewood Water District, Pierce County, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

15th day of April, 1963.

Lakewood Water District
P.O. Box 3329
Tacoma 99, Washington

M. Walker
State Supervisor of Water Resources.

ENCL. DATA

O.K. *(Signature)*

2169328

CERTIFICATE RECORD No. 12 PAGE No. 5574-A

STATE OF WASHINGTON, COUNTY OF Pierce

F2

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 268, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT

of Tacoma, Washington, has made proof

to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of

the ground waters of a well

located within NE 1/4 SE 1/4

Sec. 2, Twp. 19 N., R. 2 E. W.M.

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 7637 issued by the State

Supervisor of Water Resources and that said right to the use of said ground waters has been perfected

in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water

Resources of Washington and entered of record in Volume 12 at page 5574-A;

that the right hereby confirmed dates from October 29, 1965; that the quantity of ground

water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually

beneficially used for said purposes, and shall not exceed 1000 gallons per minute; 1600 acre-feet

per year, to supply the area served by Lakewood Water District.

Special provisions required by the Supervisor of Water Resources: Annual withdrawal shall be limited to 1600 acre-feet less any amount in excess of 5120 acre-feet withdrawn under existing rights.

A description of the lands to which such ground water right is appurtenant:

Area served by Lskewood Water District.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

16th day of November, 19 66

[Signature] State Supervisor of Water Resources.

AUDITOR'S NOTE: Seal Omitted

Filed for record Nov. 18, 1966 12:31 pm. Request of Robinson Roberts + Associates JACK W. SCHRIAG, Fiscal Co. Auditor

[Handwritten mark]

CERTIFICATE RECORD No. 2 PAGE No. 717-A

STATE OF WASHINGTON, COUNTY OF Pierce

#1603237

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKESWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a well
located within the NW 1/4 of SE 1/4 of Sec. 1, Twp. 19 N., Rge. 2 E.W.M.

for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 1789 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 2 at page 717-A;
that the right hereby confirmed dates from June 15, 1950; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 3000 gallons per minute; 3000 acre-feet
per year.

A description of the lands to which such ground water right is appurtenant, and the place where
such water is put to beneficial use, is as follows:

Community of Lakewood, Pierce County, Washington.



The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 24th
day of August, 1951.

M. Walker, Acty. Asst.
State Supervisor of Water Resources

ENGINEERING DATA
RHR

Filed for record Aug. 27 1951 10 42
Registrar of Miss Schwab
JACK W. SOHNTAG, Co. Auditor

11
H-1

CERTIFICATE RECORD No. 3 PAGE No. 1289-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of ~~the~~ Well "H"
located within the NW 1/4 of NE 1/4 of Sec. 14, Twp. 19 N., Rge. 2 E., W. 4 N.

for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 1686 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 3 at page 1289-A;
that the right hereby confirmed dates from February 21, 1951; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 2000 gallons per minute, 2500 acre-feet
per year. ~~for irrigation purposes~~

A description of the lands to which such ground water right is appurtenant, and the place where
such water is put to beneficial use, is as follows:

Community of Lakewood, Pierce County, Washington.



The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 4th
day of December, 1952.

Chas. J. Grechard
State Supervisor of Water Resources

MW

Filed for record Aug. 5 1952
Request of Lakewood Water Dist.
JACK W. ...

CERTIFICATE RECORD No. 8 PAGE No. 3831-A

A2.

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a well (H-2)
located within NE1/4NW1/4
Sec. 14, Twp. 19 N., R. 2 E. W. M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 5151 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 8 at page 3831-A;
that the right hereby confirmed dates from February 2, 1960; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 800 gallons per minute; 1280
acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources:
The total annual withdrawal under all rights shall be limited to
11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Community of Lakewood, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this
23d day of January, 1961.

[Signature]
State Supervisor of Water Resources.

RECORDED DATA
sh.

Filed for record by AS 1961 9 35
Request of Lakewood Water Dist.
JACK W. SONNLAG, Pierce Co. Auditor

I

CERTIFICATE RECORD No. 3 PAGE No. 1370-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

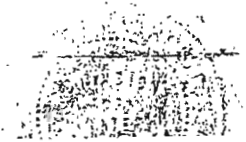
Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1943, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT of Tacoma, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of two wells (Hickins Road) located within the SW 1/4 of NW 1/4 of Sec. 34, Twp. 20 N., Rge. 2 E., W.M.

for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 2557 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 3 at page 1370-A; that the right hereby confirmed dates from December 7, 1951; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1500 gallons per minute, 1193 acre-foot per year.

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Lakewood Water District, Pierce County, Washington.



13

STATE OF WASHINGTON, COUNTY OF Pierce

CERTIFICATE OF GROUND WATER RIGHT

2401061

(Issued in accordance with the provisions of Chapter 203, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology thereunder.)

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT

of Tacoma, Washington, has made proof

to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of the State of Washington from a well

located within ~~SUB-SUB-ANNE~~

I-3 Sec. 34, Twp. 20 N., R. 2 E. W.M.,

for the purpose of municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 10313

issued by the Department of Ecology and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Ecology

and entered of record in Volume 15 at page 7320-A, that the priority of the right hereby confirmed

dates from July 28, 1970; that the quantity of ground water under the right hereby confirmed

for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes,

and shall not exceed 1200 gallons per minute, 160 acre-feet per year, during entire

year, for municipal supply.

A description of the lands to which such ground water right is appurtenant is as follows:

Area served by Lakewood Water District.

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water

Right

2692045

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IH

CERTIFICATE OF WATER RIGHT

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1943, and amendments thereto, and the rules and regulations of the Department of Ecology.)

CERTIFICATE NUMBER	PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G2-23869C	G2-23869P	G2-23869	June 24, 1975

NAME LAKEWOOD WATER DISTRICT			
ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
11900 Gravelly Lake Dr SW	Tacoma	Washington	98499

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE well
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1500	1200
QUANTITY, TYPE OF USE, PERIOD OF USE		
1200 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
2000 feet south and 120 feet east of the northwest corner of Sec. 34

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, 1E. OR W.1 W.M.	W.R.I.A.	COUNTY
SW 1/4	34	20	2 E	12	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by Lakewood Water District.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this 24th day of September, 1976.

JOHN A. BIGGS, Director
Department of Ecology

ENGINEERING DATA
OK

by *E. W. Asselstine*

E. W. Asselstine, Regional Manager

FOR COUNTY USE ONLY

2692045
Cert. of Water Right

RECORDED
16 SEP 29 PM 12.48

DEPT OF ECOLOGY
OLYMPIA, WA

Lakewood Water Dist.
11900 Phareilly Lake Dr.
S.W.
Tac. WA 98499
3-

J

S. F. No. 7361-3-51-JM. 2762

CERTIFICATE RECORD No. 3 PAGE No. 1305-A

STATE OF WASHINGTON, COUNTY OF Pierce #1641127

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT of Tacoma, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well located within the J. R. Meaker D.L.O., Sec. 31, Twp. 20 N., Rge. 3 E.W.M.

for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 1614 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 3 at page 1305-A; that the right hereby confirmed dates from December 6, 1950; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1500 gallons per minute, 2000 acre-feet per year.

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Community of Lakewood and environs, Pierce County, Washington.



The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 12th day of December, 1952.

Signature of State Supervisor of Water Resources

RECORDING OFFICE

Filed for record Dec 15 1952 1040 Lakewood Water Dist

52

CERTIFICATE RECORD No. 9 PAGE No. 4184-A

STATE OF WASHINGTON, COUNTY OF Pierce

400
#1962262

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 268, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a well (J-2)
located within J.R. Meeker D.I.C.
Sec. 31, Twp. 20 N., R. 3 E. W. M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 5779 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 9 at page 4184-A;
that the right hereby confirmed dates from November 17, 1961; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 1500 gallons per minute; 2400
acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources:
The total annual withdrawal under all rights shall be limited to
11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Area served by Lakewood Water District, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this
18th day of April, 1962.

Robert H. Russell
State Supervisor of Water Resources.

ENGINEERING DATA

O.K. SL

Filed for rec: Apr 29 1962 10 50
Regist. of Lakewood Water Dist.
JACK W. SMITH, Pierce Co. Auditor

K1 K13

CERTIFICATE RECORD No. 12 PAGE No. 5541-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

#216652

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1946, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEMOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of two wells
located within Block 25 of Lake Stellacoom Park
Sec. 2, Twp. 19 N., R. 2 E. W. M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permitt No. 7639 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 12 at page 5541-A;
that the right hereby confirmed dates from July 6, 1966; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 2600 gallons per minute; 4160 acre-feet
per year, to supply the Community of Lakewood.

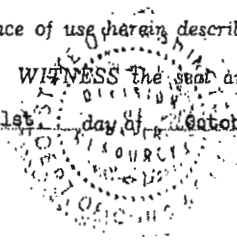
Special provisions required by the Supervisor of Water Resources: Issued as a supplemental
supply, the annual withdrawal shall be limited to 4160 acre-feet less any amount in
excess of 2560 acre-feet withdrawn under existing rights.

A description of the lands to which such ground water right is appurtenant: K-1 and K-2

Community of Lakewood.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use therein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this
21st day of October, 19 66



[Signature]
State Supervisor of Water Resources.

Filed for record Oct 25 1966 12 51
Request of Lakewood Water Dist.
JACK W. SONHAG, Pierce Co. Auditor

(21)

CERTIFICATE RECORD No. 8 PAGE No. 3830-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a wall (L-1)
located within Reserve Block of Madrona Heights Subdivision
Sec. 4, Twp. 19 N., R. 2 E. W. M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 5150 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 8 at page 3830-A;
that the right hereby confirmed dates from February 2, 1960; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 950 gallons per minute; 1520
acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources: _____
The total annual withdrawal under all rights shall be limited to
11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Community of Lakewood, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 23d day of JANUARY, 1961.


State Supervisor of Water Resources.

ENGINEERING DATA

O.K. sh

Filed for record Jan 25, 1961 7:36 a.m.
Request of Lakewood Water Dist.
JACK W. SCHNIAG, Pierce Co. Auditor

APR 27 1962

CERTIFICATE RECORD No. 9 PAGE No. 4183-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a well (L-2)
located within Reserve Block of Madrona Heights Subdivision
Sec. 4, Twp. 19 N., R. 2 E., W. M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 5778 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 9 at page 4183-A;
that the right hereby confirmed dates from November 17, 1961; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 1500 gallons per minute; 2400
acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources:

The total annual withdrawal under all rights shall be limited to
11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Area served by Lakewood Water District, Pierce County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or
place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

18th day of April, 1962.

Robert H. Russell
State Supervisor of Water Resources.

ENGINEERING DATA

O.K. sh

Filed for record Apr 20 1962 10 50 am
Request of Lakewood Water Dist.

L-3 well

STATE OF WASHINGTON, COUNTY OF PIERCE

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology thereunder.)

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT

of Tacoma, Washington, has made proof

to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of

the State of Washington from a well

located within WSW 1/4 S14 NE 1/4

L-3 Sec. 4, Twp. 19 N., R. 2 E. W.M.,

for the purpose(s) of municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 10312

issued by the Department of Ecology and that said right to the use of said ground waters has been per-

fected in accordance with the laws of Washington, and is hereby confirmed by the Department of Ecology

and entered of record in Volume 15 at page 7319-A; that the priority of the right hereby confirmed

dates from July 28, 1970; that the quantity of ground water under the right hereby con-

firmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes,

and shall not exceed 900 gallons per minute, 720 acre-feet per year, during entire

year, for municipal supply.

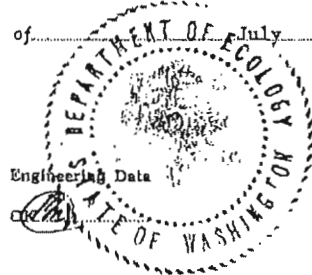
A description of the lands to which such ground water right is appurtenant is as follows:

Area served by Lakewood Water District.

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.155.

Given under my hand and seal of this office at Olympia, Washington, this 7th day of July, 1971



JOHN A. BIGGS, Director
Department of Ecology

by Glen H. Fiedler

Filed for record JUL 14 1971
Request of Richard A. Greco, Pierce County Auditor

N1-21

CERTIFICATE RECORD No. 9 PAGE No. 4447-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1946, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

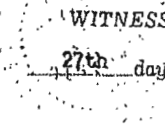
THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT of Tacoma, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a two (2) wells (N and N-2) located within Pinous P.C. (Gov't. Lot 9), sec. Sec. 32, Twp. 20 N., R. 2 E. W. M. for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 6011 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 9 at page 4447-A; that the right hereby confirmed dates from May 2, 1962; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 3000 gallons per minute; 4800 acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources: The total annual withdrawal under all rights shall be limited to 11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Area served by Lakewood Water District.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.



WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 27th day of February, 1963.

[Signature] State Supervisor of Water Resources.

Lakewood Water District P.O. Box 3329 Tacoma, Washington

Filed for record Feb 26 1963 12:46 pm Lakewood Water Dist

CERTIFICATE RECORD No. 11 PAGE No. 5194-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1948, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That Lakewood Water District of Tacoma, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well located within NW1SW1 Sec. 27, Twp. 20 N., R. 2 E. W.M., for the purpose of municipal supply under and subject to provisions contained in Ground Water Permit No. 6994 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 11 at page 5194-A; that the right hereby confirmed dates from December 1, 1964; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 800 gallons per minute, 1,280 acre-feet per year, to supply a population of 50,000 as of 1970.

Special provisions required by the Supervisor of Water Resources: Of the annual amount awarded, 11,200 acre-feet per year is issued under primary rights and 21,113 acre-feet per year under supplementary rights. This certificate issues for 800 gallons per minute, 1,280 acre-feet per year as a totally supplemental right. The total annual withdrawal under all rights shall not exceed 11,200 acre-feet.

A description of the lands to which such ground water right is appurtenant:

Community of Lakewood

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use hereint described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 13th day of August, 1965.

[Signature] State Supervisor of Water Resources.

Filed for record Aug 28 1965 12 M Request of Lakewood Water Dist. JACK W. SOHNYAG, Pierce Co. Auditor

02

CERTIFICATE RECORD No. 12 PAGE No. 5540-A

STATE OF WASHINGTON, COUNTY OF Pierce

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1946, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKWOOD WATER DISTRICT
of Tacoma, Washington, has made proof
to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of
the ground waters of a well
located within Government Lot 5
Sec. 28, Twp. 20 N., R. 2 E. W.M.,
for the purpose of municipal supply
under and subject to provisions contained in Ground Water Permit No. 7638 issued by the State
Supervisor of Water Resources and that said right to the use of said ground waters has been perfected
in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water
Resources of Washington and entered of record in Volume 12 at page 5540-A;
that the right hereby confirmed dates from July 5, 1966; that the quantity of ground
water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually
beneficially used for said purposes, and shall not exceed 1100 gallons per minute; 1760 acre-feet
per year, to supply the Community of Lakewood.

Special provisions required by the Supervisor of Water Resources: Issued as a supplemental
supply, the annual withdrawal shall be limited to 1760 acre-feet less any amount in
excess of 4960 acre-feet withdrawn under existing rights.

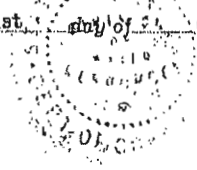
A description of the lands to which such ground water right is appurtenant:

Community of Lakewood.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1920.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this

21st day of October, 1966



[Signature]
State Supervisor of Water Resources.

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8405250266

VOL 197 PAGE 1809

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

JUN 1 2 1991

CERTIFICATE OF WATER RIGHT

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE October 29, 1982	APPLICATION NUMBER G 2-26246	PERMIT NUMBER G 2-26246 P	CERTIFICATE NUMBER G 2-26246 C
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NAME
LAKWOOD WATER DISTRICT

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)
11900 Gravelly Lake Drive Tacoma Washington 98499

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
well #0-3

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
490 acre-feet per year	municipal supply	continuously (primary)
310 acre-feet per year	municipal supply	continuously (supplemental)

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
1000 feet west and 100 feet north of the South Quarter corner of Section 28.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE 1/4 SW 1/4	28	20	2 E	12	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by Lakewood Water District.

RECORDED
84 MAY 25 12:15
RICHARD A. BRECKENRIDGE
PIERCE COUNTY WASH
DEPUTY

PROVISIONS

"The total annual withdrawal under all rights shall not exceed 13,440 acre-feet."

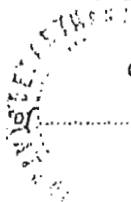
The access port shall be maintained at all times on the well (s).

An approved measuring device shall be maintained in accordance with RCW 90.03.360, WAC 508.64.020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells.)

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.



Given under my hand and the seal of this office at Olympia Washington, this.....17th day of May....., 19 84.....

DONALD W. MOOS, Director
Department of Ecology

ENGINEERING DATA

OK *[Signature]*

by *[Signature]*
Norman L. Glenn, Regional Manager

FOR COUNTY USE ONLY

1 P1 112

STATE OF WASHINGTON, COUNTY OF Pierce

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 863, Laws of Washington for 1946, and amendments thereto, and the rules and regulations of the Department of Water Resources thereunder.)

THIS IS TO CERTIFY That LAKEWOOD WATER DISTRICT of Tacoma, Washington, has made proof to the satisfaction of the Department of Water Resources of a right to the use of the public ground waters of the State of Washington from two wells located within Government Lot 6 Sec. 36, Twp. 20 N., R. 2 E., W.M., for the purpose(s) of municipal supply under and specifically subject to provisions contained in Ground Water Permit No. 2405 issued by the Department of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources and entered of record in Volume 14 at page 6840-A; that the priority of the right hereby confirmed dates from January 31, 1969; that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed 3000 gallons per minute, 2400 acre-feet per year during entire year, for municipal supply.

A description of the lands to which such ground water right is appurtenant is as follows: Area served by Lakewood Water District.

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of waters provided in RCW 90.14.180.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources, affixed this 8th day of May, 1970.

Engineering Data OK (Signature)

(Signature) Assistant Director Division of Water Management Department of Water Resources

Filed for record May 11 1970 11:54 AM Request of [Signature]

2684211
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

- Surface Water** (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water** (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

CERTIFICATE NUMBER	PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G2-21391C	G2-21391P	G2-21391	August 10, 1973

NAME LAKEWOOD WATER DISTRICT			
ADDRESS (STREET) PO Box 3329	(CITY) Tacoma	(STATE) Washington	(ZIP CODE) 98499

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE well		
TRIBUTARY OF (IF SURFACE WATERS)		
MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1500	2000
QUANTITY, TYPE OF USE, PERIOD OF USE		
2,000 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
712 feet west and 120 feet north from the southeast corner of Sec. 4

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.T.A.	COUNTY
SE 1/4	4	19	2 E	12	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Area served by Lakewood Water District.

PROVISIONS

The access port as required on your permit, shall be maintained at all times.

A suitable measuring device shall be installed and maintained in accordance with WAC 508-64-02 through WAC 508-64-040.

In no instance shall the total annual amount withdrawn under all existing rights exceed 12,950 acre-feet per year.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this13th..... day of August 19 76.....

JOHN A. BIGGS, Director
Department of Ecology

ENGINEERING DATA

OK *UW*

by *E. W. Asselstine*
E. W. Asselstine, Regional Manager

Auditor's Note:
~~Notary Seal omitted.~~

FOR COUNTY USE ONLY

4684211

Cert of Water Right

RECORDED

'76 AUG 19 PM 1:46

RICHARD S. BRIDGES JUNIOR
PERCE COUNTY WASH.
DEPUTY

[Signature]

*Lakewood Water Dist
Attn: C. D. Kempe, Manager
11900 Gravelly Lake Rd.
Tac. WA 98499 S.W.*

3

JUL 19 1989

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CERTIFICATE OF WATER RIGHT

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE February 16, 1988	APPLICATION NUMBER G 2-27280	PERMIT NUMBER G 2-27280 P	CERTIFICATE NUMBER G 2-27280 C
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NAME Lakewood Water District			
ADDRESS (STREET) 11900 Gravelly Lake Drive S.W.	(CITY) Tacoma	(STATE) Washington	(ZIP CODE) 98499

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE Well No. 0-3		
TRIBUTARY OF (IF SURFACE WATERS)		
MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 350	MAXIMUM ACRE-FEET PER YEAR 280
QUANTITY, TYPE OF USE, PERIOD OF USE 280 acre-feet per year municipal supply as needed (supplemental)		

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL 900 feet West and 200 feet North of Southeast corner of Section 4.
--

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) SE 1/4 SE 1/4	SECTION 4	TOWNSHIP N. 19	RANGE (E. OR W.) W.M. 2E	W.R.I.A. 12	COUNTY Pierce
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RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Service area of Lakewood Water District.

89 JUL -6 AM 9:17
 AUDITOR PUBLIC CO. WASH

The access port shall be maintained at all times on the well.

"The total annual withdrawal under all rights shall not exceed 14,252 acre-feet."

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia Washington, this ...30..... day

of 19 89



Christine O. Gregoire, Director
Department of Ecology

ENGINEERING

[Signature]

by *[Signature]*
Gary E. Hanson, Water Resources Supervisor

FOR COUNTY USE ONLY

AUG 13 1987

CERTIFICATE OF WATER RIGHT

RI

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
December 11, 1985	G 2-26833	G 2-26833 P	G 2-26833 C

NAME
Lakewood Water District

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)
11000 Cravelly Lake Dr, P.O. Box 99720 Tacoma Washington 9

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit Issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well #R-1

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1500	1200

QUANTITY, TYPE OF USE, PERIOD OF USE
812 acre-feet per year municipal supply as needed

primary
388 acre-feet per year
supplemental

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
2600 feet East and 150 feet South of North West Corner Section 11.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE1/4	11	19	2E	12	Pierce

RECORDED PLATTED PROPERTY
LOT BLOCK OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by Lakewood Water District

87 JUL 29 P 2: 47

87 JUL 29 P 2: 47

At such time that the Department of Ecology determines the regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and WAC 508-64-020 through WAC 508-64-040.

The access port shall be maintained at all times on the well (s).

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this 14th day of July, 1987.

Andrea Beatty Riniker, Director
Department of Ecology

Clark Haberman
by Clark Haberman, Regional Manager

ENGINEERING DATA
OK *WB*

FOR COUNTY USE ONLY

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VOL. 0528 PAGE 2996

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

FEB 15 1989

CERTIFICATE OF WATER RIGHT

- Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1946, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE July 8, 1987	APPLICATION NUMBER G 2-27158	PERMIT NUMBER G 2-27158 P	CERTIFICATE NUMBER G 2-27158 C
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NAME Lakewood Water District			
ADDRESS (STREET) 11900 Gravelly Lake Drive S.W.	(CITY) Tacoma	(STATE) Washington	(ZIP CODE) 98499

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE Angle Lane Wells 1 and 3
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 1850	MAXIMUM ACRE-FEET PER YEAR 1480
-------------------------------	------------------------------------	------------------------------------

AMOUNT, TYPE OF USE, PERIOD OF USE .480 acre-feet per year	municipal supply	as needed
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LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL 400 feet West and 1600 feet South of Northeast corner Section 4.
--

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) NE 1/4 SE 1/4	SECTION 4	TOWNSHIP N. 19	RANGE, (E. OR W.) W.M. 2E	W.R.I.A. 12	COUNTY Pierce
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RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by Lakewood Water District.

89 FEB -6 AM 11:39
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 AUDITOR PIERCE CO. WASH

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PROVISIONS

At such time that the Department of Ecology determines the regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and WAC 508-64-020 through WAC 508-64-040.

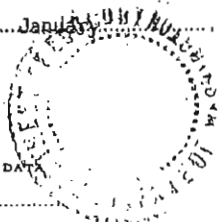
The access port shall be maintained at all times on the well (s).

"The total annual withdrawal shall not exceed 1480 acre-feet per year which shall be supplementary to existing rights."

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

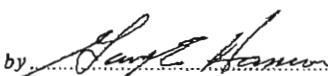
This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia Washington, this 31..... day of January 19 89.....



Christine O. Gregoire, Director
Department of Ecology

ENGINEERING DATA
OK

by 
Gary E. Hanson, Water Resources Supervisor

FOR COUNTY USE ONLY

8902060137

DEPARTMENT OF ECOLOGY

PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

Surface Water

(Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

Ground Water

(Issued in accordance with the provisions of Chapter 283, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRORITY DATE March 20, 1992	APPLICATION NUMBER G2-28431	PERMIT NUMBER G2-28431	CERTIFICATE NUMBER
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NAME
Lakewood Water District

ADDRESS (STREET) 11900 Gravelly Lake Drive SW	(CITY) Tacoma	(STATE) Washington	(ZIP CODE) 98498-1412
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The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well U-1

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 880	MAXIMUM ACRE-FEET PER YEAR 710(Supplemental)
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QUANTITY, TYPE OF USE, PERIOD OF USE

710* Acre-feet per year Municipal supply Year-round, as needed
*Supplemental to existing water rights

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

500 feet West and 800 feet North of the Southeast corner of Section 26.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) SE $\frac{1}{4}$ SE $\frac{1}{4}$	SECTION 26	TOWNSHIP N. 20	RANGE, (E. OR W.) W.M. 2E	W.R.I.A. 12	COUNTY Pierce
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RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lakewood Water District and through interties to other municipal water supply systems within central Pierce County which include present and/or future members of the water cooperative of Pierce County, organized under Chapter 24.06 RCW State of Washington, within Townships 19N and 20N and Ranges 2E, 3E and 4E.W.M.

DESCRIPTION OF PROPOSED WORK

Production Well U-1 completed at 302 feet.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: Completed	WATER PUT TO FULL USE BY THIS DATE: September 1, 2001
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PROVISIONS

"Withdrawals from Well U-1 shall be managed by the permittee so as to avoid an ongoing, progressive decline of water levels from year to year."

"Prior to issuance of a final water right certificate, data shall be submitted covering production from the subject well including pumpage and water levels, as described below:

- An approved metering device shall be installed and maintained in accordance with RCW 90.03.360, 90.44.450 and WAC 508-64-020 through -040 (installation, operation, and maintenance requirements are attached). Meter readings shall be recorded at least monthly.
- Installation and maintenance of an access port as described in WAC 173-160-355 is required. An air line and gauge may be installed in addition to the access port. Water levels shall be measured and recorded using a consistent methodology, in accordance with accepted industry standards. Such measurements shall be made at least monthly. The length of the pumping period or recovery period prior to each measurement shall be constant, and shall be included in the record.
- A summary of the previous year's monthly water level data and monthly totals of water pumped from this well shall be submitted to Ecology's Water Resources Program, Southwest Regional Office, annually during the month of February, or more frequently if requested by Ecology."

Issuance of this water right is subject to the implementation of the minimum requirements established in the Conservation Planning Requirements, Guideline and Requirements for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs, July 1994, and as revised.

Under RCW 90.03.005 and 90.54.020(6), conservation and improved water use efficiency must be emphasized in the management of the states water resources, and must be considered as a potential new source of water. Accordingly, as part of the terms of this water right, the applicant shall prepare and implement a water conservation plan approved by Department of Health. The standards for such a plan may be obtained from either the Department of Health or the Department of Ecology.

"Pursuant to RCW 90.03.330 and 90.44.080, a final certificate will be issued upon a showing satisfactory to the Department of Ecology that the appropriation has been perfected in compliance with the terms of the subject permit. The certificated withdrawal rate and annual quantity will reflect a sustainable yield and protection of senior rights, within the amounts specified on the permit. Monitoring and data submittal will be required under the certificate as well as the permit."

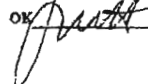
This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

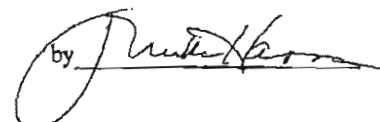
Given under my hand and the seal of this office at Olympia, Washington,

this 24th day of November, 19 97.

Department of Ecology

ENGINEERING DATA

OK 

by 



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
APPLICATION FOR CHANGE
SECOND AMENDED REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 262, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE October 16, 1958	APPLICATION NUMBER 5046	PERMIT NUMBER 4681	CERTIFICATE NUMBER 4585A
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NAME Lakewood Water District			
ADDRESS (STREET) 11900 Gravelly Lake Drive	(CITY) Lakewood	(STATE) Washington	(ZIP CODE) 98499-0729

PUBLIC WATERS TO BE APPROPRIATED

SOURCE 11 Wells (D-2, J-2, E-2, F-2, K-1, K-2, Q-1, S-2, R-1, N-1, Steilacoom Well 4)
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 2945	MAXIMUM ACRE FEET PER YEAR 4750
QUANTITY, TYPE OF USE, PERIOD OF USE 4750 Acre-feet per year	Municipal supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL See under the background section
--

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) Multiple locations see table	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.L.A. 12	COUNTY Pierce
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RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lakewood Water District and through interties to other municipal water systems within the Water Cooperative of Pierce County. The place of use of this water right is the wholesale and retail service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS

Multiple wells, see Table 2 of this Report of Examination. This system is identified by the Washington State Department of Health by Public Water System ID 45550.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: November 1, 2007	WATER PUT TO FULL USE BY THIS DATE: November 1, 2015
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REPORT

BACKGROUND INFORMATION:

Location of Diversion/Withdrawal

Proposed Point of Withdrawal	Water Right Number	Well Location	Parcel Number	TRS
D-2	601-A	2,600 ft north and 1,850 ft east from the SW corner of Section 10	472500-309-0	T19N/R2E - Sec. 10 NE SW
J-2	4184-A	2,460 ft south and 2,300 ft east from NW corner of Section 31	03-20-31-2-080	T20N/R3E - Sec. 31 SE NW
E-2	4485-A	2,600 ft south and 800 ft east from the NW corner of Section 10	02-19-10-2-014	T19N/R2E - Sec. 10 SW NW
F-2	5574-A	2,500 ft south and 120 ft west from the NE corner of Section 2	02-19-02-8-002	T19N/R2E - Sec. 2 SE NE
K-1/K-2	5541-A	1,500 ft north and 340 ft east from the SW corner of Section 2	R503000-292-0	T19N/R2E - Sec. 2 NW SW
Q-1	G2-21391C	120 ft north and 712 ft west from the SE corner of Section 4	414520-021-1	T19N/R2E - Sec. 4 SE SE
S-2	G2-27158C	1,600 ft south and 400 ft west from the NE corner of Section 4	590000-020-4	T19N/R2E - Sec. 4 SE NE
R-1	G2-26833C	150 ft south and 2,600 ft east from the NW corner of Section 11	309700-031-1	T19N/R2E - Sec. 11 NE NW
N-1	4447-A	2,350 ft south and 2,570 ft east from the NW corner of Section 32	220324046	T20N/R2E - Sec. 32 NW SE
Steilacoom Well 4	G2-00890C	1,200 ft south and 2,300 ft east from the NW corner of Section 32		T20N/R2E - Sec. 32 NE NW

On December 9, 2002, Randall Black on behalf of Lakewood Water District (District) filed two *Applications for Change of Water Rights* with the Department of Ecology. These applications were filed on Ground Water Certificates 299-A and 4585-A, to change the purpose of use, place of use and point of withdrawal on water right certificates originally issued to West Tacoma Newsprint from commercial industrial purposes associated with paper manufacturing to municipal supply.

These applications were co-signed by Ken Campbell on behalf of Abitibi Consolidated which is the successor in interest of the original facility. The requested change in the place of use is from the original area associated with the industrial plant (described on page 3 of this Report of Examination) to the regional water supply served by Lakewood Water District and its wholesale water customers, (area described in pages 1 and 2 of this Report of Examination).

The requested change in the points of withdrawal is from three wells (located near Chambers Bay in Steilacoom, WA) formerly operated by the Abitibi Consolidated Sale Corporation (Abitibi), to 11 wells operated by the District (located between 0.6 and 5.3 miles inland). This Report of Examination deals with GWC 4585-A. The District seeks to change a portion of GWC 4585-A (3,071 acre-feet/year) and all of GWC 299-A (3,650 acre-feet/year) to total 6,721 acre-feet/year. Because the two water rights are so closely linked for the purposes of this transfer, this Report of Examination will describe attributes of both water rights. GWC 299-A will be addressed under a separate Report of Examination.

The three Abitibi wells are completed in Aquifer G. This transfer seeks to move the point of withdrawal for approximately five of the six million gallons per day (MGD) from the certificated Abitibi Wells to nine District wells completed in Aquifer E and maintain one MGD of production from two District wells completed in Aquifer G. Currently, the water associated with GWC 4585-A and GWC 299-A is used onsite at the Abitibi facility, located near sea level. This water rights transfer would move the place of use inland several miles to the area served by the District and several other water purveyors.

Under RCW 90.44.100, the Department of Ecology is permitted to change an existing groundwater right after publication of a notice of the application and investigations as prescribed in the case of an original application. A public notice detailing this proposed change was published in the Tacoma News Tribune on February 4th and 9th, 2003. In response to the notice Tacoma Public Utilities (TPU) protested the Abitibi transfer in a letter to Ecology dated March 3, 2003. TPU indicated that they hold senior water rights in the Chambers/Clover Creek Basin and believes that these rights would be impaired and streamflows possibly reduced as a result of the Abitibi transfer. TPU also raised issues relating to public water system planning, and conservation planning. Additionally, Ecology received a comment letter from Pierce County Public Works. The County indicated that they supported the intent of these transfer requests, provided that the

District's activities would not impact the County's ability to develop their own groundwater source, located adjacent to Abitibi property on the County owned Chambers Creek Properties.

In evaluating a request to change a water right under RCW 90.44.100 and RCW 90.03.380, the Department of Ecology must find that the proposed change does not alter the original finding, i.e., that: (1) water is available for appropriation; (2) the appropriation/change is for a beneficial use; (3) the change will not impair existing water rights; and (4) the change will not be detrimental to the public interest.

The following tables contain information about the existing and proposed points of withdrawal:

Well Name	Associated Water Right	TRS ¼ ¼	Priority Date	Screened Interval (feet amsl)	Screened Aquifer	Qi (gpm)	Qa (A-F/yr)
Abitibi Well 3	229-A	T20N/R2E - Sec. 32 NW NE	1/4/49	-530 to -840 and -980 to -1070	G or deeper	2,250	3,650
Abitibi Well 4	4585-A	T20N/R2E - Sec. 29 SW SE	10/16/58	-790 to -840 and -1010 to -1060	G or deeper	3,900	6,240
Abitibi Well 5		T20N/R2E - Sec. 32 NW NE		-709 to -860	G or deeper		

The purpose of use for certificate 299-A is manufacturing and industrial and the purpose of use for Certificate 4585-A is industrial processing. The District proposes to transfer rights from the Abitibi Wells to existing District wells located on Figure 1 of this report. Depth and location information for the District Wells is listed in the following table (sorted by priority date).

Well Name	Associated Water Right	TRS ¼ ¼	Priority Date	Screened Interval (feet amsl)	Existing Rights		Proposed Changes	
					Primary Qi [Qa] gpm [A-F/yr]	Supplemental Qi [Qa] gpm [A-F/yr]	Proposed Additional Average Qi [Qa] gpm [A-F/yr]	Proposed Additional Qi (gpm)
Aquifer E Wells								
D-2	601-A	T19N/R2E - Sec. 10 NE SW	10/9/47	-199 to -227	2,000 [706]	0 [0]	170 [275]	510
J-2	4184-A	T20N/R3E - Sec. 31 SE NW	11/17/61	-266 to -295	0 [0]	1,500 [2,400]	337 [541]	1,010
E-2	4485-A	T19N/R2E - Sec. 10 SW NW	11/5/62	-191 to -214	0 [0]	1,200 [1,920]	170 [275]	510
F-2	5574-A	T19N/R2E - Sec. 2 SE NE	10/29/65	-225 to -280	0 [0]	1,000 [1,662]	690 [1,110]	2,070
K-1/K-2	5541-A	T19N/R2E - Sec. 2 NW SW	7/6/66	K-1 = -255 to -321 K-2 = -247 to -322	0 [0]	2,600 [4,160]	700 [1,130]	2,100
Q-1	G2-21391C	T19N/R2E - Sec. 4 SE SE	8/10/73	-220 to -286	1,500 [2,000]	0 [0]	700 [1,130]	2,100
S-2	G2-27158C [#]	T19N/R2E - Sec. 4 SE NE	7/8/87	-211 to -285	1,850 [1,480]	0 [0]		
R-1	G2-26833C	T19N/R2E - Sec. 11 NE NW	12/11/85	-244 to -302 (in various intervals)	1,500 [1,200]	1,500 [1,200]	700 [1,130]	2,100
Aquifer G Wells								
N-1	4447-A [#]	T20N/R2E - Sec. 32 NW SE	5/9/62	-717 to -834	0 [0]	3,000 [4,800]	700 [1,130]	2,100
Steilacoom Well 4	G2-00890C ^{#s}	T20N/R2E - Sec. 32 NE NW	12/7/70	-725 to -771	0 [0]	1,500 [672]		
Expected Average Pumping Rate (gpm):						4,167		
[Total Additional Proposed Qa (A-F/yr)]:						[6,721]		

Note: Proposed Maximum Qi represents the amount requested by the District to allow them operational flexibility in meeting peak demand.

= Denotes more than one well may be associated with this water right

S = Lakewood Well N-1 has been added as an additional point of withdrawal to this certificate

Attributes of the Original Certificate 4585-A

Name on Certificate:	West Tacoma Newsprint
Priority Date:	October 15, 1958
Instantaneous Quantity:	3,900 gallons per minute (gpm)
Annual Quantity:	6,240 acre-feet per year (acre-feet/year)
Point of Withdrawal:	SW 1/4, SE 1/4, Section 29, Township 20 North, Range 2 East W.M. (Well 4) NW 1/4, NE 1/4, Section 32, Township 20 North, Range 2 East W.M. (Well 5)
Purpose of Use:	Industrial Processing
Period of Use:	Continuously
Place of Use:	Beginning at the Northwest corner of a tract of land occupied by the Western

Washington Institute for the Insane, said point being also the Northeast corner of the Southern Pacific Land Company's Silver Beach Addition to Steilacoom, said point of beginning being in Section Thirty-two (32) Township Twenty (20) North, Range Two (2) East of the Willamette Meridian; thence easterly along the south line of Thomas M. Chambers' Donation Land Claim six hundred thirty-three (633) feet; thence northerly at right angles fifteen hundred seventy-four (1,574) feet; thence westerly on a line parallel with the south boundary line of said Donation Land Claim ten hundred fifteen (1,015) feet to intersect the southerly line of a proposed waterway, as shown upon a certain map made for Tacoma Company by L.A. Nicholson entitled: "Tacoma Land Company Map of Steilacoom Creek Waterway and platted tide lands, with depths of water"; thence south-westerly on a compound curve to the right along said line of waterway six hundred fifty (650) feet; more or less, to intersect a line at right angles to said south line of said Donation Land Claim nine hundred forty-three (943) feet west of the point of beginning; thence south at right angles to said south line of said Donation Land Claim twelve hundred sixty (1,260) feet, more or less, to intersect said south line of said claim; thence east along said south line of said claim to point of beginning, containing approximately fifty-four and forty-two one-hundredths (54.42) acres (excepting therefrom right-of-way of the Tacoma Railway & Power Company); also all tide or shorelands appurtenant to the above described real property.

Proposed Change

Name of Applicant:	Lakewood Water District
Date of Application for Change:	December 9, 2002
Instantaneous Quantity:	2,945 gallons per minute (gpm)
Annual Quantity:	4750 acre-feet per year (acre-feet/year)
Point of Withdrawal:	11 wells (see Table on page 3 of this Report of Examination)
Purpose of Use:	Municipal
Period of Use:	January to December
Place of Use:	Within a place of use consistent with the Updated Pierce County Coordinated Water

System Plan; including the area served by Lakewood Water District and through interties to members of the Water Cooperative of Pierce County and other purveyors in central and eastern Pierce County. Purveyors receiving water may include, but are not limited to, Curran Road Water, City of Fife, City of Fircrest, Firgrove Mutual, Fruitland Mutual, Lakewood Water District, Parkland Water, City of Puyallup, Rainier View Water, Town of Steilacoom and Summit Water. Water will be used in a manner and location consistent with the individual water system plans of these purveyors.

Attributes of the Original Certificate 299-A

Name on Certificate:	West Tacoma Newsprint
Priority Date:	January 4, 1949
Instantaneous Quantity:	2,250 gallons per minute (gpm)
Annual Quantity:	3,650 acre-feet per year (acre-feet/year)
Point of Withdrawal:	NW 1/4, NE 1/4, Section 32, Township 20 North, Range 2 East W.M. (Well 4)
Purpose of Use:	Commercial/Industrial
Period of Use:	Year-round, as needed
Place of Use:	Beginning at the Northwest corner of a tract of land occupied by the Western

Washington Institute for the Insane, said point being also the Northeast corner of the Southern Pacific Land Company's Silver Beach Addition to Steilacoom, said point of beginning being in Section Thirty-two (32) Township Twenty (20) North, Range Two (2) East of the Willamette Meridian; thence easterly along the south line of Thomas M. Chambers' Donation Land Claim six hundred thirty-three (633) feet; thence northerly at right angles fifteen hundred seventy-four (1,574) feet; thence westerly on a line parallel with the south boundary line of said Donation Land Claim ten hundred fifteen (1,015) feet to intersect the southerly line of a proposed waterway, as shown upon a certain map made for Tacoma Company by L.A. Nicholson entitled: "Tacoma Land Company Map of Steilacoom Creek Waterway and platted tide lands, with depths of water"; thence south-westerly on a compound curve to the right along said line of waterway six hundred fifty (650) feet; more or less, to intersect a line at right angles to said south line of said Donation Land Claim nine hundred forty-three (943) feet west of the point of beginning; thence south at right angles to said south line of said Donation Land Claim twelve hundred sixty (1,260) feet, more or less, to intersect said south line of said claim to point of beginning, containing approximately fifty-four and forty-two one-hundredths (54.42) acres (excepting therefrom right-of-way of the Tacoma Railway and Power Company); also all tide or shorelands to the above described real estate.

Purpose of the Change Application

Lakewood Water District plans to use existing and proposed interties to provide wholesale water supply to water systems located east of the District's retail water service area boundary within central Pierce County. These *Applications for Change* are intended to provide additional primary water rights for future growth within the District's retail service area and for wholesale delivery to water purveyors within Central Pierce County.

Lakewood Water District is among the largest water purveyors in central Pierce County, serving a population of 61,000 people and over 16,000 service connections. The District currently provides wholesale water supply to the Town of Steilacoom and Summit Water and Supply Company through water systems interties.

The intent of these *Applications for Change* was to allow for the wholesale distribution of water through interties between neighboring water purveyors, specifically, the Water Cooperative of Pierce County.

The Water Cooperative of Pierce County (Cooperative) is organized under Chapter 24.06 RCW State of Washington. Current members include Lakewood Water District, Fruitland Mutual Water, Spanaway Water Company, Summit Water and Supply Company, Mountain View Edgewood, Parkland Light and Water, Valley Water District, City of Puyallup, and Rainier View Water.

Several of these neighboring water systems are experiencing demands for new water connections that either exceed their current water right capacity or will do so in a matter of years.

The intent of this change is to make water available to the Cooperative members who have either identified a deficit in their future water needs, or may elect to purchase water instead of pursuing development of their own sources.

The 2001 Pierce County Coordinated Water System Plan includes estimates of future water demands for many of the areas largest municipal water purveyors. Based on the approximate calculations provided by the planning document and current water right allocations for Lakewood, Puyallup, Spanaway, Summit and Fruitland, there is a potential regional demand for an additional 10 million gallons per day.

The District's own future (20 year and beyond) water demand ranges between 11.24 MGD and 14.05 MGD (between 12,600 and 15,736 acre-feet/year).

Wholesale water distribution for the Central Puget Sound area remains somewhat fluid. Many water purveyors have the option of purchasing wholesale water directly from the Tacoma Public Utility system, but can also purchase wholesale water from the District or Pierce County. Lakewood Water District has the existing ability to provide wholesale water to neighboring water purveyors through interties, and the Abitibi water rights will enhance the District's water supply available for wholesale distribution to members of the Cooperative. The following table illustrates that there is a greater demand for drinking water among members of the Cooperative than the quantity of the Abitibi water rights:

Potential Wholesale Water User	Current Water Rights (acre-feet/year)	Base Case Water Demand (acre-feet/year)	High Case Water Demand (acre-feet/year)	Deficient (high case) (acre-feet/year)
City of Puyallup	11,478	7,302	12,913.6	1,435
Spanaway Water	3,002	4,670.4	8,209.6	5,207
Summit Water	3,091	2,928	3,416	325
Fruitland Mutual	2,337	2,228.8	3,998.4	1,661
Lakewood Water District	14,252	12,588.8	15,736	1,484
			Total:	10,112

With this water rights transfer, the District intends to provide for future planned growth for a 50-year demand projection, within the District's service area and the service areas of other purveyors within central and eastern Pierce County. With the Abitibi change applications (229-A and 4585-A), the District would like to add as much water as needed to total 4,167 gpm (6.0 MGD) and 6,721 acre-feet/year as municipal supply. The District seeks to change all of GWC 299-A and a portion of GWC 4585-A to total 6,721 acre-feet/year, or 6.0 million gallons per day (MGD) for future average daily demands. The District has identified the following wholesale customers and potential purchase quantities:

Customer	Potential Purchase From Lakewood (MGD)	WRIs Included in Service Area
Fruitland Mutual Water Company	0.25 to 1.0	10
City of Puyallup Public Works	0.5	10
Rainier View Water Company	1.0 to 2.0	11 and 12
Spanaway Water Company	0.5 to 2.0	12
Summit Water and Supply Company	0.5 to 2.0	10 and 12
Total:	Up to 4.0	

The District intends to offer four of the six MGD for sale and to retain two MGD for meeting demand growth within its service area. The WRIs are estimated to receive the following quantities of water as a result of this transfer:

- WRIA 10 – 1.5 MGD
- WRIA 11 – 0.5 MGD
- WRIA 12 – 4.0 MGD (includes two MGD retained for use by Lakewood Water District)

INVESTIGATION:

This application is being processed under the Department of Ecology (Ecology) Cost-Reimbursement Program, under agreement between Ecology and Golder Associates Inc. (Golder). Golder reviewed available documents pertaining to the District's application site conditions, historical water use, projected water demand and existing water right holders. This report has been prepared under the scope of work provided in CRS No. 9R09, and to address regulatory issues outlined in RCW 90.44.100 (Amendment to permit or certificate, replacement or new additional wells) and Chapter 173-512-30 WAC (surface water closures).

Site Description

The Lakewood area is part of a broad upland glacial drift plain, which is up to 450 feet in elevation in the area. The upland is bordered on the western margin by Puget Sound, which it sits above on a series of bluffs. The channels of Chambers and Clover Creeks are

incised into the drift plain in some locations and likely follow the former path of glacial meltwater streams. The surface elevations in WRIA 12 are highest in the southeast and decrease northwestward toward Puget Sound. This trend is reflected in the orientation of the hydrostratigraphic units underlying the region.

Hydrogeologic/Hydrologic Assessment

The following hydrogeologic information is excerpted from a memorandum to the Department of Ecology dated June 27, 2005 written by Jim Bailey, Licensed Hydrogeologist and Tim White, Licensed Geologist, Golder Associates, Inc. of Redmond, Washington.

A version of the WRATS database (current as of December 2003) was queried to determine existing water rights within the estimated radius of influence of the District Wells. Well logs on file at Ecology and included in the water rights files were also examined to determine the hydrogeologic conditions in the vicinity each well. Information on regional hydrogeologic data was obtained from the following resource material:

- AGI Technologies. 1998. Report of 1995 Ground Water Studies South Tacoma Aquifer System, Tacoma, Washington. Volumes I and II.
- Borden, R.K. and Troost, K.G. 2001. Late Pleistocene Stratigraphy in the South-Central Puget Lowland, Pierce County, Washington. Washington Division of Geology and Earth Resources Report of Investigations 33, Washington State Department of Natural Resources.
- Brown and Caldwell, Sweet Edwards and Associates, Inc., and Robinson, Noble and Saltbush, Inc. 1985. Clover/Chambers Creek Geohydrologic Study: prepared for Tacoma-Pierce County Health Department, Final Report.
- Brown and Caldwell, Inc., Adolfsen Associates, Inc., Sweet-Edwards/EMCON, Inc., Robinson, Noble and Saltbush, Inc., and Triangle Associates. 1990. Draft Clover/Chambers Creek Basin Ground Water Management Program and Environmental Impact Statement, with Technical Appendices.
- Garling, M. E., Dee Molenaar, and et al. 1965. Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands, State of Washington, Department of Conservation, Washington Division of Water Resources.
- Jones, M. A. 1996. Thickness of Unconsolidated Deposits in the Puget Sound Lowland, Washington and British Columbia, a Contribution of the Regional Aquifer-System Analysis Program, Tacoma, Washington: U.S. Geological Survey.
- Jones, M.A., Orr, L.A., Ebbert, J.C., and S.S. Sumioka. 1999. Ground-Water Hydrology of the Tacoma-Puyallup Area, Pierce County Washington. Water-Resources Investigations Report 99-4013.
- Kahle, S. C. 1998. Hydrogeology of Naval Submarine Base Bangor and Vicinity, Kitsap County, Washington, U.S. Geological Survey.
- Morgan, D.S. and Jones, J. L. 1999. Numerical Model Analysis of the Effects of Ground-Water Withdrawals on Discharge to Streams and Springs in Small Basins Typical of the Puget Sound Lowland, Washington. U.S. Geological Survey Water-Supply Paper 2492.
- Noble, J. B. 1990. Proposed Revision of Nomenclature for the Pleistocene Stratigraphy of Coastal Pierce County, Washington, Washington Division of Geology and Earth Resources.
- Robinson and Noble, Inc. 1995. Water Rights Investigation for Water Cooperative of Pierce County. 50pp, appendices and maps.
- Robinson, Noble and Saltbush, Inc. 2003. Analysis of Potential Benefits to the Shallow Groundwater Regime from Abitibi Water Rights Transfer for Lakewood Water District. September 2003 Memorandum to Lakewood Water District and Department of Ecology.
- Robinson, Noble and Saltbush, Inc., Brown and Caldwell, Inc., Applied Environmental Services, Inc., and Water Rights, Inc. 2003. Chambers-Clover Technical Assessment Final Report. Prepared for the Tacoma-Pierce County Health Department, with the assistance of the Chambers-Clover Planning Unit.
- Robinson, Noble and Saltbush, Inc. 2004. Aquifer E Flow Modeling of Abitibi Water Rights Transfer Lakewood Water District.
- Tacoma Pierce County Health Department, Triangle Associates, Inc., and TetraTech/KCM. 2004. Chambers-Clover Watershed Management Plan. Ecology Grant Number G9900033.
- Walters, K.L. and Kimmel, G.E. 1968. Ground-Water Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington.

Also examined for this transfer was the District's mitigation strategy, which was detailed in a January 23, 2004 memo from Thomas M. Pors (representing Lakewood Water District) to Jill Walsh (Ecology). The memo is titled "Water Resource Management and Mitigation Plan - Lakewood Water District - Abitibi Consolidated Water Right Change Applications, GWC-0229 and GWC-4585". Potentiometric surface maps and isopach maps are available in the WRIA 12 Technical Assessment (Robinson, Noble and Saltbush, 2003).

State Environmental Policy Act (SEPA)

A Mitigated Determination of Non-significance was issued by the Lakewood Water District on April 27, 2005. A 14-day comment period concluded on May 11, 2005. Comments were received and responded to directly by Lakewood Water.

Existing Rights for the Lakewood Water District System

Withdrawals from the Lakewood Water System are currently authorized by the following water rights:

Table 5. Water Rights Held by the Lakewood Water District

Water Right Number	Well(s)	Qi (gpm)	Qa Primary (acre-feet/year)	Qa Supplemental * (acre-feet/year)	Priority Date	Original Point of Withdrawal
146-D	A-1	380	410	0	9/26/1997	T19N/R02E-16
148-D	D-3	400	520	0	1/1/1925	T19N/R02E-10 NE/SW
149-D	D-3	600	732	0	1/1/1925	T19N/R02E-10 NE/SW
601-A	D-2	2,000	706	0	10/9/1947	T19N/R02E-10 SE/NW
717-A	G-1,G-2	3,000	3,000	0	6/15/1950	T19N/R02E-01 NW/SE
1305-A	J-1	1,500	2,000	0	12/6/1950	T20N/R03E-31
1289-A	H-1	2,000	32	2,468	2/21/1951	T19N/R02E-14 NW/NE
1370-A	I-2	1,500	0	1,193	12/7/1951	T20N/R02E-34 SW/NW
3830-A	L-1	950	1,520	0	2/2/1960	T19N/R02E-04
3751-A	A-2	750	1,200	0	2/2/1960	T19N/R02E-16
3831-A	H-2	800	1,080	200	2/2/1960	T19N/R02E-14 NE/NW
4183-A	L-2	1,500	0	2,400	11/17/1961	T19N/R02E-04
4184-A	J-2	1,500	0	2,400	11/17/1961	T20N/R03E-31
4447-A	N-1,N-2	3,000	0	4,800	5/9/1962	T20N/R02E-32
4485-A	E-2	1,200	0	1,920	10/15/58	(Well 4) T20N/R2E-29 SW/SE (Well 5) T20N/R2E-32 NW/NE
5194-A	O-1	800	0	1,280	12/1/1964	T20N/R02E-27 NW/SW
5573-A	A-3	1,500	0	2,400	10/29/1965	T19N/R02E-16
5574-A	F-2	1,000	0	1,600	10/29/1965	T19N/R02E-02 NE/SE
5540-A	O-2	1,100	0	1,760	7/5/1966	T20N/R02E-28
5541-A	K-1,K-2	2,600	0	4,160	7/6/1966	T19N/R02E-02
6840-A	P-1,P-2	3,000	0	2,400	1/31/1969	T20N/R02E-36
7319-A	L-3	900	720	0	7/28/1970	T19N/R02E-04 SW/SW
7320-A	I-3	1,200	160	0	7/28/1970	T20N/R02E-34
G2-21391	Q-1	1,500	870	1,130	8/10/1973	T19N/R02E-04 SE/SE
G2-23869	I-4	1,500	0	1,200	6/24/1975	T20N/R02E-34 SW/NW
G2-26246	O-3	1,000	490	310	10/29/1982	T20N/R02E-28 SE/SW
G2-26833	R-1	1,500	812	388	12/11/1985	T19N/R02E-11 NE/NW
G2-27158	S-1,S-2	1,850	0	1,480	7/8/1987	T19N/R02E-04 SE/NE
G2-27280	Q-3	350	0	280	2/16/1988	T19N/R02E-04 SE/SE
G2-28431	U-1	880	0	710	3/20/1992	T20N/R02E-26 SE/SE
Total:		41,760	14,252			

*Note: The intent of the "supplemental" or "Alternate" designation is to provide the purveyor with flexibility in deciding which wells to operate, within the total primary allocation. The annual quantity of these Supplemental/Alternate rights is not additive, and it is the responsibility of the purveyor to operate the wells so that the total annual primary allocation is not exceeded.

The total annual quantity of water allocated to Lakewood Water District under existing permits and certificates is 14,252 acre-feet/year. Supplemental annual quantities in excess of that figure have been approved for augmentation of the water system supply.

Neighboring Groundwater Rights

Certificates and Permits

Water rights and well logs were examined in order to determine water right holders that may potentially be impaired by increased pumping in the District's Wells. Using the estimated 10-foot drawdown contour from the Aquifer E modeling report (Figure 7 - Robinson, Noble and Saltbush, 2004) as a guideline, water rights for neighboring wells were identified. The search area has an approximate radius of 12 miles (Figure 1). Water rights (primary certificates and permits) for wells completed in Aquifer E or deeper were identified and are presented below (sorted by priority date):

Table 6. Neighboring Certificates and Permits

Water Right Number	Owner Name	Priority Date	Purpose of Use *	Drawdown Available at Time of Drilling (feet)	TRS ¼ ¼
211-A	Pioneer Sand & Gravel Co	5/20/1948	CI	Well completed in Aquifer G	T20N/R02E-20 SE/SW
1738-A	West Tacoma Newsprint Co	8/28/1953	CI	169	T20N/R02E-29 SW/SE
2678-A	Tacoma Meats Inc	11/9/1953	DS IR	225	T19N/R03E-23 NE/NW
G2-*09400C	Pierce Cnty Dept Public Works & Utility	4/22/1968	CI	Well is screened in Aquifer G or deeper	T20N/R02E-20 SW/SE
7025-A	WA DOI/Western State Hospital	10/21/1968	DM	No well log could be located for this well	T20N/R02E-33 NE/NW
G2-26905C	WA Department Of Fish & Wildlife	5/9/1986	FS	202	T20N/R02E-27 SW/SE
G2-27450	DuPont City	11/7/1988	MU	Well log did not provide a static	T19N/R01E-25 NW/SW

Table 6. Neighboring Certificates and Permits

Water Right Number	Owner Name	Priority Date	Purpose of Use *	Drawdown Available at Time of Drilling (feet)	TRS ¼ ¼
				water level	
G2-27860	Tacoma City	8/14/1990	MU	Well is screened in Aquifer G or deeper	T20N/R03E-30 NE/SW
G2-27958C	SPANAWAY WATER CO	11/5/1990	MU	160	T18N/R03E-04 SW/SE

* CI = Commercial/Industrial; DS = Domestic single; DM = Domestic Multiple; FS = Fish Propagation; IR = Irrigation; MU = Municipal

The amount of available drawdown at time of drilling was determined by finding the difference between the static water level and the depth to the top of the well screen. In some cases the water level data is quite old (>50 years). In order to provide additional certainty that senior rights in Aquifer E (or other aquifers) will not be impaired from exercising their rights, additional water level and aquifer response data collection has been recommended (see discussion below in *Withdrawal Management Plan – Water Level Monitoring Provisions*).

Claims

Groundwater claims are filed by individuals indicating that they have used water since before the establishment of the Groundwater Code in 1945. Their acceptance as a valid right usually requires a general water right adjudication. Claims are often associated with shallow, low yield domestic water wells that served private domestic homes or small hobby farms. Because the area is now served by water purveyors, it is likely that most wells associated with claims have been abandoned and homes are now connected to municipal water supply. Additionally, most wells associated with water rights claims likely tap only shallow water-bearing units and are likely to be relatively unaffected by pumping in Aquifer E or below. Therefore claims were not addressed in this water rights evaluation.

Site Visit

On March 18, 2005 Jill Walsh of Ecology, and Jim Bailey of Golder Associates meet with Ken Campbell of Abitibi Corporation to tour the Abitibi site. Each of the three Abitibi wells were visually inspected and photographed. Well 5 was the only well still being actively used. Wells 3 and 4 were not in use during the site visit, but the pumps were still in the wells. Groundwater was flowing from both Well 3 and 4 due to natural hydrostatic pressure. All of the well sites are located inside a guarded fenced area where access is controlled through a gate. In addition to visiting the Abitibi site, Golder and Ecology have at various times visited and/or inspected the Lakewood Water District wells identified in this ROE.

Topographic and Local Area Maps

The following USGS 7.5-minute topographic maps were examined during this investigation:

- Steilacoom
- Tacoma South
- Fort Lewis
- Spanaway
- Frederickson
- McNeil Island
- Puyallup
- Nisqually

Lakewood Water District Water System Plan

The Department of Ecology is in receipt of the Lakewood Water Districts Comprehensive Water System Plan dated February 2005. This document has been reviewed to determine water right consistency, and to review demand forecasting calculations and evaluated the District Conservation Program.

Pierce County Coordinated Water System Plan

The District's proposal is generally consistent with Section IX of the Pierce County Coordinated Water System Plan which was adopted on November 26, 1996. Page IX-12 of the CWSP provides:

It is recommended that the individual systems [Cooperative members] continue to develop groundwater resources in their service areas to the extent that the groundwater aquifer will sustain the use and it is feasible to secure a water right. There may be opportunities for joint development of wells and/or storage by adjacent systems . . . As a further step in regional cooperation, it is recommended that the area to be served by the water right include the entire service area of the Cooperative . . . Further, it is suggested that filing for new water right also identify the entire area.

Hydrologic Analysis

Lakewood Water District serves a region of northwestern Pierce County (Figure 1). This area of Pierce County is at the southern end of the Puget Lowland, within WRIA 12 (Chambers-Clover). For purposes of this report, this region of Pierce County will be referred to as the Lakewood area. The northwest portion of mainland Pierce County is part of an extensive glacial drift plain comprising the Puget Lowland, which was formed by at least six glaciations that occurred in the region during the last two million years (Kahle, 1998). Mainland Pierce County is bordered on its western margin by marine channels referred to as Dalco Passage, The Narrows, and Puget Sound. A complex sequence of unconsolidated and semi-consolidated sediments comprise the Puget Lowland. The sediments include advance and recessional glacial deposits, and fluvial and lacustrine interglacial sediments. The total thickness of the sedimentary sequence in northwestern Pierce County ranges between 1,700 and 1,900 feet (Jones, 1996). The sediments are underlain by Miocene volcanic and sedimentary bedrock (Garling et al., 1965).

Groundwater in northwestern Pierce County is primarily produced from three aquifer zones, referred to generally as the Vashon (Layer A), Sea Level (Layer C), and Deep Aquifers (Layers E, G, and others). A series of low permeability, semi-confining units (Layers B, D, and F) separates the aquifers (Robinson, Noble and Saltbush et al, 2003). These semi-confining units are primarily comprised of fine-

grained non-glacial sediments (e.g., fine sand, silts and clays) that act to restrict flow between aquifer units. Although they are present over much of the Lakewood area, several "windows" have been identified where these layers are absent. It is important to note that these interglacial units are not the only confining layers present in the Lakewood area. Each of the aquifers (particularly Aquifers C, E and deeper) may contain zones of low permeability which effectively serve as confining units. However, these layers may not be as thick or extensive as Layers B, D and F. Hydrogeologic cross-sections created by Robinson, Noble and Saltbush (2004) are included in Appendix A of this report. The cross-section location is shown on Figure 1. The hydrogeologic units important to groundwater production in this area of Pierce County are summarized below after Robinson and Noble (1995), Brown and Caldwell (1985), and Borden and Troost (2001):

Vashon Aquifer – Layer (Aquifer) A

Layer A is comprised of Vashon Recessional Outwash (including Steilacoom Gravel), Vashon Till, Vashon Advance Outwash, glaciolacustrine silt/clay (Lawton Clay), Olympia beds (non-glacial), and Pre-Olympia drift. The recessional outwash and Steilacoom Gravel consist of coarse sands and gravels overlying till, with thicknesses of usually only tens of feet. The till is often highly compact and consequently has low permeability. These units are not typically important in terms of regional water production. Underlying the till is the advance outwash, which is comprised of interbedded coarse sand and gravel and represents the primary water-bearing unit of Layer A. Thickness of Layer A ranges from 0 to 200 feet (including non-water bearing materials) and can be highly transmissive, with some calculated values greater than 20,000 ft²/day. These values have been noted on cross-sections produced by Brown and Caldwell (1985) and were calculated from pumping test data. Average transmissivity values are generally lower, in the range of 200 to 2,000 ft²/day (Brown and Caldwell, 1985). Water table conditions exist in much of Layer A and the water level in the advance outwash generally mimics surface topography.

Second Interglacial Deposits – Layer B

A second non-glacial unit typically underlies the Vashon Aquifer and is referred to as Layer B. Layer B is the principal aquitard separating the Vashon and Sea Level Aquifers. It is a thin unit (typically with a maximum thickness of less than 50 feet, except in the western part of the study area (e.g., near Lake Steilacoom and Puget Sound), where the unit can be over 200 feet thick. The unit is comprised of silt and clay with lesser amounts of fine sand (with some gravel). Although the unit is widespread, it is not continuous in the area. Where Layer B is absent, the hydraulic connection between Aquifers A and C is likely stronger than in locations where the confining layer is present.

Sea Level Aquifer – Layer (Aquifer) C

The Sea Level Aquifer is a thick heterogeneous glacial sequence of stratified sand and gravel, whose upper surface is commonly between sea level and 250 feet amsl (above mean sea level). Layer C is comprised of advance and recessional outwash with interbedded till deposits, which are often referred to as the Salmon Springs Drift. Layer C may correlate to the Double Bluff Drift present in the northern Puget Sound Lowland. Layer C is frequently found with a thickness of greater than 150 feet in the Lakewood area. Many of the region's productive wells are completed in Layer C. Some transmissivity values as high as 14,000 ft²/day have been calculated for wells completed in Layer C. These values have been noted on cross-sections produced by Brown and Caldwell (1985) and were calculated from pumping test data. Average transmissivity values are generally lower, in the range of 600 to 6,000 ft²/day – assuming a thickness of 150 feet (Brown and Caldwell, 1985). Layer C is likely recharged by leakage through Layer B and also in the southeastern part of WRJA 12 where Layer B is thin or absent and Layers A and C are in contact with one another (Brown and Caldwell, 1985).

Layer D

Layer D is a non-glacial unit comprised of fine sand, silt and clay that like Layer B, creates an important aquitard between the coarse grained units present above and below it. Layer D can be up to 200 feet thick in the area. Its average thickness is typically around 100 feet. No wells are known to be completed in this layer. Layer D is widespread but there is an approximately five to six square mile section in the North Spanaway/Brookdale area (north central portion of T19N, R3E - Sections 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23) where the layer is known to be absent (Figure 1). According to the cross-sections produced by Brown and Caldwell (1985) and Robinson, Noble and Saltbush (2003), Layer B may also be absent in this area. However, new data from Parkland Well No. 14 (drilled in 2003) indicate that Layer B exists over at least part of the area where it was previously thought to be absent (cross-section A-A' in Appendix A).

Associated with Layer D in the western portion of the Lakewood area, near the marine shoreline, is a thick and continuous clay unit that is interpreted to be a channel fill deposit associated with a glacial lake. According to Brown and Caldwell (1985), the channel is parallel to and east of The Narrows and could possibly represent an ancestral Narrows scoured by glaciers during the advance of the Puget Lobe. The clay-filled former channel is approximately 300 feet thick and is present from near the bottom of Layer C downward to near the bottom of Layer E. The presence of the clay between the mainland and marine water could create a hydraulic dam for groundwater flowing from east to west in Layer E.

Part of Deep Aquifer – Layer (Aquifer) E

Layer E is a glacial layer consisting of poorly sorted sand, gravel, and silt comprising part of the Deep Aquifer. The layer can be up to 200 feet thick, with an average thickness of 150 feet in the Lakewood area. It is thought to be the highest yielding hydrostratigraphic layer in the Lakewood area. Transmissivity values have been measured at between 6,000 and 60,000 ft²/day with an average transmissivity of approximately 20,000 ft²/day – assuming a thickness of 150 feet (Brown and Caldwell, 1985). The average transmissivity calculated for the District wells completed in Aquifer E is approximately 8,200 ft²/day (Robinson, Noble and Saltbush, October 23, 2003, Letter to Dave Nazy – Ecology).

Layer E is bounded above by the low permeability Layer D, except in north-central portion of T19N, R3E - Sections 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23 where the layer is known to be absent (Figure 1). Where Layer D is absent, Layers C and E are likely in stronger hydraulic continuity than areas where Layer D is present. Layer E is likely recharged by leakage through Layer D and also in areas where Layer D is thin or absent and Layers C and E are in contact with one another.

Layer E is bounded on the west near the marine shoreline by a thick clay layer, discussed above in the description of Layer D. Water flowing westward in Layer E likely discharges to Puget Sound by flowing around the ancestral Narrows clay layer. It is thought that most discharge from Layer E flows northwesterly around the ancestral Narrows clay before discharging to Puget Sound (Robinson,

Noble and Saltbush, 2004). Additionally, some of the water discharging from Layer E may flow through the ancestral Narrows clay and/or upward through Layer D to Layer C before discharging to Puget Sound.

Layer F

Layer F is a non-glacial unit consisting primarily of silt and clay, with some gravel. Layer F is up to 200 feet thick and forms an aquitard between the overlying E and underlying G aquifers. Its thickness and extent are not well known because few wells penetrate it in the Lakewood area. At least 11 wells penetrate Layer F in the Lakewood area. These are listed in the section describing Layer G and deeper aquifer zones.

Layer G and Deeper Aquifer Zones

Below Layer F, there are multiple water-bearing zones and confining units encountered in wells typically drilled deeper than 350 feet below msl. Layer G is the uppermost unit in this sequence and is comprised of glacial drift, which can be up to at least 100 feet thick. Very few wells have penetrated this layer in order to allow a regional characterization of the layer. The following wells are completed in the Layer G or deeper zone:

- Abitibi Wells 4 (T20N/R2E - Sec. 29)
- Abitibi Wells 3 & 5 (T20N/R2E - Sec. 32)
- Steilacoom Well 4 (T20N/R2E - Sec. 32)
- Lakewood Well N-1 (T20N/R2E - Sec. 32)
- Fort Lewis Well 7 (T19N/R2E - Sec. 22)
- Fort Lewis Well 4 (T19N/R2E - Sec. 18)
- McCord AFB Well 846 (T19N/R2E - Sec. 23)
- Parkland Well 8 (T19N/R3E - Sec. 22)
- Tacoma Well 13A (T20N/R3E - Sec. 30)
- Pierce Co Well 2 (Pioneer Sand and Gravel) (T20N/R2E - Sec. 2)

Brown and Caldwell (1985) note that there is a generally downward slope to the west and northwest of the hydrostratigraphic layers in the Lakewood area. As a result, groundwater in Layer G likely flows northwestward from topographically high areas to discharge to Puget Sound.

Evaluation of Beneficial Use and Tentative Determination of Extent and Validity of Water Rights:

Under RCW 90.03.380, water rights can be changed or transferred only to the extent the right has been put to beneficial use and only to the extent it has not been abandoned or relinquished. Under RCW 90.14.160, a water right is subject to relinquishment and reversion to the state for voluntary failure, without sufficient cause, to beneficially use the water for five successive years. However, there is no relinquishment of a water right "if such right is claimed for a determined future development to take place either within 15 years of July 1, 1967 or the most recent beneficial use of the water right, whichever date is later." RCW 90.14.140(2)(c). For this exception to relinquishment to apply, the future use of water must be determined before the expiration of five years of nonuse, although the actual physical development may occur after the initial five-year period. *R.D. Merrill Co. v. PCHB, 137 Wn.2d 118, 143 (1999).*

Determined Future Development

The following factors support the establishment of a determined future development for municipal water supply no later than December 2001 by Abitibi.

- Abitibi announced the permanent closure of the West Tacoma Mill in June 2000. Actual production ceased in December 2000 and Abitibi has not made beneficial use of its water rights since that time.
- In December 2000, Abitibi first contacted Ecology's Southwest Regional Office to inquire about the quantity and transferability of its water rights.
- During the year 2001, Mr. Campbell of behalf of Abitibi met several times with Ecology regarding Abitibi's intent to sell its water rights to a municipal water supplier, either Pierce County or the District. By April of 2001, potential sales of the West Tacoma Mill for industrial use had all fallen through, and Abitibi focused its efforts on reaching agreement with a municipal water supplier to purchase its water rights.
- Inquiries from the District's general manager, Randall M. Black, about Abitibi's interest in selling water rights to the District were received by Abitibi in early 2001. On August 30, 2001, the District indicated that they were interested in purchasing the Abitibi water rights. At the same time, the District began investigating the Abitibi water rights in earnest with their attorney and consultants. The parties met and communicated several times from September through December of 2001 to discuss the scope and feasibility of the transaction.
- On October 18, 2001, Randall M. Black informed Ken Campbell by that the District's board of commissioners had authorized him to proceed with negotiating to purchase the water rights. The parties then exchanged data relevant to a purchase agreement and on November 30, 2001, the District's attorney outlined the steps to complete a transfer of the water right. The District met with Jill Walsh of Ecology in late November or early December 2001 to outline how to proceed with a transfer of the Abitibi water rights and what information would be needed by Ecology to process the applications.
- The District and Abitibi then met on December 20, 2001 to negotiate the purchase agreement. At that time, Abitibi agreed to sell the District up to 6.0 MGD of its deep well water rights, and the District agreed it would purchase a minimum of 2.0 MGD with an option to purchase the balance of water rights that Abitibi had available.
- The District sent Ken Campbell a draft letter of intent to purchase Abitibi's water rights on January 14, 2002, confirming its intent to purchase 6.0 MGD of groundwater rights with an option to purchase the balance Abitibi's water rights. A detailed purchase and sale agreement was entered into on November 30, 2002.
- The applications to change the Abitibi water rights were filed with Ecology by the District on December 9, 2002.

Based on our review of the Abitibi's effort to transfer these water rights to Lakewood Water District, it appears reasonable to find that Abitibi made a determination no later than the end of December 2001 that its Ground Water Certificates 299-A and 4585-A would be transferred to the District for municipal purposes. Subsequent negotiations and documents confirmed this intent and were, in essence,

due diligence by both parties toward the completion of the determined future development. For purposes of this decision, the relevant five-year period of previous beneficial for determination of potential relinquishment is January 1, 1997 to December 31, 2001.

History of Beneficial Use

The following water rights are associated with the Abitibi facility:

Water Right Number	Source	Q1 (gpm)	Qa (acre-feet/year)
10880	Chambers Crk.	2,785*	4,492
S2-28039	Garrison Crk.	1,800*	2,240
1738-A	Well 1	650	1,040
299-A	Well 3	2,250	3,650
4585-A	Wells 4 and 5	3,900	6,249
Total:		11,385	17,671

* Denotes surface water source

Ground Water Certificate 299-A (Priority date January 4, 1949) was issued for 2,250 gpm, and 3,650 acre-feet per year from Well 3 for manufacturing and industrial use.

Ground Water Certificate 1738-A (Priority date August 28, 1953) was issued for 650 gpm, and 1,040 acre-feet per year from Well 1 for industrial supply. At 275 feet, Well 1 is the shallowest of the Mill's groundwater sources, the primary use of Well 1 has been to supply water for domestic and sanitary purposes.

Ground Water Certificate 4585-A (Priority date October 16, 1958) supersedes Certificate 4548-A. It authorizes the withdrawal of 3,900 gpm (Well 4 authorized to pump 1,400 gpm, and Well 5 authorized to pump 2,900 gpm) and 6,240 acre-feet per year for industrial processing. The report of examination drafted for this permit indicated that the allocation was for additional water – beyond the previously issued certificates, with the comment that Well 1 was being used for domestic and sanitary purposes only, and that Well 3 had lost some of its capacity and needed to be rehabilitated. The Report of Examination indicates that production at the plant had tripled since the last water right had been issued and more water was needed.

The water rights that are the subject of this application were developed and used in a paper mill located near the mouth of Chambers Creek in Steilacoom, known generally as the West Tacoma Mill. The West Tacoma Mill produced pulp and newsprint for newspaper publication from 1919 to its closure in December 2000. Abitibi provided Ecology with two separate submittals regarding the history of its water rights and recent beneficial use of water.

A May 15, 2003 letter from Ken Campbell explains that the water rights for Well No. 3 and Wells No. 4 and 5 were put to beneficial use at the time that proof of appropriation affidavits were filed with the State of Washington on May 19, 1949 and June 26, 1959, respectively. A document entitled "History of West Tacoma Mill," prepared by Ken Campbell and submitted to Ecology by letter dated June 16, 2003, cites several news articles reporting expansions of the plant and daily and annual productions of paper product. The West Tacoma Mill expanded at various times and produced an average of 616 tons per day of newsprint during its peak operations from 1995-1998, when it was operating 24 hours/day, seven days/week. At various other times the plant was also operated 24 hours/day, seven days/week, with a capacity of 10,000,000 gallons per day in 1953; 5,500,000 gallons of water usage per day in 1957; and 23,000,000 gallons per day capacity in 1984. Given this evidence, there is no basis for disputing that Well No. 3 was originally perfected in the amount of 2,250 gallons per minute (gpm) and 3,650 acre-feet/year, and that Wells 4 and 5 combined were perfected in the amount of 3,900 gpm and 6,240 acre-feet/year.

Abitibi installed flow meters in the 1990s to measure water usage in its paper manufacturing process. The flow meters measured total groundwater usage, but did not measure each well's individual production. The flow data was inputted electronically to a centralized computer which shut down with the plant in December 2000 and is obsolete. There is no readable backup report of the data collection available. Ken Campbell's May 15, 2003 letter provides anecdotal reporting of water usage for the last five years of the plant's production (1995 to 1999 and a partial production year in 2000) based on "monthly statistical reports" of various computer readouts, including total groundwater production in these years.

Data is not available to distinguish between water usage at Well No. 3 vs. water usage at Wells No. 4 and 5. Based on the Report of Examination prepared for Certificate 4585-A (Wells No. 4 and 5) it appeared that Well 3 had a diminished capacity, accordingly it is assumed that Certificate 4585-A was used in the 1995 to 1997 peak production years to its full capacity, followed by usage of Certificate 299-A (Well No. 3) to make up the additional demand.

Table 8 is based on information provided by Ken Campbell, who was sales manager at the West Tacoma Mill during the relevant time period, and demonstrates average groundwater production in million gallons per day and acre-feet/year, as follows:

Totals	1995	1996	1997	1998*	1999*	2000**
MGD	6.35	5.32	7.33	2.57	3.25	0.65
Acre-feet	7,113	5,960	8,211	2,879	3,641	--

* Annual Mill production below normal

** Partial production year

The year of highest water usage in the last five years of beneficial use of water at the West Tacoma Mill was 1997. Based on the groundwater production numbers in Table 1, Abitibi has established that Certificate 4585-A was beneficially used to its capacity of 5.62 MGD (equivalent to 3,900 gpm) and 6,240 acre-feet/year in 1997, and that Certificate 299-A was used for the balance of 1997's production amount, or 1.71 MGD (equivalent to 1187.5 gpm) and 1,971 acre-feet/year. The balance of Certificate 299-A (Well 3) is not transferable pursuant to these applications.

Impairment of Other Rights

Hydrograph Data

The timing and magnitude of the hydraulic responses between the aquifers in the Lakewood Area is difficult to discern at the regional level. Hydrographs for three District Wells completed in Layer E are shown in Figures 2 through 4 of this report. The figures have been plotted to show the water levels and production records together (Figure 2-a, 3-a, 4-a) and then separately (Figures 2-b and 2-c, 3-b and 3-c, 4-b and 4-c). The water level data represent a daily record and were collected by taking the highest recorded water level reading of each day as equal to the static water level and the lowest recorded water level reading as equal to the pumping water level. Generally, all data points were measured on a daily basis, though there are occasionally some days for which data was not recorded.

Figure 2-a shows the hydrographs for wells J-1 (Aquifer A) and J-2 (Aquifer E). The hydrograph shows that the water levels in the two aquifers did not respond similarly during this time period. The water level in Aquifer A in the vicinity of Well J-1 rose (likely as a result of precipitation occurring during this time), while the water level in Aquifer E in the vicinity of Well J-2 declined. Since Aquifer E is recharged by leakage from overlying units and Aquifer A is recharged primarily by precipitation, the response times of the aquifers are expected to be different. Figure 2-a shows this trend with water levels in Aquifer A rising, while water levels in Aquifer E declined over the same period. Figure 3-a shows the hydrographs for wells D-2 (Aquifer E) and D-3 (Aquifer C). The water level in Well D-2 from November 20, 2002 to December 18, 2002 declined as a result of pumping in the well. During this same time however, the water level in Well D-3 (which was not pumping) remained essentially constant, rising only slightly. In fact, the water level in Well D-2 remained relatively constant throughout the whole period of record, despite pumping in Aquifer E. Figure 4-a shows the hydrographs for wells E-2 (Aquifer E) and E-3 (Aquifer C). There is no clear hydraulic relationship between Aquifer C and Aquifer E shown by the hydrographs for Wells E-2 and E-3 for the period of record indicated in Figure 4a. Both wells show a similar trend of gradually increasing water levels despite ongoing production in both wells. The hydrographs show that the aquifers in the vicinity of the two wells responded similarly in terms of seasonal water level changes. In particular, the water levels in Wells E-2 and E-3 rose between November and April 2003 (Figure 4-a).

There is an area east of the District's Wells, near north Spanaway/Brookdale where Layer D is absent (Figure 1) and Aquifers C and E may be in stronger hydraulic connection than areas where Layer D is present. The nearest District transfer well (completed in Aquifer E) to this location is Well J-2, located approximately 2.4 miles west of this area. Monitoring water levels in wells completed in Aquifers A and C in the area where Layer D is absent would allow for determination of the degree of impact to Aquifers A and C from increased pumping in Aquifer E. The following wells have been identified by Robinson, Noble and Saltbush (2004) as being completed in Aquifer A, in or near the area where Layer D is absent:

- Parkland TW (T19N, R3E - Sec. 17)
- Parkland Well 9 (T19N, R3E - Sec. 8)
- Southeast Tacoma Mutual Water Association Well 3 (T19N, R3E - Sec. 5)
- Southeast Tacoma Mutual Water Association Well 5 (T19N, R3E - Sec. 5)

The following wells have been identified as being completed in Aquifer C, in or near the area where Layer D is absent:

- Parkland Wells 1, 10 (T19N, R3E - Sec. 8)
- Parkland Wells 2, 3, 5 (T19N, R3E - Sec. 9)
- Parkland Well 6 (T19N, R3E - Sec. 17)
- Spanaway Well 5 (T19N, R3E - Sec. 21)
- Spanaway Well 6 (T19N, R3E - Sec. 27)
- Spanaway Well 9 (T19N, R3E - Sec. 23)
- Domestic Well [Crescent Park] (T19N, R3E - Sec. 22)

Examination and comparison of historical hydrographs from these wells and the District's Aquifer E Wells will also help clarify the connection between Aquifers A, C and E, if any. Most of the above wells are being monitored on a regular basis by both the well owner and Tacoma-Pierce County Health Department for the County's regional aquifer management program. The County data are available for review by participating water purveyors such as Lakewood. See Withdrawal Management Plan - Water Level Monitoring Provisions below.

Aquifer E Modeling Report

Robinson, Noble and Saltbush (2004) used an analytic element model to estimate the likely drawdown in Aquifer E and induced leakage from Layer D as a result of shifting five MGD of the six MGD from Aquifer G to Aquifer E. Their simulation consisted of a single layer model which estimated leakage by extracting hydraulic head values from a pumping simulation and applying Darcy's Law to calculate the total induced leakage.

The boundaries of the model are comprised of linesinks and no-flow boundaries including: valley fill sediments associated with the Puyallup River on the north and the Nisqually River on the south, Puget Sound on the west and north, the ancestral Narrows clay unit also on the west, and a buried bedrock contact in the south and southwest.

The aquifer was modeled as three large zones of differing hydraulic conductivity and thickness, with smaller zones of differing conductivities in the Lakewood area. The model was calibrated against 17 water level elevations from wells completed in the aquifer system. Recharge (as leakage) was applied uniformly across the model. The estimated recharge to Aquifer E (downward leakage from Aquifer C through Layer D) was 6.3 inches/year before the transfer of 5 MGD. This value was obtained from previous analyses of WRIA 12, which indicated that approximately 15% of annual precipitation (42 inches/year in the Lakewood area) reaching Aquifer E. To account for current production from Aquifer E, an estimated 9.7 MGD (equivalent to 1.3 inches/year) was subtracted from the annual recharge value, leaving approximately 5 inches/year of recharge flowing to Aquifer E from overlying units. An additional 1.5 inches of recharge was applied in the area near Parkland where the non-glacial unit (Layer D) is absent. This additional recharge is probably conservatively high as low-permeability glacial materials are present throughout the area (at the bottom of the Aquifer C system or the top of the Aquifer E system) which provides a level of confinement to the Aquifer E system. Potentiometric surface maps for the region show notable differences in water level elevation between Aquifers C and E though the Parkland area, which further supports the conclusion of the confined conditions of the system.

The model estimated the total induced leakage volume from the sediments overlying Aquifer E to be 238,729 gallons per day (166 gpm; 268 acre-feet/year).

Effects to Surface Water

In 1979, the Chambers-Clover Creek basin was closed to further consumptive surface water diversions through Chapter 173-512-050 WAC, the Instream Resources Protection Program for the Chambers-Clover Creeks Basin, Water Resource Inventory Area (WRIA) 12. Any groundwater withdrawals with priority dates later than the December 12, 1979 must consider the potential impacts to surface water (WAC 173-512-040). Where a proposed groundwater withdrawal or a proposed change in the place of groundwater withdrawal would reduce the flow in surface waters closed to further appropriations, denial is typically required because water is unavailable and withdrawal would be detrimental to the public welfare. It is recognized that the District has proposed mitigation measures for this transfer to offset any potential impact of these change applications on the flow of streams closed to further appropriation.

Since the District's Aquifer E wells are screened below approximately 200 feet below msl and Layers B and D are present in most places in the Lakewood area, the effect to surface water is estimated to be both relatively low and attenuated over time. The hydrographs for several District wells completed in Aquifer E compared to several shallower wells completed in very close proximity (Figures 2 to 4) do not show any direct evidence of impact on the shallower aquifers as a result of pumping in Aquifer E.

Chambers Creek flows over an area where Layer D is absent (Figure 1). Layer B may also be absent across this area, as indicated on cross-sections produced by Brown and Caldwell (1985) and Robinson, Noble and Saltbush (2003). However, the potentiometric surface maps for this region and water level data provided by Tacoma/Pierce County Health District show notable differences in water level elevation between Layers C and E throughout the Parkland area, which supports the conclusion that even in Layer C there are confined conditions, and that the window in Layer D does not, by itself, indicate a hydraulic connection between Layer E and Layer C. The Parkland Well 14, drilled in NW NW Sec. 15, T19N, R3E in 2003 indicates that Layer B is present as a claybound sand and gravel zone in the well between 183 and 301 feet bgs. The nearest District transfer well (completed in Aquifer E) to this location (J-2) is approximately 2.4 miles west of this area. Monitoring water levels in wells completed in Layers A and C may provide a better determination of hydraulic connection, if any, between surface water and Aquifer E. Several wells that could potentially help determine the hydraulic connection between Aquifer E and surface water bodies are identified in the Withdrawal Management Plan section of this Report of Examination.

Mitigation Plan

The existing Abitibi withdrawals from Aquifer G have a region-wide effect on overlying geologic layers by inducing leakage through those layers into Aquifer G. The existing induced leakage into Aquifer G from Layers E and F, for example, also induces leakage in a more diffuse manner from Layers C and D and in an even more diffuse manner from the groundwater table aquifers and surface waters in the basin. The total groundwater withdrawals from the basin will not increase as a result of the proposed change of withdrawal points for 5 MGD of the Abitibi rights from Aquifer G to Aquifer E; however the amount of induced leakage from Layers C and D is expected to increase in the vicinity of the District's Aquifer E wells, and will occur in a somewhat more direct manner and on a somewhat shorter timeframe. The effect of these changes on Aquifer A and surface waters is necessarily much more diffused and on a longer timescale, to the point that it may not be measurable and is difficult to calculate with any certainty. It is appropriate, therefore, to apply some measure of safety in order to determine that surface waters which are closed to further appropriation would not be impacted by these changes.

The District proposes to mitigate the impacts from the proposed Abitibi transfer with some of its existing groundwater rights. The District proposes mitigation for the maximum amount of estimated induced leakage into Aquifer E (267.4 acre-feet/year) from overlying geologic layers, based on the results presented in Robinson, Noble and Saltbush's 2004 modeling report. All of this mitigation would be provided by not pumping an existing District water right in Aquifer C that is centrally located among the Aquifer E wells (i.e., Well I-4). The estimated quantity of mitigation is in the maximum range of predicted impacts to geologic Layers D and C after incorporating several conservative assumptions in the modeling analysis, including an overestimation of the current water usage from Aquifer E, the use of conservative parameters to calculate induced leakage from overlying sediments, and ignoring the reduction of induced leakage from Aquifer E to Aquifer G caused by the proposed changes (the latter factor will further reduce actual drawdowns from Aquifer C, but this is being conservatively ignored to provide additional certainty for the effectiveness of the mitigation).

The District also proposes to provide additional mitigation directly to surface water and to the shallow aquifer system that is directly connected to surface water in order to provide additional certainty that the impacts of the changes will not have a detrimental affect on surface waters closed to further appropriation. While the potential for impacts to surface waters would be very diffuse over the entire basin and impossible to measure or predict with certainty in a viable and cost-effective scientific manner, the proposed additional mitigation would provide significant benefits to surface waters in this basin that are closed to further appropriation, as described in Table 10 below.

The following mitigation strategy is summarized from the January 23, 2004 memo from Thomas M. Pors (attorney for the District) to Jill Walsh (Ecology) and includes additional discussion of the benefits of each measure.

Table 10. Mitigation Source and Benefit Information

Water Right Number	Wells	Proposed Action	Mitigation Capacity	Summary of Benefits
1289-A 3831-A	Well H-1 Well H-2	Discharge well water into Clover Creek to provide adequate flow for salmon migrations. Current voluntary mitigation would receive mitigation credit against Total Annual Offset (TAO) required.	2,000 gpm 13.26 acre-feet/year	Low flows in Clover Creek were identified as a significant "limiting factor" for salmonid survival in this watershed. At critical times, including August and September, flows are inadequate for migration of spawning Coho. This project would provide significant benefits to native Coho runs in Clover Creek and for habitat downstream of the point of augmentation. Therefore this supplementation program would provide significant environmental benefits at a particular time when stream flow supplementation is needed the most.
Flett Dairy 460-A 461-A 462-A 3713-A		Transfer the Flett Dairy water rights into the Trust Water Rights Program for instream flow preservation.	Water Right Certificates totaling 1000 gpm and 800 acre-feet/year	Under the mitigation plan, existing shallow aquifer groundwater rights would not be pumped. Because the aquifer is in hydraulic continuity with Chambers Creek, an existing impact on Chambers Creek would be eliminated and more water would be left in Aquifer A to provide base flow recharge to area streams and lakes.
G2-27280C	Well Q-3	Relinquish existing water right for shallow aquifer (Aquifer A).	Water Rights Totaling 350 gpm and 280 acre-feet/year	This water right is centrally located among the District's Aquifer E wells, and is more closely connected with surface water in the Chambers/Clover Creek basin than Aquifers C or E. Therefore, its relinquishment provides greater benefit to surface water than the projected drawdown of a similar quantity of water from Aquifer C.
G2-23869C	Well I-4	Rest (do not pump) existing water right for Aquifer C.	Up to maximum projected impact to Aquifer C of 166 gpm and 267.4 acre-feet/year	The well location is within one to three miles of the new points of withdrawal within Aquifer E, but in close proximity to Lake Steilacoom and Clover Creek, which are closed to further appropriations and considered surface waters of significant value in this basin. This mitigation measure will have a greater positive effect on the levels of these significant surface waters than the negative impact of the proposed changes.
		Totals:	<p>A total of 2,000 gpm and 13.3 acre-feet/year direct augmentation of streamflow</p> <p>Up to a total of 166 gpm and 267.4 acre-feet/year of resting (not pumping) existing water right in Aquifer C</p> <p>A total of 1350 gpm and 806.6 acre-feet/year in Aquifer A either relinquished or transferred to the Trust Water Rights Program to benefit instream flows</p>	

The information for these water rights is summarized in the following table:

Table 11. Mitigation Well Water Right Information

Common Name	Water Right Number	Type	Aquifer	Qi (gpm)	Qa (acre-feet/year)	Purpose of Use	Proposed Action	TRS 1/4 1/4
Well H1	1289-A	S	C	2,000 (prim)	2,500 (supp)	DM	Continued seasonal diversion to Clover Creek = 2,000 gpm/13.26 acre-feet/year	T19N/R02E-14 NW/NE
Well H2	3831-A	P	C	800 (prim)	1,280 (prim)	DM		T19N/R02E-14 NE/NW
Flett Dairy	460-A	P	A	500	150	IR	Transfer to Trust Water Right Program. Total quantity of water right not relinquished through nonuse is 465.7 acre-feet/year	T20N/R02E-25 SW/SW
Flett Dairy	461-A	S	A	250 (supp)	204 (54 primary, 150 supp)	CI IR		T20N/R02E-25 SE/SW
Flett Dairy	462-A	P	?	175	204	CI		T20N/R02E-36 NE/NW
Flett Dairy	3713-A	S	A	1000	800 total, including amounts used under 460, 461 and 462	CI		T20N/R02E-25 SW SW
Well Q-3	G2-27280C	S	A	350	280	MU		Maximum mitigation credit = 350 gpm, 6.6 acre-feet/year, the maximum amount of beneficial use of this well in 1988
Well I-4	G2-23869C	S	C	1,500	1,200	DM	Rest for mitigation credit up to maximum of 166 gpm, 267.4 acre-feet/year	T20N/R02E-34 SW/NW

Note: P = Primary, S = Supplemental

Beneficial Use of Flett Dairy Water Rights. The District proposes that mitigation credit be given to the District each year in a quantity equal to the extent that the Flett Dairy water rights were beneficially used in the five-year period leading up to the year 2000, when a determined future development was fixed by the District for mitigation use of these water rights. The water rights were acquired by the District by a deed from the then owner of the property, Tackwood LLC, in May 2002. A March 22, 2005 report from Burt Clothier, L.H.G., R.G. describes his interview with the former maintenance head of Flett Dairy, Dick Gratzler. The interview established the beneficial use of the Flett Dairy water rights in the last years of its operation for two houses and the dairy processing plant in the amount of 990 gpm, 465.7 acre-feet/year. This is found to be the existing scope of the Flett Dairy water rights for mitigation purposes.

Discussion of Mitigation Plan: The proposed mitigation plan provides a reasonable approach to mitigate the estimated impacts of the proposed change in points of withdrawal, as defined by the Aquifer E model. The primary mitigation approach is to reduce pumping from Aquifers A and C, thus equalizing the water available in these shallower aquifers for existing rights and for recharge to surface water. For example, the reduction in pumping of Well I-4 alone could account for 100% of the maximum additional induced leakage calculated from Layers C and D into Aquifer E.

A critical element of the mitigation plan is able to offset anticipated impacts to Aquifer C by reducing pumping by an equal amount in Aquifer C. The benefit of resting the District's Well I-4 well is more immediate in the vicinity of that well, whereas the impact of to Aquifer C from the changes is diffuse throughout the basin. The District has offered additional mitigation for any remaining unmitigated impacts to Aquifer A and surface water in the basin. The reduction in Aquifer A pumping by relinquishing the District's Well Q-3 right and by putting the Flett Dairy water rights into the Trust Water Right Program for instream flow purposes will have a more immediate and direct benefit to the shallow aquifer system (Aquifer A) than the estimated impacts resulting from increased pumping in Aquifer E. As a result, the mitigation proposed by the District and incorporated into the conditions of approval will likely benefit stream flows in an amount greater than any detriment caused by increased pumping in Aquifer E.

The District proposed the following formula for determining the total annual amount of water required to offset the potential impacts of increased pumping in Aquifer E.

$$TAO = (QaTE - QaEE) * (4.8\%)$$

where:

TAO = Total Annual Offset required in any given year

QaTE = total annual quantity of water pumped from the District's Aquifer E wells.

QaEE = the total annual quantity of water pumped from the District's Aquifer E wells under existing water rights

4.8% = the estimated leakage induced from overlying layers as a percentage of the proposed production in Aquifer E

This mitigation formula allows for a "pro-rated" offset; as total annual demand increases, the amount of offset from resting the I-4 well will be required to keep pace.

The additional shallow aquifer and surface water mitigation measures proposed by the District is a reasonable approach to providing certainty that surface water resources in the basin will not be negatively impacted by the proposed changes. As described in Table 10, these measures will either significantly improve surface water flows when necessary to aid salmon migration (Wells H-1 and H-2 pumped to Clover Creek),

or they will reduce shallow aquifer withdrawals in areas proximate to closed streams and lakes, improving the natural recharge of these surface waters from the shallow aquifer systems.

Overall, including the Well I-4 mitigation to Aquifer C and the transfer of the Flett Dairy water right to the Trust Water Rights Program, the District is offering approximately a 4:1 mitigation ratio for the maximum estimated drawdown impact of the proposed changes.

The District has proposed providing an annual report to Ecology demonstrating the total annual amount of mitigation offset provided by resting the I-4 well, and the additional mitigation provided by the remaining mitigation and resource management techniques outlined in the previous Table 10.

Other Hydrogeological Considerations

In addition to moving the point of withdrawals inland, this transfer would move the place of use of the water inland also. Currently, the water associated with GWC 4585-A is used onsite at the Abitibi facility, located near sea level. This water rights transfer would move the place of use inland several miles to the area served by the District and several other water purveyors. While not considered as mitigation for the purposes of this evaluation, Ecology acknowledges that this transfer will fundamentally alter the movement of water in the Chambers-Clover basin.

There is a total of six MGD involved in this water rights transfer. Four of the six MGD involved in this transfer would initially be sold to the following purveyors:

- Fruitland Mutual Water Company (WRIA 10)
- City of Puyallup Public Works (WRIA 10)
- Rainier View Water Company (WRIs 11 and 12)
- Spanaway Water Company (WRIA 12)
- Summit Water and Supply Company (WRIs 10 and 12)

The District would retain two MGD from this water right for meeting demand growth within its own service area in WRIA 12. The purveyors listed above serve areas located in WRIs 10, 11 and 12. The following distribution of water is expected in this transfer:

- WRIA 10 – 1.5 MGD
- WRIA 11 – 0.5 MGD
- WRIA 12 – 4.0 MGD (includes two MGD retained by Lakewood Water District)

This transfer will likely benefit the groundwater system of the greater Lakewood area by leaving groundwater in shallow source aquifers that would otherwise be withdrawn. Additionally, increased water use will result in a corresponding increase in the amount of residential water discharged to the shallow groundwater via septic systems, leaking pipes and other related uses.

All of the water purveyors (with the exception of Lakewood Water District) included in this transfer currently produce a majority of their water from Aquifers A and C. If this transfer is approved and the wholesale agreements proceed as planned, each purveyor will initially diminish production from its existing wells by the amount of water purchased through the "take or pay" wholesale contractual agreement. At the beginning of the contract, the water would remain in the source aquifers and only be used as back-up or emergency sources for each purveyor. The sources would then be returned to service in the event that the purchase agreement ends or as a result of the growth in demand for that system.

Sewer system service is not continuous across the service areas of the purveyors. A review of Pierce County planning documents by Robinson, Noble and Saltbush determined the overall service area served by sewer systems (Robinson, Noble and Saltbush, 2003). Any areas not served by sewer were assumed to be served by septic systems. These current (2003) estimates were then projected under full build out of the County's Urban Growth Area (UGA). The distribution of septic return flow estimated in these scenarios is indicated in the following table:

Customer	Purchased Transfer Water (MGD)	Septic Return Flow by Location					
		WRIA 10		WRIA 11		WRIA 12	
		2003 (MGD)	Projected UGA Sewerage (MGD)	2003 (MGD)	Projected UGA Sewerage (MGD)	2003 (MGD)	Projected UGA Sewerage (MGD)
Fruitland Mutual Water Company	0.1	0.05	0	0	0	0	0
City of Puyallup Public Works	0.5	0.04	0	0	0	0	0
Rainier View Water Company	1.0	0	0	0.15	0.11	0.46	0.32
Spanaway Water Company	0.9	0	0	0	0	0.5	0
Summit Water and Supply Company	1.5	0.91	0.92	0	0	0.04	0.04
Totals:	4.0	1.0	0.92	0.15	0.11	1.0	0.36

The total amount of water estimated to be returned by septic tanks in 2003 was estimated to be 2.15 MGD or 54% of the purchased transfer water. This amount declines to approximately 1.4 MGD or 35% of the purchased transfer water under final build-out of the UGAs. It is important to note that under this transfer, the septic system return flows represents direct addition of groundwater from Aquifers E and G to shallow aquifers. The addition of groundwater through septic systems will serve to enhance and augment flow in the shallow groundwater regime.

Further, it is recognized that additional water will be returned to shallow aquifers through distribution pipeline leakage and exterior use, such as irrigation, washing and recreation. While difficult to quantify, it is believed that a significant amount of water is able to recharge shallow groundwater as a result of these activities. These benefits have not been calculated as a reduction in the mitigation requirement for this water right transfer because state policy is not adequately formed to accept the uncertainties of timing and permanence that each of these benefits involves.

Seawater Intrusion

Given the coastal nature of the Steilacoom-Lakewood area, seawater intrusion is a potential concern, not just for the District Wells but for other wells in the area screened below sea level and located near Puget Sound. Historical monitoring of the District Wells under DOH requirements has not detected any elevation of chloride levels above background concentrations. Moving the points of withdrawal inland and distributing the water rights amongst more sources would likely reduce the potential for seawater intrusion that may result from concentrated pumping in Aquifer G at the Abitibi site.

The degree of impact, if any that increased pumping in Aquifer E will have on the fresh water-salt water mixing zone is undefined but expected to be small. Water quality monitoring in wells completed in aquifers open below sea level and located close to Puget Sound is recommended. Lakewood Water District already maintains a water quality monitoring plan which will provide a baseline to measure any future changes.

Protests/Public Comment

Tacoma Public Utilities (TPU) protested the Abitibi transfer in a letter to Ecology dated March 3, 2003. TPU reminded Ecology that they hold senior water rights for their South Tacoma Wellfield within the Chambers/Clover Creek Basin and believes that these rights would be impaired and streamflows possibly reduced as a result of the Abitibi transfer.

With the exception of Well 13A, TPU's wells are completed in Aquifer C. In the March 3, 2003 letter to Ecology, TPU expressed concern about the "window" in Layer D that may allow for increased leakage from Aquifer C as a result of increased pumping in Aquifer E. TPU is also concerned about the District changing the place of use for the Abitibi rights, effectively creating a regional service area. TPU indicated a desire to review documentation regarding this change specified in WAC 246-290-100, including a SEPA checklist. TPU stated that the proposed transfer would involve transferring water from WRIA 12 to WRIA 10.

Additionally, Ecology received a comment letter from Pierce County Public Works, dated February 26, 2003. The County indicated that they supported the intent of these transfer requests, provided that the District's activities would not impact the County's ability to develop their own groundwater source, located adjacent to Abitibi property on the County owned Chambers Creek Properties.

The amount of water that would actually be transferred to WRIA 10 is unknown at this time, but is estimated to be on the order of 1.5 MGD (Purpose of Change Application section of this report). The primary mechanism for water to leave the basin is via wholesale sales to water purveyors such as Summit Water - which operate a service area that extends into the adjoining Puyallup-White basin. Nothing precludes transfers of this nature, provided that it does not result in impairment to other water users. Since, currently all water withdrawn by the Mill leaves the basin as a direct discharge to the Tacoma Narrows, it is unlikely that the small percentage of water ultimately being used in WRIA 10 will result in an impairment within WRIA 12.

Since receiving the TPU protests, the District filed two responses intended to address Tacoma's concerns, (a March 3, 2003 letter from Thomas M. Pors, and a March 28, 2003 letter from Robinson, Noble and Saltbush, Inc.) The District met with Tacoma on November 17, 2004 to discuss Tacoma's concerns about the change applications. Robert E. Mack, representing Tacoma, sent an additional letter to Ecology on December 13, 2004. In this letter TPU stated that they expected Ecology's determination to be based on reliable and sufficient data and studies, and reiterated their concerns that Tacoma's senior rights be protected from impairment.

This letter also requested that conservation standards and conditions that have been applied to Tacoma's Permit No. S1-0076P also apply to the District's Applications for Change of Water Rights. Ecology has evaluated this statement, but is unable to find any formal directive to alter or change the standard planning requirements for regional public water systems. It appears that the conservation planning requirements applied to the issuance of an extension for the development of the Second Supply Project were drafted to address a specific set of agency concerns. TPU's additional conservation requirements are detailed in an Memorandum of Understanding which was applicable to the second supply project participants, the Department of Ecology, and the Department of Health. This MOU addresses the extension of surface water permit S1-0076P, a water right permit for a large surface water diversion from the regulated Green River. The conditions imposed as permit provisions in the extension of S1-0076 were intended to match those conditions imposed in the Green River Habitat Conservation Plan.

While the fact patterns surrounding TPU's Green River Permit is different than these Applications for Change, Ecology acknowledges the importance of stringent conservation planning requirements. Both TPU and Lakewood are required to collect and submit detailed water use records. While TPU is required to reduce water use by 10% over a 10-year period (from 2001 to 2011) we note that Lakewood Water District's Comprehensive Water System Plan (February 2005) commits the District to reach a goal of 14% water reduction (from 1994 to 2010). The District has already achieved an 8% reduction in average per capita water usage from 1994 to 2003.

We also note that Lakewood Water District's potential wholesale partners within the Water Cooperative of Pierce County have similar conservation goals. The City of Puyallup has already reduced its per connection water demand 6% between 1997 and 2002, and projects an additional 5% reduction between 2003 and 2013. Spanaway Water has reduced its per connection water demand by 11.7% between 1994 and 2004, and Summit Water has reduced its per connection demand by 9.5% between 1991 and 1996. Both Spanaway and Summit have active conservation programs that are anticipated to result in additional water saving reductions.

While conservation requirements were imposed on the extension of TPU's the second supply project in 2001, we note that there new statutory conservation planning and water use efficiency requirements for public water systems were adopted since then. The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems, including Lakewood Water District. Ecology is required to coordinate approval procedures with the Department of Health under RCW 90.03.386(1), and finds that imposition of conservation requirements for TPU's Green River System on the District's use of the Abitibi water rights would potentially conflict with or be redundant to the District's Comprehensive Water System Plan and Department of Health's new water use efficiency rules, which both the District, its wholesale customers, and TPU must comply with. The requirements for conservation planning for systems like Lakewood are addressed in the section on Conservation Planning Requirements.

Tacoma's concerns about hydraulic connection between Lakewood's Aquifer E wells and Tacoma's South Tacoma wells have been addressed in the Hydrologic Analysis section of this report and the discussion of Neighboring Groundwater Rights. In particular, it is noted that the Layer D "window" in the Parkland area described in Tacoma's protest is located approximately 2.4 miles from the nearest District transfer well (Well J-2). The potentiometric surface maps for this region and water level data provided by Tacoma-Pierce

County Health District show notable differences in water level elevation between Layers C and E throughout the Parkland area, which supports the conclusion that even in Layer C there are confined conditions, and that the window in Layer D does not, by itself, indicate a hydraulic connection between the District's Layer E wells and Tacoma's wells in Layer C.

DISCUSSION:

The transfer of water rights from the three Abitibi wells to several wells operated by Lakewood Water District would represent the transfer of five MGD from Aquifer G to Aquifer E. One MGD would be retained for production from Aquifer G. The Abitibi Wells lie near the western margin of the aquifer and the District wells are located up to several miles inland. This transfer of water rights would essentially reallocate most pumping to shallower locations upgradient (eastward) from the current withdrawals from the Abitibi Wells.

Shifting pumping to a shallower aquifer upgradient in a basin will change the hydrology of the basin and could possibly lead to increased leakage from overlying units and/or decrease discharge from the aquifer(s) at the local level near each proposed pumping center. However, at the regional, basin-wide scale, the total volume of the water used remains unchanged from Abitibi's original use of the water. In the case of the Lakewood area, the proposed pumping changes are from wells completed in Aquifer G near Puget Sound to wells completed in Aquifer E inland several miles. The hydraulic connection between the aquifers in the area is not fully understood. While the total amount of leakage through layers above Aquifer E will remain the same, the pattern of that leakage will change as a result of using different production locations.

During early pumping in Aquifer E, the potentiometric surface will begin to decline as water is removed from storage. As pumping continues, the cone of depression will expand from the pumping centers toward the recharge and/or discharge areas. The lowering of the potentiometric surface will result in either: increased recharge to the aquifer or reduced discharge from the aquifer, or both, in order to balance the withdrawals from pumping. The increased recharge to Aquifer E would come from downward leakage from overlying units. Decreased discharge from Aquifer E would likely result in reduced upward flow to overlying units near Puget Sound and/or a landward shift of the fresh water-salt water mixing zone. If leakage from the overlying units is induced, the overlying units will respond to the lowered potentiometric surface in Aquifer E and water levels in these overlying aquifers will continue to fall until a new "equilibrium" in aquifer pressure is established. Consequently, water levels in the pumping wells (Aquifer E) will only stabilize when a new balance of recharge and discharge is established.

Moving the point of withdrawal upbasin may change the pattern of induced leakage from layers above Aquifer E. However, moving the place of use of the water rights upbasin could potentially benefit the shallow aquifer system by providing groundwater recharge related to water usage (i.e., septic systems, irrigation, leaking water distribution lines and recreational uses). Uncertainties about the pattern of induced leakage from the proposed changes can be managed by post-permit monitoring of water levels in several aquifers, coupled with a condition that requires additional mitigation or cessation of further withdrawals if water level declines in the shallow aquifers are attributed to the additional withdrawals from Aquifer E. See the Withdrawal Management Plan condition in the Provisions and Conditions section of this Report.

Conservation Planning Requirements

The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems, including Lakewood Water District.

The Washington State Department of Health (DOH) is specifically tasked with the development of a conservation/water use efficiency rule. RCW 90.03.386 requires municipal water suppliers to implement cost-effective water conservation in accordance with the DOH conservation/water use efficiency rules, as part of their approved water system plan, and sets minimum conservation requirements for water system plans. It also requires municipal water suppliers to meet current conservation requirements and continue implementing their current programs. Draft conservation/efficiency regulations are currently being prepared by DOH's Drinking Water Program and its Water Use Efficiency Subcommittee. These regulations are expected to be adopted by year-end 2005.

The current Conservation Planning Requirements published by the Departments of Ecology and Health in 1994 identifies the water use reporting, forecasting and conservation program requirements for public water systems. A water conservation plan meeting these requirements is a necessary element of a Water System Plan.

Currently, the elements of a Conservation Plan include 1) water use data collection, 2) water demand forecasting, 3) water conservation program. The Conservation Plan needs to identify goals and objectives, evaluate alternative conservation measures, and identify the selected measures including their schedule, cost, monitoring requirements, and estimated water savings. The Municipal Water Law adds additional requirements for conservation planning programs include increased evaluation of cost-effectiveness of conservation measures and through exploring opportunities for water reclamation.

The Lakewood Water District's water conservation program is called "Water Wise". The plan is outlined in the District's February 2005 Water System Plan. The program complies with the Departments of Ecology and Health's requirements for such programs.

High points of the District's conservation efforts include:

- Continued reduction of the average per capita water demand from 160 gallons per day per capita in 1994 to 147 gallons per capita in 2003 to a targeted 137 gallons per day per capita in 2010;
- Education programs;
- Maintain and further reduce the District's historically low amount of unaccounted for water. Current unaccounted for water is less than 6.5% (1996 - 2003);
- Conservation pricing; and,
- Utility Retro-fits

The Lakewood Water District is currently in compliance with its conservation planning requirements, and will be subject to the newly adopted requirements for systems over 1,000 connections. Specifically:

Section 5(3) – Conservation requirements for systems with 1,000 or more connections

This section provides direction on conservation to water systems with 1,000 or more connections. This includes reporting the conservation measures the utility has put into practice in the past and how those measures have increased their water use efficiency. It also directs water systems that are using inchoate portions of their water right certificates to describe how, through additional cost-effective conservation measures, they could delay the use of their inchoate water rights.

Section 7 – Current conservation programs and the conservation rule

This section directs DOH to develop water conservation rules by the end of 2005 and to involve key stakeholders in the process. It also directs municipal water suppliers to continue meeting the current conservation planning requirements and carry out their current conservation program.

FINDINGS AND CONCLUSIONS:

Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights including the process to amend or change existing rights. Laws specifically governing the water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to these rights are covered primarily under RCW 90.03.380 and RCW 90.44.100.

• **Potential for Enlargement**

No enlargement of the water right will occur under this transfer application. The original certificate is for the instantaneous quantity of 3,900 gpm, and an annual quantity of 6,240 acre-feet/year. The combined rates of withdrawal from the proposed additional wells will not exceed these certificated rates, and will be reduced to reflect actual beneficial use.

• **Same Body of Public Groundwater**

Groundwater in the aquifer system in which the Abitibi wells and the proposed new points of withdrawal (District wells Table 2) are located, is within the hydrogeologic basin that generally defines the Chambers-Clover Creek Basin/Tacoma/Puyallup area of northwestern Pierce County. The wells are all completed in a regional groundwater system consisting of multiple water producing layers and semi-confining units deposited in various glacial and interglacial periods during the last two million years. These units are considered to be hydraulically connected.

The conceptual model of hydraulically interconnected hydrostratigraphic units in the southern Puget Sound is supported in two modeling reports published by the USGS in the Tacoma-Puyallup area (Jones et. al, 1999) and Soos Creek Basin (Morgan and Jones, 1999). Therefore, the existing and proposed points of withdrawal wells should be considered parts of the same body of public water.

• **Potential for Impairment to Neighboring Rights and Instream Flows:**

In evaluating this application Golder Associates reviewed all relevant reports, data collections and information provided by the applicant such as results from a hydrogeological modeling study. Ecology's consultants have not identified any likely cause for impairment resulting from this Application for Change. While increases in leakage between aquifer system may occur as a result of this change they are buffered over a large regional area and are not anticipated to directly affect other water right holder's ability to exercise their rights.

Under the provisions of Chapter 173-512-050 WAC, the Instream Resources Protection Program for the Chambers-Clover Creeks Basin, Water Resource Inventory Area (WRIA) 12 any new applications for ground water must consider the potential impacts to surface water (WAC 173-512-040). Where a proposed groundwater withdrawal or a proposed change in the place of groundwater withdrawal would reduce the flow in surface waters closed to further appropriations, denial is typically required because water is unavailable and withdrawal would be detrimental to the public welfare. It is recognized however, that the District has proposed mitigation measures for this transfer to offset any potential impact of these change applications on the flow of streams closed to further appropriation.

• **Beneficial Use**

According to RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020, municipal supply is considered a beneficial use of water.

• **Public Interest**

No detriment to the public interest could be identified during the investigation of this Application for Change. This transfer will be beneficial to the public interest by providing a reliable drinking water source. Ecology recognizes the access to a reliable source of public water to benefit the public living within the central Pierce County region. Additionally, this transfer will likely benefit the ground water system of the greater Lakewood area by leaving groundwater in shallow source aquifers that would otherwise be withdrawn.

In accordance with chapters 90.03 and 90.44 RCW, it is concluded that these water rights are in good standing and are eligible to be changed. It is determined that the change to 4585-A will not enlarge the certificate and the water use will be beneficial. Approval of this change request will not cause impairment of existing rights or be detrimental to the public interest. Based on these conclusions, this change request should be approved subject to existing rights and provisions and a superseding certificate should be issued.

RECOMMENDATIONS:

It is recommended that this Application for Change be approved and authorization issued to allow maximum instantaneous appropriation outlined in Table 2 of this Report of Examination.

I recommend the issuance of Superceding Water Right Certificates in the following amounts:

- 4585-A issued to Lakewood Water District for municipal supply; 2945 gpm and 4750 acre-feet/year. The period of use is year-round as needed;
- 4585-B issued to Abitibi Consolidated for industrial supply in the amount of 955 gpm, and 1490 acre-feet/year. The period of use is year-round as needed; and,
- 299-A issued to Lakewood Water District for municipal supply in the amount of 1187.5 gpm and 1971 acre-feet/year. The period of use is year-round as needed.

The total amount of this water rights change is 6,721 acre-feet/year. It is recommended that a portion of GWC 4585-A (2945 gpm/4750 acre-feet/year) be transferred subject to the provisions in this Report of Examination. Approximately 955 gpm/1490 acre-feet/year will remain under GWC 4585-B. The transfer of the full amount of GWC 299-A that was beneficially used in 1997 and remains valid and transferable for municipal purposes (1187.5 gpm/1971 acre-feet/year) will be addressed under a separate Report of Examination. The period of use is year-round as needed.

PROVISIONS AND CONDITIONS:

The certificate, when issued, supersedes that of same number issued on August 15, 1963, and is subject to the following provisions.

1. "Withdrawal Management Plan

Approval of this authorization is contingent on the applicant's participation in an active *Withdrawal Management Plan*. The following sections discuss the recommended post-permitting monitoring conditions for the transfer under the pumping regimen proposed by the District. All requested monitoring, metering and mitigation data will be for the previous year shall be submitted in a report format to the Water Resources Program, Department of Ecology, Southwest Regional Office by January 31st each year. It is recommended that when applicable the applicant correlates the data related to surface water flows to a standard water year format.

(a) Water Level Monitoring

Well hydrograph analysis is possibly the best tool to determine the degree of hydraulic continuity between Aquifer E and shallower aquifers and surface water. Hydrographs of District Wells completed in Aquifer E and nearby wells screened in Aquifers A and C indicate that in some cases, the aquifers responded differently to pumping. This difference in response is likely a result of different sources of recharge (e.g., precipitation in shallow aquifers vs. leakage from overlying layers in deeper aquifers). In at least one case (Wells D-2 and D-3), the water level in Aquifer C did not respond to daily pumping of a nearby well in Aquifer E for a period of approximately one month. Comparing water levels in wells completed in Aquifer E to water levels in wells completed in Aquifers A and C will indicate how the shallower aquifers respond to pumping in Aquifer E. Ideally the wells will be "nested" (i.e., located very close to one another, but completed in different aquifers - as some of the District Wells are currently) in order to closely monitor effects of pumping. Aquifer A should be used as an indicator (although not a perfect indicator) for effects of pumping on surface water. If it is found that Aquifer A does not respond to pumping in Aquifer E, then the potential for impacts to surface water is low.

The District has already collected data comparing water levels between the aquifers (Figures 2 through 4) and this data should be expanded to include other wells. This will help determine the hydraulic relationship between Aquifer E and the shallower aquifers where a major confining unit is absent. Much of the future water level monitoring may be done using existing District Wells. A representative sampling scheme should include the following wells:

Well Combination	Relevant Aquifers	Location
Lakewood Water District J-1/J-2	C and E	T20N, R3E - Sec. 31
Lakewood Water District D-3/D-2	C and E	T19N, R2E - Sec. 10
Lakewood Water District V-1 and E-3/E-2	A, C and E	T19N, R2E - Sec. 9 and T19N, R2E - Sec. 10
Lakewood Water District L-1 (2 or 3) and S-1/S-2	A, C and E	T19N, R2E - Sec. 4
Steilacoom Well 2 and Lakewood Water District T-13	A and E	T19N, R2E - Sec. 5
Lakewood Water District H-1 or H-2 (or Nyanza Rd TW) and Lakewood Water District T-4	A and E	T19N, R2E - Sec. 11

In order to help better define the regional aquifer conditions and provide information on potential changes resulting from this transfer, the District will collect publicly available water level data for the wells listed in Table 13. This can include, but is not limited to, data provided directly from the well owner, data collected as part of the Tacoma-Pierce County aquifer monitoring program, or through a cooperative agreement between the well owner and the District to allow the District access to collect measurements.

Table 13. Well Pairs to be Monitored to Determine Impacts to Aquifers A and C in Layer D "Window" (as Part of the Water Level Monitoring Provision)		
Well Name	Screened Aquifer	Location
North Group		
Parkland Well 9	A	T19N, R3E - Sec. 8
Parkland Well 10	C	T19N, R3E - Sec. 8
Parkland Well 11	C	T19N, R3E - Sec. 8
Parkland Well 11	E	T19N, R3E - Sec. 8
Parkland TW*	A	T19N, R3E - Sec. 17
(No accompanying deeper well)	--	--
(No accompanying shallow well)	--	--
Parkland Well 14	E	T19N, R3E - Sec. 15
Parkland Wells 2, 3, 5	C	T19N, R3E - Sec. 9
Parkland TW-7*	E	T19N, R3E - Sec. 9
South Group		
Parkland Well 6	C	T19N, R3E - Sec. 17
Parkland Well 12	E	T19N, R3E - Sec. 17
Spanaway Well 5	C	T19N, R3E - Sec. 21
Parkland Well 8	E	T19N, R3E - Sec. 22
H2O Water System Wells **	?	T19N, R3E - Sec. 22

* This well has not been field verified and may have been abandoned.

** Status of wells is unknown, but wells may be useful for monitoring water levels

The following wells are potential monitoring locations if other wells are unavailable:

- Spanaway Well 6 (Aquifer C) T19N, R3E - Sec. 27
- Spanaway Well 9 (Aquifer C) T19N, R3E - Sec. 23

Spanaway Wells 6 and 9 may not be located on the "window" in Layer D, but may provide helpful water level information in determining the effects to Aquifer C as a result of increased pumping in Aquifer E.

Water level data should be measured weekly, and compiled and submitted to Ecology by January 31st of each calendar year in order to determine if there is any water level decline in Aquifers A and C as a result of increased pumping in Aquifer E. Water level monitoring should begin as soon as possible before increased pumping from Aquifer E commences, in order to establish "baseline" conditions.

The wells presented above are shown to indicate potential monitoring wells. The actual wells used for monitoring could be a subset of that depending on the availability of data and level of access granted to the District by the well owners. Only purveyor wells have been included, with the assumption that access would be easier and water level/pumping records may be easier to obtain and compile.

(b) Water Level Measurements

In order to maintain a sustainable supply of water as well as to ensure that shallow aquifers and surface water sources are not impaired, pumping must be managed so that static water levels do not progressively decline from year to year. Therefore, water levels shall be measured and recorded in all production wells as well as several observation wells, using a consistent methodology.

If pumping from the wells authorized by this water right change results in a decreasing water level trend over a period of three or more years (corrected for any long-term effects related to drought) in any of the subject aquifers, immediate action shall be required to prevent water level declines to continue. These actions include, but are not limited to:

- reducing the instantaneous withdrawal rate (gpm) of the wells, including those owned by the District and its municipal wholesale customers;
- lowering the annual quantity removed from such wells;
- rotating pumping cycles; or,
- turning off certain wells; or,
- implementing additional mitigation strategies; or

Static water levels data shall be recorded and submitted to Ecology in hard copy as well as in digital format and shall include the following elements for each well:

1. Water Right Number
2. Unique Well ID Number
3. Measurement date and time
4. Measurement method (air line, electric tape, pressure transducer, etc.)
5. Well status (pumping, recently pumped, etc.)
6. Water level accuracy (to nearest foot, tenth of foot, etc.)
7. Description of the measuring point (top of casing, sounding tube, etc.)
8. Measuring point elevation above or below land surface to the nearest 0.1 foot
9. Land surface elevation at the well head to the nearest foot.
10. Static water level below measuring point to the nearest 0.1 foot.

For all monitoring wells that will continue to be used as production wells, water levels shall be measured using pressure transducers. Data shall be collected so that minimum and maximum water levels can be determined on a daily basis. For all monitoring wells that are not used as production wells, water levels shall be measured and recorded on a weekly basis.

(C) Water Quality Monitoring

Monitoring chloride concentrations in wells completed in aquifers below sea level near Puget Sound will help determine if reduced discharge from Aquifer E (if any) will result in seawater intrusion. The wells would ideally be located near Puget Sound (e.g., within one-half mile). A review of well logs indicates that there are very few wells that fulfill these criteria. Installing a new "sentinel" well could provide important water quality information but could be quite expensive and must be carefully sited and designed to identify the fresh water-salt water mixing zone. However, since seawater intrusion has not historically been an issue in the Lakewood Area, it is recommended that existing wells be used for monitoring at this time. A minimum monitoring scheme should include annual monitoring in the following wells:

Table 14. Proposed Chloride Monitoring/Sampling Well Locations	
Aquifer	Proposed Well Locations
C	Lakewood Water District O-2 or O-3 (T20N, R2E Sec. 28) or Western State Hospital Well #3 (T20N, R2E Sec. 33)
E	Lakewood Water District N-2 (T20N, R2E Sec. 32)
G	Abitibi Well 3 or 5 (T20N/R2E - Sec. 32) or Abitibi Well 4 (T20N/R2E - Sec. 29)

Water quality measurements should be taken twice yearly, and compiled and submitted to Ecology by January 31st of each calendar year. Lakewood Water District has stated that their current monitoring program includes analysis for seawater intrusion. These data should be compiled into a single repository and serve as a historical record for review by Ecology. Chloride monitoring should begin as soon as possible before increased pumping from Aquifer E commences, in order to establish "baseline" conditions.

If chloride concentrations are found to reach 100 mg/L or greater in the above mentioned wells, it is recommended that Ecology evaluate water level and water quality data in order that mitigative measures can be taken to reduce pumping from wells that may be responsible for the increase in chloride concentration.

(D) Metering Requirements

Approved measuring devices shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows the water user to petition Ecology for modifications to some of the requirements.

It is recognized that individual wells will be pumped for short periods of time at rates higher than the total average instantaneous rate, but the annual quantity for each well will not exceed the amounts indicated in Table 2 of this Report of Examination. In accordance to WAC 173-173-060, it is recommended that the pumping wells involved with this transfer (see Table 2 of this Report of Examination) be individually metered in order to determine weekly and annual amounts of withdrawal, as well as maximum rate of withdrawal.

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

A water level monitoring plan developed and implemented prior to the start of pumping in Aquifer E would provide a mechanism to evaluate the accuracy of the groundwater model assumptions and conclusions

(E) Mitigation Provision

Issuance of this approval is contingent on the submittal of an annual report that details mitigation activities. The method of determining the total annual offset is outlined in the Mitigation Plan section of this Report of Examination. The plan should include:

- the total annual quantity of water pumped from the Abitibi water rights from Aquifer E wells;
 - the total annual quantity of water pumped from Aquifer E wells under authorization from the District's existing water rights; and,
 - the total annual amount of offset provided by one or more of the mitigation resources management techniques described in this Report of Examination (with mitigation itemized by each source)
2. "If water levels continue to decline as a result of this water right change, even after corrective measures are taken, the Department may initiate regulatory action under Chapter RCW 43.27A to prevent impairment of existing rights or violation of the WRIA 12 stream closures at WAC 173-512-030."
 3. "If it can be shown that the requested change has the effect of impairing existing rights, it shall be the responsibility of the water right holder to mitigate for this impact and/or alter or cease withdrawal of water to prevent such impairment."
 4. The water appropriated under this application will be used for public water supply. The State Board of Health rules require public water supply owners to obtain written approval from the Office of Water Supply, Department of Health, 1112 SE Quince Street, PO Box 47890, Olympia, Washington 98504-7890, prior to any new construction or alterations of a public water supply system.

5. Water System Planning

Issuance of this approval is subject to implementation of all required conservation and planning standards. The Department of Health (DOH), Office of Drinking Water is directed by the legislature to adopt water use efficiency rules by December 2005. This new rule is a requirement of the Municipal Water Supply - Efficiency Requirements Act, Chapter 5, Laws of 2003 First Special Session. DOH has drafted proposed revisions to the Group A Public Water Systems rule, chapter 246-290 WAC. Specifically:

- Water Use Efficiency Planning Requirements - As part of a water system plan or small water system management program, municipal water system will have to collect data, forecast demand, and evaluate leakage and water use efficiency measures (including rates that encourage water use efficiency).

- Distribution Leakage Standard – Municipal System will be required to meet a state leakage standard of 10% or less in order to minimize loss of water from leakage in the distribution system.
 - Water Use Efficiency Goal Setting and Performance Reporting – Municipal System will be required to set water use efficiency goals through a public process and report to DOI and the public on their performance.
 - Lakewood Water and all wholesale water customers are required to be in compliance with the standards adopted under WAC 246-290.
6. This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Tribes under treaty or settlement.

ATTACHMENTS:

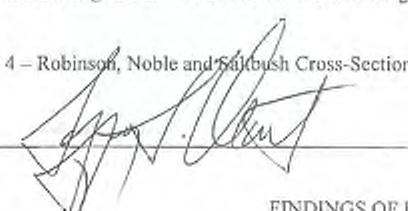
Figures

- Figure 1 – Location of Selected Wells in the Lakewood Area
- Figure 2a-2c – District Well J-1/J-2 Hydrograph Comparison and Daily Production
- Figure 3a-3c – District Well D-1/D-2 Hydrograph Comparison and Daily Production
- Figure 4a-4c – District Well E-1/E-2 Hydrograph Comparison and Daily Production
- Figure 5 – USGS Stream Gage Data – North Clover Creek Average Daily Flow 1990-2003

Appendix A

- Figures 2, 3, and 4 – Robinson, Noble and Saltbush Cross-Sections, 2004

REPORT BY: _____



DATE: _____

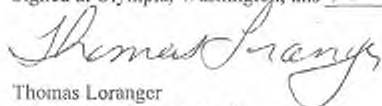
Feb 14, 2007

FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the requested Application for Change have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a superseding certificate be issued under Water Right Number 4585A, subject to existing rights and indicated provisions, to allow appropriation of public water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 14th day of February, 2007.



Thomas Loranger
Water Resources Section Manager
Southwest Regional Office



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
APPLICATION FOR CHANGE
SECOND AMENDED REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

Ground Water (Issued in accordance with the provisions of Chapter 253, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
January 4, 1949	1050	947	299A

NAME	(CITY)	(STATE)	(ZIP CODE)
Lakewood Water District	Lakewood	Washington	98499-0729
ADDRESS (STREET)			
11900 Gravelly Lake Drive			

PUBLIC WATERS TO BE APPROPRIATED

SOURCE:
11 Wells (D-2, J-2, E-2, F-2, K-1, K-2, Q-1, S-2, R-1, N-1, Steilacoom Well 4)
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1187.5	1971

QUANTITY, TYPE OF USE, PERIOD OF USE
1971 Acre-feet per year Municipal supply Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
See under Background section.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
Multiple locations - see table under Background section.				12	Pierce

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lakewood Water District and through interties to other municipal water systems within the Water Cooperative of Pierce County. The place of use of this water right is the wholesale and retail service area described in the Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS

Multiple wells, see Table 2 of this Report of Examination. This system is identified by the Washington State Department of Health by Public Water System ID 45550.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: November 1, 2007	WATER PUT TO FULL USE BY THIS DATE: November 1, 2015
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REPORT

BACKGROUND INFORMATION:Location of Diversion/Withdrawal

Proposed Point of Withdrawal	Water Right Number	Well Location	Parcel Number	TRS
D-2	601-A	2,600 ft north and 1,850 ft east from the SW corner of Section 10	472500-309-0	T19N/R2E - Sec. 10 NE SW
J-2	4184-A	2,460 ft south and 2,300 ft east from NW corner of Section 31	03-20-31-2-080	T20N/R3E - Sec. 31 SE NW
E-2	4485-A	2,600 ft south and 800 ft east from the NW corner of Section 10	02-19-10-2-014	T19N/R2E - Sec. 10 SW NW
F-2	5574-A	2,500 ft south and 120 ft west from the NE corner of Section 2	02-19-02-8-002	T19N/R2E - Sec. 2 SE NE
K-1/K-2	5541-A	1,500 ft north and 340 ft east from the SW corner of Section 2	R503000-292-0	T19N/R2E - Sec. 2 NW SW
Q-1	G2-21391C	120 ft north and 712 ft west from the SE corner of Section 4	414520-021-1	T19N/R2E - Sec. 4 SE SE
S-2	G2-27158C	1,600 ft south and 400 ft west from the NE corner of Section 4	590000-020-4	T19N/R2E - Sec. 4 SE NE
R-1	G2-26833C	150 ft south and 2,600 ft east from the NW corner of Section 11	309700-031-1	T19N/R2E - Sec. 11 NE NW
N-1	4447-A	2,350 ft south and 2,570 ft east from the NW corner of Section 32	220324046	T20N/R2E - Sec. 32 NW SE
Steilacoom Well 4	G2-00890C	1,200 ft south and 2,300 ft east from the NW corner of Section 32		T20N/R2E - Sec. 32 NE NW

On December 9, 2002, Randall Black on behalf of Lakewood Water District (District) filed two *Applications for Change of Water Rights* with the Department of Ecology. These applications were filed on Ground Water Certificates 299-A and 4585-A, to change the purpose of use, place of use and point of withdrawal on water right certificates originally issued to West Tacoma Newsprint from commercial industrial purposes associated with paper manufacturing to municipal supply.

These applications were co-signed by Ken Campbell on behalf of Abitibi Consolidated which is the successor in interest of the original facility. The requested change in the place of use is from the original area associated with the industrial plant (described on page 3 of this Report of Examination) to the regional water supply served by Lakewood Water District and its wholesale water customers, (area described in pages 1 and 2 of this Report of Examination).

The requested change in the points of withdrawal is from three wells (located near Chambers Bay in Steilacoom, WA) formerly operated by the Abitibi Consolidated Sale Corporation (Abitibi), to 11 wells operated by the District (located between 0.6 and 5.3 miles inland). This Report of Examination deals with GWC 4585-A. The District seeks to change a portion of GWC 4585-A (3,071 acre-feet/year) and all of GWC 299-A (3,650 acre-feet/year) to total 6,721 acre-feet/year. Because the two water rights are so closely linked for the purposes of this transfer, this Report of Examination will describe attributes of both water rights.

The three Abitibi wells are completed in Aquifer G. This transfer seeks to move the point of withdrawal for approximately five of the six million gallons per day (MGD) from the certificated Abitibi Wells to nine District wells completed in Aquifer E and maintain one MGD of production from two District wells completed in Aquifer G. Currently, the water associated with GWC 4585-A and GWC 299-A is used onsite at the Abitibi facility, located near sea level. This water rights transfer would move the place of use inland several miles to the area served by the District and several other water purveyors.

Under RCW 90.44.100, the Department of Ecology is permitted to change an existing groundwater right after publication of a notice of the application and investigations as prescribed in the case of an original application. A public notice detailing this proposed change was published in the Tacoma News Tribune on February 4th and 9th, 2003. In response to the notice Tacoma Public Utilities (TPU) protested the Abitibi transfer in a letter to Ecology dated March 3, 2003. TPU indicated that they hold senior water rights in the Chambers/Clover Creek Basin and believes that these rights would be impaired and streamflows possibly reduced as a result of the Abitibi transfer. TPU also raised issues relating to public water system planning, and conservation planning. Additionally, Ecology received a comment letter from Pierce County Public Works. The County indicated that they supported the intent of these transfer requests, provided that the

District's activities would not impact the County's ability to develop their own groundwater source, located adjacent to Abitibi property on the County owned Chambers Creek Properties.

In evaluating a request to change a water right under RCW 90.44.100 and RCW 90.03.380, the Department of Ecology must find that the proposed change does not alter the original finding, i.e., that: (1) water is available for appropriation; (2) the appropriation/change is for a beneficial use; (3) the change will not impair existing water rights; and (4) the change will not be detrimental to the public interest.

The following tables contain information about the existing and proposed points of withdrawal:

Well Name	Associated Water Right	TRS ¼ ¼	Priority Date	Screened Interval (feet amsl)	Screened Aquifer	Qi (gpm)	Qa (A-F/yr)
Abitibi Well 3	229-A	T20N/R2E - Sec. 32 NW NE	1/4/49	-530 to -840 and -980 to -1070	G or deeper	2,250	3,650
Abitibi Well 4	4585-A	T20N/R2E - Sec. 29 SW SE	10/16/58	-790 to -840 and -1010 to -1060	G or deeper	3,900	6,240
Abitibi Well 5		T20N/R2E - Sec. 32 NW NE		-709 to -860	G or deeper		

The purpose of use for certificate 299-A is manufacturing and industrial and the purpose of use for Certificate 4585-A is industrial processing. The District proposes to transfer rights from the Abitibi Wells to existing District wells located on Figure 1 of this report. Depth and location information for the District Wells is listed in the following table (sorted by priority date).

Well Name	Associated Water Right	TRS ¼ ¼	Priority Date	Screened Interval (feet amsl)	Existing Rights		Proposed Changes		
					Primary Qi [Qa] gpm [A-F/yr]	Supplemental Qi [Qa] gpm [A-F/yr]	Proposed Additional Average Qi [Qa] gpm [A-F/yr]	Proposed Additional Qi (gpm)	
Aquifer E Wells									
D-2	601-A	T19N/R2E - Sec. 10 NE SW	10/9/47	-199 to -227	2,000 [706]	0 [0]	170 [275]	510	
J-2	4184-A	T20N/R3E - Sec. 31 SE NW	11/17/61	-266 to -295	0 [0]	1,500 [2,400]	337 [541]	1,010	
E-2	4485-A	T19N/R2E - Sec. 10 SW NW	11/5/62	-191 to -214	0 [0]	1,200 [1,920]	170 [275]	510	
F-2	5574-A	T19N/R2E - Sec. 2 SE NE	10/29/65	-225 to -280	0 [0]	1,000 [1,662]	690 [1,110]	2,070	
K-1/K-2	5541-A	T19N/R2E - Sec. 2 NW SW	7/6/66	K-1 = -255 to -321 K-2 = -247 to -322	0 [0]	2,600 [4,160]	700 [1,130]	2,100	
Q-1	G2-21391C	T19N/R2E - Sec. 4 SE SE	8/10/73	-220 to -286	1,500 [2,000]	0 [0]	700 [1,130]	2,100	
S-2	G2-27158C [#]	T19N/R2E - Sec. 4 SE NE	7/8/87	-211 to -285	1,850 [1,480]	0 [0]			
R-1	G2-26833C	T19N/R2E - Sec. 11 NE NW	12/11/85	-244 to -302 (in various intervals)	1,500 [1,200]	1,500 [1,200]	700 [1,130]	2,100	
Aquifer G Wells									
N-1	4447-A [#]	T20N/R2E - Sec. 32 NW SE	5/9/62	-717 to -834	0 [0]	3,000 [4,800]	700 [1,130]	2,100	
Steilacoom Well 4	G2-00890C ^{#5}	T20N/R2E - Sec. 32 NE NW	12/7/70	-725 to -771	0 [0]	1,500 [672]			
						Expected Average Pumping Rate (gpm):		4,167	
						[Total Additional Proposed Qa (A-F/yr)]:		[6,721]	

Note: Proposed Maximum Qi represents the amount requested by the District to allow them operational flexibility in meeting peak demand.

= Denotes more than one well may be associated with this water right

§ = Lakewood Well N-1 has been added as an additional point of withdrawal to this certificate

Attributes of the Original Certificate 4585-A

Name on Certificate:	West Tacoma Newsprint
Priority Date:	October 15, 1958
Instantaneous Quantity:	3,900 gallons per minute (gpm)
Annual Quantity:	6,240 acre-feet per year (acre-feet/year)
Point of Withdrawal:	SW ¼, SE ¼, Section 29, Township 20 North, Range 2 East W.M. (Well 4) NW ¼, NE ¼, Section 32, Township 20 North, Range 2 East W.M. (Well 5)
Purpose of Use:	Industrial Processing
Period of Use:	Continuously
Place of Use:	Beginning at the Northwest corner of a tract of land occupied by the Western

Washington Institute for the Insane, said point being also the Northeast corner of the Southern Pacific Land Company's Silver Beach Addition to Steilacoom, said point of beginning being in Section Thirty-two (32) Township Twenty (20) North, Range Two (2) East of the Willamette Meridian; thence easterly along the south line of Thomas M. Chambers' Donation Land Claim six hundred thirty-three (633) feet; thence northerly at right angles fifteen hundred seventy-four (1,574) feet; thence westerly on a line parallel with the south boundary line of said Donation Land Claim ten hundred fifteen (1,015) feet to intersect the southerly line of a proposed waterway, as shown upon a certain map made for Tacoma Company by L.A. Nicholson entitled: "Tacoma Land Company Map of Steilacoom Creek Waterway and platted tide lands, with depths of water"; thence south-westerly on a compound curve to the right along said line of waterway six hundred fifty (650) feet; more or less, to intersect a line at right angles to said south line of said Donation Land Claim nine hundred forty-three (943) feet west of the point of beginning; thence south at right angles to said south line of said Donation Land Claim twelve hundred sixty (1,260) feet, more or less, to intersect said south line of said claim; thence east along said south line of said claim to point of beginning, containing approximately fifty-four and forty-two one-hundredths (54.42) acres (excepting therefrom right-of-way of the Tacoma Railway & Power Company); also all tide or shorelands appurtenant to the above described real property.

Proposed Change

Name of Applicant:	Lakewood Water District
Date of Application for Change:	December 9, 2002
Instantaneous Quantity:	2,945 gallons per minute (gpm)
Annual Quantity:	4750 acre-feet per year (acre-feet/year)
Point of Withdrawal:	11 wells (see Table on page 3 of this Report of Examination)
Purpose of Use:	Municipal
Period of Use:	January to December
Place of Use:	Within a place of use consistent with the Updated Pierce County Coordinated Water

System Plan; including the area served by Lakewood Water District and through interties to members of the Water Cooperative of Pierce County and other purveyors in central and eastern Pierce County. Purveyors receiving water may include, but are not limited to, Curran Road Water, City of Fife, City of Fircrest, Firgrove Mutual, Fruitland Mutual, Lakewood Water District, Parkland Water, City of Puyallup, Rainier View Water, Town of Steilacoom and Summit Water. Water will be used in a manner and location consistent with the individual water system plans of these purveyors.

Attributes of the Original Certificate 299-A

Name on Certificate:	West Tacoma Newsprint
Priority Date:	January 4, 1949
Instantaneous Quantity:	2,250 gallons per minute (gpm)
Annual Quantity:	3,650 acre-feet per year (acre-feet/year)
Point of Withdrawal:	NW ¼, NE ¼, Section 32, Township 20 North, Range 2 East W.M. (Well 4)
Purpose of Use:	Commercial/Industrial
Period of Use:	Year-round, as needed
Place of Use:	Beginning at the Northwest corner of a tract of land occupied by the Western

Washington Institute for the Insane, said point being also the Northeast corner of the Southern Pacific Land Company's Silver Beach Addition to Steilacoom, said point of beginning being in Section Thirty-two (32) Township Twenty (20) North, Range Two (2) East of the Willamette Meridian; thence easterly along the south line of Thomas M. Chambers' Donation Land Claim six hundred thirty-three (633) feet; thence northerly at right angles fifteen hundred seventy-four (1,574) feet; thence westerly on a line parallel with the south boundary line of said Donation Land Claim ten hundred fifteen (1,015) feet to intersect the southerly line of a proposed waterway, as shown upon a certain map made for Tacoma Company by L.A. Nicholson entitled: "Tacoma Land Company Map of Steilacoom Creek Waterway and platted tide lands, with depths of water"; thence south-westerly on a compound curve to the right along said line of waterway six hundred fifty (650) feet; more or less, to intersect a line at right angles to said south line of said Donation Land Claim nine hundred forty-three (943) feet west of the point of beginning; thence south at right angles to said south line of said Donation Land Claim twelve hundred sixty (1,260) feet, more or less, to intersect said south line of said claim to point of beginning, containing approximately fifty-four and forty-two one-hundredths (54.42) acres (excepting therefrom right-of-way of the Tacoma Railway and Power Company); also all tide or shorelands to the above described real estate.

Purpose of the Change Application

Lakewood Water District plans to use existing and proposed interties to provide wholesale water supply to water systems located east of the District's retail water service area boundary within central Pierce County. These *Applications for Change* are intended to provide additional primary water rights for future growth within the District's retail service area and for wholesale delivery to water purveyors within Central Pierce County.

Lakewood Water District is among the largest water purveyors in central Pierce County, serving a population of 61,000 people and over 16,000 service connections. The District currently provides wholesale water supply to the Town of Steilacoom and Summit Water and Supply Company through water systems interties.

The intent of these *Applications for Change* was to allow for the wholesale distribution of water through interties between neighboring water purveyors, specifically, the Water Cooperative of Pierce County.

The Water Cooperative of Pierce County (Cooperative) is organized under Chapter 24.06 RCW State of Washington. Current members include Lakewood Water District, Fruitland Mutual Water, Spanaway Water Company, Summit Water and Supply Company, Mountain View Edgewood, Parkland Light and Water, Valley Water District, City of Puyallup, and Rainier View Water.

Several of these neighboring water systems are experiencing demands for new water connections that either exceed their current water right capacity or will do so in a matter of years.

The intent of this change is to make water available to the Cooperative members who have either identified a deficit in their future water needs, or may elect to purchase water instead of pursuing development of their own sources.

The 2001 Pierce County Coordinated Water System Plan includes estimates of future water demands for many of the areas largest municipal water purveyors. Based on the approximate calculations provided by the planning document and current water right allocations for Lakewood, Puyallup, Spanaway, Summit and Fruitland, there is a potential regional demand for an additional 10 million gallons per day.

The District's own future (20 year and beyond) water demand ranges between 11.24 MGD and 14.05 MGD (between 12,600 and 15,736 acre-feet/year).

Wholesale water distribution for the Central Puget Sound area remains somewhat fluid. Many water purveyors have the option of purchasing wholesale water directly from the Tacoma Public Utility system, but can also purchase wholesale water from the District or Pierce County. Lakewood Water District has the existing ability to provide wholesale water to neighboring water purveyors through interties, and the Abitibi water rights will enhance the District's water supply available for wholesale distribution to members of the Cooperative. The following table illustrates that there is a greater demand for drinking water among members of the Cooperative than the quantity of the Abitibi water rights:

Potential Wholesale Water User	Current Water Rights (acre-feet/year)	Base Case Water Demand (acre-feet/year)	High Case Water Demand (acre-feet/year)	Deficient (high case) (acre-feet/year)
City of Puyallup	11,478	7,302	12,913.6	1,435
Spanaway Water	3,002	4,670.4	8,209.6	5,207
Summit Water	3,091	2,928	3,416	325
Fruitland Mutual	2,337	2,228.8	3,998.4	1,661
Lakewood Water District	14,252	12,588.8	15,736	1,484
			Total:	10,112

With this water rights transfer, the District intends to provide for future planned growth for a 50-year demand projection, within the District's service area and the service areas of other purveyors within central and eastern Pierce County. With the Abitibi change applications (229-A and 4585-A), the District would like to add as much water as needed to total 4,167 gpm (6.0 MGD) and 6,721 acre-feet/year as municipal supply. The District seeks to change all of GWC 299-A and a portion of GWC 4585-A to total 6,721 acre-feet/year, or 6.0 million gallons per day (MGD) for future average daily demands. The District has identified the following wholesale customers and potential purchase quantities:

Customer	Potential Purchase From Lakewood (MGD)	WRIs Included in Service Area
Fruitland Mutual Water Company	0.25 to 1.0	10
City of Puyallup Public Works	0.5	10
Rainier View Water Company	1.0 to 2.0	11 and 12
Spanaway Water Company	0.5 to 2.0	12
Summit Water and Supply Company	0.5 to 2.0	10 and 12
Total:	Up to 4.0	

The District intends to offer four of the six MGD for sale and to retain two MGD for meeting demand growth within its service area. The WRIs are estimated to receive the following quantities of water as a result of this transfer:

- WRIA 10 - 1.5 MGD
- WRIA 11 - 0.5 MGD
- WRIA 12 - 4.0 MGD (includes two MGD retained for use by Lakewood Water District)

INVESTIGATION:

This application is being processed under the Department of Ecology (Ecology) Cost-Reimbursement Program, under agreement between Ecology and Golder Associates Inc. (Golder). Golder reviewed available documents pertaining to the District's application site conditions, historical water use, projected water demand and existing water right holders. This report has been prepared under the scope of work provided in CRS No. 9R09, and to address regulatory issues outlined in RCW 90.44.100 (Amendment to permit or certificate, replacement or new additional wells) and Chapter 173-512-30 WAC (surface water closures).

Site Description

The Lakewood area is part of a broad upland glacial drift plain, which is up to 450 feet in elevation in the area. The upland is bordered on the western margin by Puget Sound, which it sits above on a series of bluffs. The channels of Chambers and Clover Creeks are

incised into the drift plain in some locations and likely follow the former path of glacial meltwater streams. The surface elevations in WRIA 12 are highest in the southeast and decrease northwestward toward Puget Sound. This trend is reflected in the orientation of the hydrostratigraphic units underlying the region.

Hydrogeologic/Hydrologic Assessment

The following hydrogeologic information is excerpted from a memorandum to the Department of Ecology dated June 27, 2005 written by Jim Bailey, Licensed Hydrogeologist and Tim White, Licensed Geologist, Golder Associates, Inc. of Redmond, Washington.

A version of the WRATS database (current as of December 2003) was queried to determine existing water rights within the estimated radius of influence of the District Wells. Well logs on file at Ecology and included in the water rights files were also examined to determine the hydrogeologic conditions in the vicinity each well. Information on regional hydrogeologic data was obtained from the following resource material:

- AGI Technologies. 1998. Report of 1995 Ground Water Studies South Tacoma Aquifer System, Tacoma, Washington. Volumes I and II.
- Borden, R.K. and Troost, K.G. 2001. Late Pleistocene Stratigraphy in the South-Central Puget Lowland, Pierce County, Washington. Washington Division of Geology and Earth Resources Report of Investigations 33, Washington State Department of Natural Resources.
- Brown and Caldwell, Sweet Edwards and Associates, Inc., and Robinson, Noble and Saltbush, Inc. 1985. Clover/Chambers Creek Geohydrologic Study: prepared for Tacoma-Pierce County Health Department, Final Report.
- Brown and Caldwell, Inc., Adolfsen Associates, Inc., Sweet-Edwards/EMCON, Inc., Robinson, Noble and Saltbush, Inc., and Triangle Associates. 1990. Draft Clover/Chambers Creek Basin Ground Water Management Program and Environmental Impact Statement, with Technical Appendices.
- Garling, M. E., Dee Molenaar, and et al. 1965. Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands, State of Washington, Department of Conservation, Washington Division of Water Resources.
- Jones, M. A. 1996. Thickness of Unconsolidated Deposits in the Puget Sound Lowland, Washington and British Columbia, a Contribution of the Regional Aquifer-System Analysis Program. Tacoma, Washington: U.S. Geological Survey.
- Jones, M.A., Orr, L.A., Ebbert, J.C., and S.S. Sumioka. 1999. Ground-Water Hydrology of the Tacoma-Puyallup Area, Pierce County Washington. Water-Resources Investigations Report 99-4013.
- Kahle, S. C. 1998. Hydrogeology of Naval Submarine Base Bangor and Vicinity, Kitsap County, Washington, U.S. Geological Survey.
- Morgan, D.S. and Jones, J. L. 1999. Numerical Model Analysis of the Effects of Ground-Water Withdrawals on Discharge to Streams and Springs in Small Basins Typical of the Puget Sound Lowland, Washington. U.S. Geological Survey Water-Supply Paper 2492.
- Noble, J. B. 1990. Proposed Revision of Nomenclature for the Pleistocene Stratigraphy of Coastal Pierce County, Washington, Washington Division of Geology and Earth Resources.
- Robinson and Noble, Inc. 1995. Water Rights Investigation for Water Cooperative of Pierce County. 50pp, appendices and maps.
- Robinson, Noble and Saltbush, Inc. 2003. Analysis of Potential Benefits to the Shallow Groundwater Regime from Abitibi Water Rights Transfer for Lakewood Water District. September 2003 Memorandum to Lakewood Water District and Department of Ecology.
- Robinson, Noble and Saltbush, Inc., Brown and Caldwell, Inc., Applied Environmental Services, Inc., and Water Rights, Inc. 2003. Chambers-Clover Technical Assessment Final Report. Prepared for the Tacoma-Pierce County Health Department, with the assistance of the Chambers-Clover Planning Unit.
- Robinson, Noble and Saltbush, Inc. 2004. Aquifer E Flow Modeling of Abitibi Water Rights Transfer Lakewood Water District.
- Tacoma Pierce County Health Department, Triangle Associates, Inc., and TetraTech/KCM. 2004. Chambers-Clover Watershed Management Plan. Ecology Grant Number G9900033.
- Walters, K.L. and Kimmel, G.E. 1968. Ground-Water Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington.

Also examined for this transfer was the District's mitigation strategy, which was detailed in a January 23, 2004 memo from Thomas M. Pors (representing Lakewood Water District) to Jill Walsh (Ecology). The memo is titled "Water Resource Management and Mitigation Plan - Lakewood Water District - Abitibi Consolidated Water Right Change Applications, GWC-0229 and GWC-4585". Potentiometric surface maps and isopach maps are available in the WRIA 12 Technical Assessment (Robinson, Noble and Saltbush, 2003).

State Environmental Policy Act (SEPA)

A Mitigated Determination of Non-significance was issued by the Lakewood Water District on April 27, 2005. A 14-day comment period concluded on May 11, 2005. Comments were received and responded to directly by Lakewood Water.

Existing Rights for the Lakewood Water District System

Withdrawals from the Lakewood Water System are authorized by the following water rights:

Table 5. Water Rights Held by the Lakewood Water District

Water Right Number	Well(s)	Qi (gpm)	Qa Primary (acre-feet/year)	Qa Supplemental * (acre-feet/year)	Priority Date	Original Point of Withdrawal
146-D	A-1	380	410	0	9/26/1997	T19N/R02E-16
148-D	D-3	400	520	0	1/1/1925	T19N/R02E-10 NE/SW
149-D	D-3	600	732	0	1/1/1925	T19N/R02E-10 NE/SW
601-A	D-2	2,000	706	0	10/9/1947	T19N/R02E-10 SE/NW
717-A	G-1,G-2	3,000	3,000	0	6/15/1950	T19N/R02E-01 NW/SE
1305-A	J-1	1,500	2,000	0	12/6/1950	T20N/R03E-31
1289-A	H-1	2,000	32	2,468	2/21/1951	T19N/R02E-14 NW/NE
1370-A	I-2	1,500	0	1,193	12/7/1951	T20N/R02E-34 SW/NW
3830-A	L-1	950	1,520	0	2/2/1960	T19N/R02E-04
3751-A	A-2	750	1,200	0	2/2/1960	T19N/R02E-16
3831-A	H-2	800	1,080	200	2/2/1960	T19N/R02E-14 NE/NW
4183-A	L-2	1,500	0	2,400	11/17/1961	T19N/R02E-04
4184-A	J-2	1,500	0	2,400	11/17/1961	T20N/R03E-31
4447-A	N-1,N-2	3,000	0	4,800	5/9/1962	T20N/R02E-32
4485-A	E-2	1,200	0	1,920	10/15/58	(Well 4) T20N/R2E-29 SW/SE (Well 5) T20N/R2E-32 NW/NE
5194-A	O-1	800	0	1,280	12/1/1964	T20N/R02E-27 NW/SW
5573-A	A-3	1,500	0	2,400	10/29/1965	T19N/R02E-16
5574-A	F-2	1,000	0	1,600	10/29/1965	T19N/R02E-02 NE/SE
5540-A	O-2	1,100	0	1,760	7/5/1966	T20N/R02E-28
5541-A	K-1,K-2	2,600	0	4,160	7/6/1966	T19N/R02E-02
6840-A	P-1,P-2	3,000	0	2,400	1/31/1969	T20N/R02E-36
7319-A	L-3	900	720	0	7/28/1970	T19N/R02E-04 SW/SW
7320-A	I-3	1,200	160	0	7/28/1970	T20N/R02E-34
G2-21391	Q-1	1,500	870	1,130	8/10/1973	T19N/R02E-04 SE/SE
G2-23869	I-4	1,500	0	1,200	6/24/1975	T20N/R02E-34 SW/NW
G2-26246	O-3	1,000	490	310	10/29/1982	T20N/R02E-28 SE/SW
G2-26833	R-1	1,500	812	388	12/11/1985	T19N/R02E-11 NE/NW
G2-27158	S-1,S-2	1,850	0	1,480	7/8/1987	T19N/R02E-04 SE/NE
G2-27280	Q-3	350	0	280	2/16/1988	T19N/R02E-04 SE/SE
G2-28431	U-1	880	0	710	3/20/1992	T20N/R02E-26 SE/SE
Total:		41,760	14,252			

*Note: The intent of the "supplemental" or "Alternate" designation is to provide the purveyor with flexibility in deciding which wells to operate, within the total primary allocation. The annual quantity of these Supplemental/Alternate rights is not additive, and it is the responsibility of the purveyor to operate the wells so that the total annual primary allocation is not exceeded.

The total annual quantity of water allocated to Lakewood Water District under existing permits and certificates is 14,252 acre-feet/year. Supplemental annual quantities in excess of that figure have been approved for augmentation of the water system supply.

Neighboring Groundwater Rights

Certificates and Permits

Water rights and well logs were examined in order to determine water right holders that may potentially be impaired by increased pumping in the District's Wells. Using the estimated 10-foot drawdown contour from the Aquifer E modeling report (Figure 7 - Robinson, Noble and Saltbush, 2004) as a guideline, water rights for neighboring wells were identified. The search area has an approximate radius of 12 miles (Figure 1). Water rights (primary certificates and permits) for wells completed in Aquifer E or deeper were identified and are presented below (sorted by priority date):

Table 6. Neighboring Certificates and Permits

Water Right Number	Owner Name	Priority Date	Purpose of Use *	Drawdown Available at Time of Drilling (feet)	TRS ¼ ¼
211-A	Pioneer Sand & Gravel Co	5/20/1948	CI	Well completed in Aquifer G	T20N/R02E-20 SE/SW
1738-A	West Tacoma Newsprint Co	8/28/1953	CI	169	T20N/R02E-29 SW/SE
2678-A	Tacoma Meats Inc	11/9/1953	DS IR	225	T19N/R03E-23 NE/NW
G2-*09400C	Pierce Cnty Dept Public Works & Utility	4/22/1968	CI	Well is screened in Aquifer G or deeper	T20N/R02E-20 SW/SE
7025-A	WA DOI/Western State Hospital	10/21/1968	DM	No well log could be located for this well	T20N/R02E-33 NE/NW
G2-26905C	WA Department Of Fish & Wildlife	5/9/1986	FS	202	T20N/R02E-27 SW/SE
G2-27450	DuPont City	11/7/1988	MU	Well log did not provide a static	T19N/R01E-25 NW/SW

Table 6. Neighboring Certificates and Permits

Water Right Number	Owner Name	Priority Date	Purpose of Use *	Drawdown Available at Time of Drilling (feet)	TRS ¼ ¼
				water level	
G2-27860	Tacoma City	8/14/1990	MU	Well is screened in Aquifer G or deeper	T20N/R03E-30 NE/SW
G2-27958C	SPANAWAY WATER CO	11/5/1990	MU	160	T18N/R03E-04 SW/SE

* CI = Commercial/Industrial; DS = Domestic single; DM = Domestic Multiple; FS = Fish Propagation; IR = Irrigation; MU = Municipal

The amount of available drawdown at time of drilling was determined by finding the difference between the static water level and the depth to the top of the well screen. In some cases the water level data is quite old (>50 years). In order to provide additional certainty that senior rights in Aquifer E (or other aquifers) will not be impaired from exercising their rights, additional water level and aquifer response data collection have been recommended (see discussion below in *Withdrawal Management Plan - Water Level Monitoring Provisions*).

Claims

Groundwater claims are filed by individuals indicating that they have used water since before the establishment of the Groundwater Code in 1945. Their acceptance as a valid right usually requires a general water right adjudication. Claims are often associated with shallow, low yield domestic water wells that served private domestic homes or small hobby farms. Because the area is now served by water purveyors, it is likely that most wells associated with claims have been abandoned and homes are now connected to municipal water supply. Additionally, most wells associated with water rights claims likely tap only shallow water-bearing units and are likely to be relatively unaffected by pumping in Aquifer E or below. Therefore claims were not addressed in this water rights evaluation.

Site Visit

On March 18, 2005 Jill Walsh of Ecology, and Jim Bailey of Golder Associates meet with Ken Campbell of Abitibi Corporation to tour the Abitibi site. Each of the three Abitibi wells were visually inspected and photographed. Well 5 was the only well still being actively used. Wells 3 and 4 were not in use during the site visit, but the pumps were still in the wells. Groundwater was flowing from both Well 3 and 4 due to natural hydrostatic pressure. All of the well sites are located inside a guarded fenced area where access is controlled through a gate. In addition to visiting the Abitibi site, Golder and Ecology have at various times visited and/or inspected the Lakewood Water District wells identified in this ROE.

Topographic and Local Area Maps

The following USGS 7.5-minute topographic maps were examined during this investigation:

- Steilacoom
- Tacoma South
- Fort Lewis
- Spanaway
- Frederickson
- McNeil Island
- Puyallup
- Nisqually

Lakewood Water District Water System Plan

The Department of Ecology is in receipt of the Lakewood Water Districts Comprehensive Water System Plan dated February 2005. This document has been reviewed to determine water right consistency, and to review demand forecasting calculations and evaluated the District Conservation Program.

Pierce County Coordinated Water System Plan

The District's proposal is generally consistent with Section IX of the Pierce County Coordinated Water System Plan which was adopted on November 26, 1996. Page IX-12 of the CWSP provides:

It is recommended that the individual systems [Cooperative members] continue to develop groundwater resources in their service areas to the extent that the groundwater aquifer will sustain the use and it is feasible to secure a water right. There may be opportunities for joint development of wells and/or storage by adjacent systems. . . . As a further step in regional cooperation, it is recommended that the area to be served by the water right include the entire service area of the Cooperative. . . . Further, it is suggested that filing for new water right also identify the entire area.

Hydrologic Analysis

Lakewood Water District serves a region of northwestern Pierce County (Figure 1). This area of Pierce County is at the southern end of the Puget Lowland, within WRIA 12 (Chambers-Clover). For purposes of this report, this region of Pierce County will be referred to as the Lakewood area. The northwest portion of mainland Pierce County is part of an extensive glacial drift plain comprising the Puget Lowland, which was formed by at least six glaciations that occurred in the region during the last two million years (Kahle, 1998). Mainland Pierce County is bordered on its western margin by marine channels referred to as Dalco Passage, The Narrows, and Puget Sound. A complex sequence of unconsolidated and semi-consolidated sediments comprise the Puget Lowland. The sediments include advance and recessional glacial deposits, and fluvial and lacustrine interglacial sediments. The total thickness of the sedimentary

sequence in northwestern Pierce County ranges between 1,700 and 1,900 feet (Jones, 1996). The sediments are underlain by Miocene volcanic and sedimentary bedrock (Garling et al., 1965).

Groundwater in northwestern Pierce County is primarily produced from three aquifer zones, referred to generally as the Vashon (Layer A), Sea Level (Layer C), and Deep Aquifers (Layers E, G, and others). A series of low permeability, semi-confining units (Layers B, D, and F) separates the aquifers (Robinson, Noble and Saltbush et al, 2003). These semi-confining units are primarily comprised of fine-grained non-glacial sediments (e.g., fine sand, silts and clays) that act to restrict flow between aquifer units. Although they are present over much of the Lakewood area, several "windows" have been identified where these layers are absent. It is important to note that these interglacial units are not the only confining layers present in the Lakewood area. Each of the aquifers (particularly Aquifers C, E and deeper) may contain zones of low permeability which effectively serve as confining units. However, these layers may not be as thick or a really extensive as Layers B, D and F. Hydrogeologic cross-sections created by Robinson, Noble and Saltbush (2004) are included in Appendix A of this report. The cross-section location is shown on Figure 1. The hydrogeologic units important to groundwater production in this area of Pierce County are summarized below after Robinson and Noble (1995), Brown and Caldwell (1985), and Borden and Troost (2001):

Vashon Aquifer – Layer (Aquifer) A

Layer A is comprised of Vashon Recessional Outwash (including Steilacoom Gravel), Vashon Till, Vashon Advance Outwash, glaciolacustrine silt/clay (Lawton Clay), Olympia beds (non-glacial), and Pre-Olympia drift. The recessional outwash and Steilacoom Gravel consist of coarse sands and gravels overlying till, with thicknesses of usually only tens of feet. The till is often highly compact and consequently has low permeability. These units are not typically important in terms of regional water production. Underlying the till is the advance outwash, which is comprised of interbedded coarse sand and gravel and represents the primary water-bearing unit of Layer A. Thickness of Layer A ranges from 0 to 200 feet (including non-water bearing materials) and can be highly transmissive, with some calculated values greater than 20,000 ft²/day. These values have been noted on cross-sections produced by Brown and Caldwell (1985) and were calculated from pumping test data. Average transmissivity values are generally lower, in the range of 200 to 2,000 ft²/day (Brown and Caldwell, 1985). Water table conditions exist in much of Layer A and the water level in the advance outwash generally mimics surface topography.

Second Interglacial Deposits – Layer B

A second non-glacial unit typically underlies the Vashon Aquifer and is referred to as Layer B. Layer B is the principal aquitard separating the Vashon and Sea Level Aquifers. It is a thin unit (typically with a maximum thickness of less than 50 feet, except in the western part of the study area (e.g., near Lake Steilacoom and Puget Sound), where the unit can be over 200 feet thick. The unit is comprised of silt and clay with lesser amounts of fine sand (with some gravel). Although the unit is widespread, it is not continuous in the area. Where Layer B is absent, the hydraulic connection between Aquifers A and C is likely stronger than in locations where the confining layer is present.

Sea Level Aquifer – Layer (Aquifer) C

The Sea Level Aquifer is a thick heterogeneous glacial sequence of stratified sand and gravel, whose upper surface is commonly between sea level and 250 feet amsl (above mean sea level). Layer C is comprised of advance and recessional outwash with interbedded till deposits, which are often referred to as the Salmon Springs Drift. Layer C may correlate to the Double Bluff Drift present in the northern Puget Sound Lowland. Layer C is frequently found with a thickness of greater than 150 feet in the Lakewood area. Many of the region's productive wells are completed in Layer C. Some transmissivity values as high as 14,000 ft²/day have been calculated for wells completed in Layer C. These values have been noted on cross-sections produced by Brown and Caldwell (1985) and were calculated from pumping test data. Average transmissivity values are generally lower, in the range of 600 to 6,000 ft²/day – assuming a thickness of 150 feet (Brown and Caldwell, 1985). Layer C is likely recharged by leakage through Layer B and also in the southeastern part of WRIA 12 where Layer B is thin or absent and Layers A and C are in contact with one another (Brown and Caldwell, 1985).

Layer D

Layer D is a non-glacial unit comprised of fine sand, silt and clay that like Layer B, creates an important aquitard between the coarse grained units present above and below it. Layer D can be up to 200 feet thick in the area. Its average thickness is typically around 100 feet. No wells are known to be completed in this layer. Layer D is widespread but there is an approximately five to six square mile section in the North Spanaway/Brookdale area (north central portion of T19N, R3E - Sections 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23) where the layer is known to be absent (Figure 1). According to the cross-sections produced by Brown and Caldwell (1985) and Robinson, Noble and Saltbush (2003), Layer B may also be absent in this area. However, new data from Parkland Well No. 14 (drilled in 2003) indicate that Layer B exists over at least part of the area where it was previously thought to be absent (cross-section A-A" in Appendix A).

Associated with Layer D in the western portion of the Lakewood area, near the marine shoreline, is a thick and continuous clay unit that is interpreted to be a channel fill deposit associated with a glacial lake. According to Brown and Caldwell (1985), the channel is parallel to and east of The Narrows and could possibly represent an ancestral Narrows scoured by glaciers during the advance of the Puget Lobe. The clay-filled former channel is approximately 300 feet thick and is present from near the bottom of Layer C downward to near the bottom of Layer E. The presence of the clay between the mainland and marine water could create a hydraulic dam for groundwater flowing from east to west in Layer E.

Part of Deep Aquifer – Layer (Aquifer) E

Layer E is a glacial layer consisting of poorly sorted sand, gravel, and silt comprising part of the Deep Aquifer. The layer can be up to 200 feet thick, with an average thickness of 150 feet in the Lakewood area. It is the thought to be the highest yielding hydrostratigraphic layer in the Lakewood area. Transmissivity values have been measured at between 6,000 and 60,000 ft²/day with an average transmissivity of approximately 20,000 ft²/day – assuming a thickness of 150 feet (Brown and Caldwell, 1985). The average transmissivity calculated for the District wells completed in Aquifer E is approximately 8,200 ft²/day (Robinson, Noble and Saltbush, October 23, 2003 Letter to Dave Nazy – Ecology).

Layer E is bounded above by the low permeability Layer D, except in north-central portion of T19N, R3E - Sections 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23 where the layer is known to be absent (Figure 1). Where Layer D is absent, Layers C and E are likely in stronger

hydraulic continuity than areas where Layer D is present. Layer E is likely recharged by leakage through Layer D and also in areas where Layer D is thin or absent and Layers C and E are in contact with one another.

Layer E is bounded on the west near the marine shoreline by a thick clay layer, discussed above in the description of Layer D. Water flowing westward in Layer E likely discharges to Puget Sound by flowing around the ancestral Narrows clay layer. It is thought that most discharge from Layer E flows northwesterly around the ancestral Narrows clay before discharging to Puget Sound (Robinson, Noble and Saltbush, 2004). Additionally, some of the water discharging from Layer E may flow through the ancestral Narrows clay and/or upward through Layer D to Layer C before discharging to Puget Sound.

Layer F

Layer F is a non-glacial unit consisting primarily of silt and clay, with some gravel. Layer F is up to 200 feet thick and forms an aquitard between the overlying E and underlying G aquifers. Its thickness and extent are not well known because few wells penetrate it in the Lakewood area. At least 11 wells penetrate Layer F in the Lakewood area. These are listed in the section describing Layer G and deeper aquifer zones.

Layer G and Deeper Aquifer Zones

Below Layer F, there are multiple water-bearing zones and confining units encountered in wells typically drilled deeper than 350 feet below msl. Layer G is the uppermost unit in this sequence and is comprised of glacial drift, which can be up to at least 100 feet thick. Very few wells have penetrated this layer in order to allow a regional characterization of the layer. The following wells are completed in the Layer G or deeper zone:

- Abitibi Wells 4 (T20N/R2E – Sec. 29)
- Abitibi Wells 3 & 5 (T20N/R2E – Sec. 32)
- Steilacoom Well 4 (T20N/R2E – Sec. 32)
- Lakewood Well N-1 (T20N/R2E – Sec. 32)
- Fort Lewis Well 7 (T19N/R2E – Sec. 22)
- Fort Lewis Well 4 (T19N/R2E – Sec. 18)
- McCord AFB Well 846 (T19N/R2E – Sec. 23)
- Parkland Well 8 (T19N/R3E – Sec. 22)
- Tacoma Well 13A (T20N/R3E – Sec. 30)
- Pierce Co Well 2 (Pioneer Sand and Gravel) (T20N/R2E – Sec. 2)

Brown and Caldwell (1985) note that there is a generally downward slope to the west and northwest of the hydrostratigraphic layers in the Lakewood area. As a result, groundwater in Layer G likely flows northwestward from topographically high areas to discharge to Puget Sound.

Evaluation of Beneficial Use and Tentative Determination of Extent and Validity of Water Rights:

Under RCW 90.03.380, water rights can be changed or transferred only to the extent the right has been put to beneficial use and only to the extent it has not been abandoned or relinquished. Under RCW 90.14.160, a water right is subject to relinquishment and reversion to the state for voluntary failure, without sufficient cause, to beneficially use the water for five successive years. However, there is no relinquishment of a water right "if such right is claimed for a determined future development to take place either within 15 years of July 1, 1967 or the most recent beneficial use of the water right, whichever date is later." RCW 90.14.140(2)(c). For this exception to relinquishment to apply, the future use of water must be determined before the expiration of five years of nonuse, although the actual physical development may occur after the initial five-year period. *R.D. Merrill Co. v. PCHB, 137 Wn.2d 118, 143 (1999).*

Determined Future Development

The following factors support the establishment of a determined future development for municipal water supply no later than December 2001 by Abitibi.

- Abitibi announced the permanent closure of the West Tacoma Mill in June 2000. Actual production ceased in December 2000 and Abitibi has not made beneficial use of its water rights since that time.
- In December 2000, Abitibi first contacted Ecology's Southwest Regional Office to inquire about the quantity and transferability of its water rights.
- During the year 2001, Mr. Campbell of behalf of Abitibi met several times with Ecology regarding Abitibi's intent to sell its water rights to a municipal water supplier, either Pierce County or the District. By April of 2001, potential sales of the West Tacoma Mill for industrial use had all fallen through, and Abitibi focused its efforts on reaching agreement with a municipal water supplier to purchase its water rights.
- Inquiries from the District's general manager, Randall M. Black, about Abitibi's interest in selling water rights to the District were received by Abitibi in early 2001. On August 30, 2001, the District indicated that they were interested in purchasing the Abitibi water rights. At the same time, the District began investigating the Abitibi water rights in earnest with their attorney and consultants. The parties met and communicated several times from September through December of 2001 to discuss the scope and feasibility of the transaction.
- On October 18, 2001, Randall M. Black informed Ken Campbell by that the District's board of commissioners had authorized him to proceed with negotiating to purchase the water rights. The parties then exchanged data relevant to a purchase agreement and on November 30, 2001, the District's attorney outlined the steps to complete a transfer of the water right. The District met with Jill Walsh of Ecology in late November or early December 2001 to outline how to proceed with a transfer of the Abitibi water rights and what information would be needed by Ecology to process the applications.
- The District and Abitibi then met on December 20, 2001 to negotiate the purchase agreement. At that time, Abitibi agreed to sell the District up to 6.0 MGD of its deep well water rights, and the District agreed it would purchase a minimum of 2.0 MGD with an option to purchase the balance of water rights that Abitibi had available.
- The District sent Ken Campbell a draft letter of intent to purchase Abitibi's water rights on January 14, 2002, confirming its intent to purchase 6.0 MGD of groundwater rights with an option to purchase the balance Abitibi's water rights. A detailed purchase and sale agreement was entered into on November 30, 2002.

- The applications to change the Abitibi water rights were filed with Ecology by the District on December 9, 2002.

Based on our review of the Abitibi's effort to transfer these water rights to Lakewood Water District, it appears reasonable to find that Abitibi made a determination no later than the end of December 2001 that its Ground Water Certificates 299-A and 4585-A would be transferred to the District for municipal purposes. Subsequent negotiations and documents confirmed this intent and were, in essence, due diligence by both parties toward the completion of the determined future development. For purposes of this decision, the relevant five-year period of previous beneficial for determination of potential relinquishment is January 1, 1997 to December 31, 2001.

History of Beneficial Use

The following water rights are associated with the Abitibi facility:

Water Right Number	Source	Qi (gpm)	Qa (acre-feet/year)
10880	Chambers Crk.	2,785*	4,492
S2-28039	Garrison Crk.	1,800*	2,240
1738-A	Well 1	650	1,040
299-A	Well 3	2,250	3,650
4585-A	Wells 4 and 5	3,900	6,249
Total:		11,385	17,671

* Denotes surface water source

Ground Water Certificate 299-A (Priority date January 4, 1949) was issued for 2,250 gpm, and 3,650 acre-feet per year from Well 3 for manufacturing and industrial use.

Ground Water Certificate 1738-A (Priority date August 28, 1953) was issued for 650 gpm, and 1,040 acre-feet per year from Well 1 for industrial supply. At 275 feet, Well 1 is the shallowest of the Mill's groundwater sources; the primary use of Well 1 has been to supply water for domestic and sanitary purposes.

Ground Water Certificate 4585-A (Priority date October 16, 1958) supersedes Certificate 4548-A. It authorizes the withdrawal of 3,900 gpm (Well 4 authorized to pump 1,400 gpm, and Well 5 authorized to pump 2,900 gpm) and 6,240 acre-feet per year for industrial processing. The report of examination drafted for this permit indicated that the allocation was for additional water – beyond the previously issued certificates, with the comment that Well 1 was being used for domestic and sanitary purposes only, and that Well 3 had lost some of its capacity and needed to be rehabilitated. The Report of Examination indicates that production at the plant had tripled since the last water right had been issued and more water was needed.

The water rights that are the subject of this application were developed and used in a paper mill located near the mouth of Chambers Creek in Steilacoom, known generally as the West Tacoma Mill. The West Tacoma Mill produced pulp and newsprint for newspaper publication from 1919 to its closure in December 2000. Abitibi provided Ecology with two separate submittals regarding the history of its water rights and recent beneficial use of water.

A May 15, 2003 letter from Ken Campbell explains that the water rights for Well No. 3 and Wells No. 4 and 5 were put to beneficial use at the time that proof of appropriation affidavits were filed with the State of Washington on May 19, 1949 and June 26, 1959, respectively. A document entitled "History of West Tacoma Mill," prepared by Ken Campbell and submitted to Ecology by letter dated June 16, 2003, cites several news articles reporting expansions of the plant and daily and annual productions of paper product. The West Tacoma Mill expanded at various times and produced an average of 616 tons per day of newsprint during its peak operations from 1995-1998, when it was operating 24 hours/day, seven days/week. At various other times the plant was also operated 24 hours/day, seven days/week, with a capacity of 10,000,000 gallons per day in 1953; 5,500,000 gallons of water usage per day in 1957; and 23,000,000 gallons per day capacity in 1984. Given this evidence, there is no basis for disputing that Well No. 3 was originally perfected in the amount of 2,250 gallons per minute (gpm) and 3,650 acre-feet/year, and that Wells 4 and 5 combined were perfected in the amount of 3,900 gpm and 6,240 acre-feet/year.

Abitibi installed flow meters in the 1990s to measure water usage in its paper manufacturing process. The flow meters measured total groundwater usage, but did not measure each well's individual production. The flow data was inputted electronically to a centralized computer which shut down with the plant in December 2000 and is obsolete. There is no readable backup report of the data collection available. Ken Campbell's May 15, 2003 letter provides anecdotal reporting of water usage for the last five years of the plant's production (1995 to 1999 and a partial production year in 2000) based on "monthly statistical reports" of various computer readouts, including total groundwater production in these years.

Data is not available to distinguish between water usage at Well No. 3 vs. water usage at Wells No. 4 and 5. Based on the Report of Examination prepared for Certificate 4585-A (Wells No. 4 and 5) it appeared that Well 3 had a diminished capacity, accordingly it is assumed that Certificate 4585-A was used in the 1995 to 1997 peak production years to its full capacity, followed by usage of Certificate 299-A (Well No. 3) to make up the additional demand.

Table 8 is based on information provided by Ken Campbell, who was sales manager at the West Tacoma Mill during the relevant time period, and demonstrates average groundwater production in million gallons per day and acre-feet/year, as follows:

Totals	1995	1996	1997	1998*	1999*	2000**
MGD	6.35	5.32	7.33	2.57	3.25	0.65
Acre-feet	7,113	5,960	8,211	2,879	3,641	--

* Annual Mill production below normal

** Partial production year

The year of highest water usage in the last five years of beneficial use of water at the West Tacoma Mill was 1997. Based on the groundwater production numbers in Table 1, Abitibi has established that Certificate 4585-A was beneficially used to its capacity of 5.62 MGD (equivalent to 3,900 gpm) and 6,240 acre-feet/year in 1997, and that Certificate 299-A was used for the balance of 1997's production amount, or 1.71 MGD (equivalent to 1,187.5 gpm) and 1,971 acre-feet/year. The balance of Certificate 299-A (Well 3) is not transferable pursuant to these applications.

Impairment of Other Rights

Hydrograph Data

The timing and magnitude of the hydraulic responses between the aquifers in the Lakewood Area is difficult to discern at the regional level. Hydrographs for three District Wells completed in Layer E are shown in Figures 2 through 4 of this report. The Figures have been plotted to show the water levels and production records together (Figure 2-a, 3-a, 4-a) and then separately (Figures 2-b and 2-c, 3-b and 3-c, 4-b and 4-c). The water level data represent a daily record and were collected by taking the highest recorded water level reading of each day as equal to the static water level and the lowest recorded water level reading as equal to the pumping water level. Generally, all data points were measured on a daily basis, though there are occasionally some days for which data was not recorded.

Figure 2-a shows the hydrographs for wells J-1 (Aquifer A) and J-2 (Aquifer E). The hydrograph shows that the water levels in the two aquifers did not respond similarly during this time period. The water level in Aquifer A in the vicinity of Well J-1 rose (likely as a result of precipitation occurring during this time), while the water level in Aquifer E in the vicinity of Well J-2 declined. Since Aquifer E is recharged by leakage from overlying units and Aquifer A is recharged primarily by precipitation, the response times of the aquifers are expected to be different. Figure 2-a shows this trend with water levels in Aquifer A rising, while water levels in Aquifer E declined over the same period. Figure 3-a shows the hydrographs for wells D-2 (Aquifer E) and D-3 (Aquifer C). The water level in Well D-2 from November 20, 2002 to December 18, 2002 declined as a result of pumping in the well. During this same time however, the water level in Well D-3 (which was not pumping) remained essentially constant, rising only slightly. In fact, the water level in Well D-2 remained relatively constant throughout the whole period of record, despite pumping in Aquifer E. Figure 4-a shows the hydrographs for wells E-2 (Aquifer E) and E-3 (Aquifer C). There is no clear hydraulic relationship between Aquifer C and Aquifer E shown by the hydrographs for Wells E-2 and E-3 for the period of record indicated in Figure 4a. Both wells show a similar trend of gradually increasing water levels despite ongoing production in both wells. The hydrographs show that the aquifers in the vicinity of the two wells responded similarly in terms of seasonal water level changes. In particular, the water levels in Wells E-2 and E-3 rose between November and April 2003 (Figure 4-a).

There is an area east of the District's Wells, near north Spanaway/Brookdale where Layer D is absent (Figure 1) and Aquifers C and E may be in stronger hydraulic connection than areas where Layer D is present. The nearest District transfer well (completed in Aquifer E) to this location is Well J-2, located approximately 2.4 miles west of this area. Monitoring water levels in wells completed in Aquifers A and C in the area where Layer D is absent would allow for determination of the degree of impact to Aquifers A and C from increased pumping in Aquifer E. The following wells have been identified by Robinson, Noble and Saltbush (2004) as being completed in Aquifer A, in or near the area where Layer D is absent:

- Parkland TW (T19N, R3E - Sec. 17)
- Parkland Well 9 (T19N, R3E - Sec. 8)
- Southeast Tacoma Mutual Water Association Well 3 (T19N, R3E - Sec. 5)
- Southeast Tacoma Mutual Water Association Well 5 (T19N, R3E - Sec. 5)

The following wells have been identified as being completed in Aquifer C, in or near the area where Layer D is absent:

- Parkland Wells 1, 10 (T19N, R3E - Sec. 8)
- Parkland Wells 2, 3, 5 (T19N, R3E - Sec. 9)
- Parkland Well 6 (T19N, R3E - Sec. 17)
- Spanaway Well 5 (T19N, R3E - Sec. 21)
- Spanaway Well 6 (T19N, R3E - Sec. 27)
- Spanaway Well 9 (T19N, R3E - Sec. 23)
- Domestic Well [Crescent Park] (T19N, R3E - Sec. 22)

Examination and comparison of historical hydrographs from these wells and the District's Aquifer E Wells will also help clarify the connection between Aquifers A, C and E, if any. Most of the above wells are being monitored on a regular basis by both the well owner and Tacoma-Pierce County Health Department for the County's regional aquifer management program. The County data are available for review by participating water purveyors (of which Lakewood is one). See *Withdrawal Management Plan - Water Level Monitoring Provisions* below.

Aquifer E Modeling Report

Robinson, Noble and Saltbush (2004) used an analytic element model to estimate the likely drawdown in Aquifer E and induced leakage from Layer D as a result of shifting five MGD of the six MGD from Aquifer G to Aquifer E. Their simulation consisted of a single layer model which estimated leakage by extracting hydraulic head values from a pumping simulation and applying Darcy's Law to calculate the total induced leakage.

The boundaries of the model are comprised of linesinks and no-flow boundaries including: valley fill sediments associated with the Puyallup River on the north and the Nisqually River on the south, Puget Sound on the west and north, the ancestral Narrows clay unit also on the west, and a buried bedrock contact in the south and southwest.

The aquifer was modeled as three large zones of differing hydraulic conductivity and thickness, with smaller zones of differing conductivities in the Lakewood area. The model was calibrated against 17 water level elevations from wells completed in the aquifer system. Recharge (as leakage) was applied uniformly across the model. The estimated recharge to Aquifer E (downward leakage from Aquifer C through Layer D) was 6.3 inches/year before the transfer of 5 MGD. This value was obtained from previous analyses of WRIA 12, which indicated that approximately 15% of annual precipitation (42 inches/year in the Lakewood area) reaching Aquifer E.

To account for current production from Aquifer E, an estimated 9.7 MGD (equivalent to 1.3 inches/year) was subtracted from the annual recharge value, leaving approximately 5 inches/year of recharge flowing to Aquifer E from overlying units. An additional 1.5 inches of recharge was applied in the area near Parkland where the non-glacial unit (Layer D) is absent. This additional recharge is probably conservatively high as low-permeability glacial materials are present throughout the area (at the bottom of the Aquifer C system or the top of the Aquifer E system) which provides a level of confinement to the Aquifer E system. Potentiometric surface maps for the region show notable differences in water level elevation between Aquifers C and E though the Parkland area, which further supports the conclusion of the confined conditions of the system.

The model estimated the total induced leakage volume from the sediments overlying Aquifer E to be 238,729 gallons per day (166 gpm; 268 acre-feet/year).

Effects to Surface Water

In 1979, the Chambers-Clover Creek basin was closed to further consumptive surface water diversions through Chapter 173-512-050 WAC, the Instream Resources Protection Program for the Chambers-Clover Creeks Basin, Water Resource Inventory Area (WRIA) 12. Any groundwater withdrawals with priority dates later than the December 12, 1979 must consider the potential impacts to surface water (WAC 173-512-040). Where a proposed groundwater withdrawal or a proposed change in the place of groundwater withdrawal would reduce the flow in surface waters closed to further appropriations, denial is typically required because water is unavailable and withdrawal would be detrimental to the public welfare. It is recognized that the District has proposed mitigation measures for this transfer to offset any potential impact of these change applications on the flow of streams closed to further appropriation.

Since the District's Aquifer E wells are screened below approximately 200 feet below msl and Layers B and D are present in most places in the Lakewood area, the effect to surface water is estimated to be both relatively low and attenuated over time. The hydrographs for several District wells completed in Aquifer E compared to several shallower wells completed in very close proximity (Figures 2 to 4) do not show any direct evidence of impact on the shallower aquifers as a result of pumping in Aquifer E.

Chambers Creek flows over an area where Layer D is absent (Figure 1). Layer B may also be absent across this area, as indicated on cross-sections produced by Brown and Caldwell (1985) and Robinson, Noble and Saltbush (2003). However, the potentiometric surface maps for this region and water level data provided by Tacoma/Pierce County Health District show notable differences in water level elevation between Layers C and E throughout the Parkland area, which supports the conclusion that even in Layer C there are confined conditions, and that the window in Layer D does not, by itself, indicate a hydraulic connection between Layer E and Layer C. The Parkland Well 14, drilled in NW NW Sec. 15, T19N, R3E in 2003 indicates that Layer B is present as a claybound sand and gravel zone in the well between 183 and 301 feet bgs. The nearest District transfer well (completed in Aquifer E) to this location (J-2) is approximately 2.4 miles west of this area. Monitoring water levels in wells completed in Layers A and C may provide a better determination of hydraulic connection, if any, between surface water and Aquifer E. Several wells that could potentially help determine the hydraulic connection between Aquifer E and surface water bodies are identified in the Withdrawal Management Plan section of this Report of Examination.

Mitigation Plan

The existing Abitibi withdrawals from Aquifer G have a region-wide effect on overlying geologic layers by inducing leakage through those layers into Aquifer G. The existing induced leakage into Aquifer G from Layers E and F, for example, also induces leakage in a more diffuse manner from Layers C and D and in an even more diffuse manner from the groundwater table aquifers and surface waters in the basin. The total groundwater withdrawals from the basin will not increase as a result of the proposed change of withdrawal points for 5 MGD of the Abitibi rights from Aquifer G to Aquifer E; however the amount of induced leakage from Layers C and D is expected to increase in the vicinity of the District's Aquifer E wells, and will occur in a somewhat more direct manner and on a somewhat shorter timeframe. The effect of these changes on Aquifer A and surface waters is necessarily much more diffused and on a longer timescale, to the point that it may not be measurable and is difficult to calculate with any certainty. It is appropriate, therefore, to apply some measure of safety in order to determine that surface waters which are closed to further appropriation would not be impacted by these changes.

The District proposes to mitigate the impacts from the proposed Abitibi transfer with some of its existing groundwater rights. The District proposes mitigation for the maximum amount of estimated induced leakage into Aquifer E (267.4 acre-feet/year) from overlying geologic layers, based on the results presented in Robinson, Noble and Saltbush's 2004 modeling report. All of this mitigation would be provided by resting (e.g., not pumping) an existing District water right in Aquifer C that is centrally located among the Aquifer E wells (i.e., Well I-4). The estimated quantity of mitigation is in the maximum range of predicted impacts to geologic Layers D and C after incorporating several conservative assumptions in the modeling analysis, including an overestimation of the current water usage from Aquifer E, the use of conservative parameters to calculate induced leakage from overlying sediments, and ignoring the reduction of induced leakage from Aquifer E to Aquifer G caused by the proposed changes (the latter factor will further reduce actual drawdowns from Aquifer C, but this is being conservatively ignored to provide additional certainty for the effectiveness of the mitigation).

The District also proposes to provide additional mitigation directly to surface water and to the shallow aquifer system that is directly connected to surface water in order to provide additional certainty that the impacts of the changes will not have a detrimental affect on surface waters closed to further appropriation. While the potential for impacts to surface waters would be very diffuse over the entire basin and impossible to measure or predict with certainty in a viable and cost-effective scientific manner, the proposed additional mitigation would provide significant benefits to surface waters in this basin that are closed to further appropriation, as described in Table 10 below.

The following mitigation strategy is summarized from the January 23, 2004 memo from Thomas M. Pors (attorney for the District) to Jill Walsh (Ecology) and includes additional discussion of the benefits of each measure.

Table 10. Mitigation Source and Benefit Information

Water Right Number	Wells	Proposed Action	Mitigation Capacity	Summary of Benefits
1289-A 3831-A	Well H-1 Well H-2	Discharge well water into Clover Creek to provide adequate flow for salmon migrations. Current voluntary mitigation would receive mitigation credit against Total Annual Offset (TAO) required.	2,000 gpm 13.26 acre-feet/year	Low flows in Clover Creek were identified as a significant "limiting factor" for salmonid survival in this watershed. At critical times, including August and September, flows are inadequate for migration of spawning Coho. This project would provide significant benefits to native Coho runs in Clover Creek and for habitat downstream of the point of augmentation. Therefore this supplementation program would provide significant environmental benefits at a particular time when stream flow supplementation is needed the most.
Flett Dairy 460-A 461-A 462-A 3713-A		Transfer the Flett Dairy water rights into the Trust Water Rights Program for instream flow preservation.	Water Right Certificates totaling 1000 gpm and 800 acre-feet/year	Because the aquifer is in hydraulic continuity with Chambers Creek, an existing impact on Chambers Creek would be eliminated and more water would be left in Aquifer A to provide base flow recharge to area streams and lakes.
G2-27280C	Well Q-3	Relinquish existing water right from A level Aquifer.	Water Rights Totaling 350 gpm and 280 acre-feet/year	This water right is centrally located among the District's Aquifer E wells, and is more closely connected with surface water in the Chambers/Clover Creek basin than Aquifers C or E. Therefore, its relinquishment provides greater benefit to surface water than the projected drawdown of a similar quantity of water from Aquifer C.
G2-23869C	Well I-4	Rest (do not pump) existing water right in Aquifer C.	Up to maximum projected impact to Aquifer C of 166 gpm and 267.4 acre-feet/year	The well location is within one to three miles of the new points of withdrawal within Aquifer E, but in close proximity to Lake Steilacoom and Clover Creek, which are closed to further appropriations and considered surface waters of significant value in this basin. This mitigation measure will have a greater positive effect on the levels of these significant surface waters than the negative impact of the proposed changes.
		Totals:	<p>A total of 2,000 gpm and 13.3 acre-feet/year direct augmentation of streamflow</p> <p>Up to a total of 166 gpm and 267.4 acre-feet/year of resting (not pumping) existing water right in Aquifer C</p> <p>A total of 1350 gpm and 806.6 acre-feet/year in Aquifer A either relinquished or transferred to the Trust Water Rights Program to benefit instream flows</p>	

The information for these water rights is summarized in the following table:

Table 11. Mitigation Well Water Right Information

Common Name	Water Right Number	Type	Aquifer	Qi (gpm)	Qa (acre-feet/year)	Purpose of Use	Proposed Action	TRS I/4 I/4
Well H1	1289-A	S	C	2,000 (prim)	2,500 (supp)	DM	Continued seasonal diversion to Clover Creek = 2,000 gpm/13.26 acre-feet/year	T19N/R02E-14 NW/NE
Well H2	3831-A	P	C	800 (prim)	1,280 (prim)	DM		T19N/R02E-14 NE/NW
Flett Dairy	460-A	P	A	500	150	IR	Transfer to Trust Water Right Program. Water rights would not be exercised. Total quantity of water right not relinquished through nonuse is 465.7 acre-feet/year	T20N/R02E-25 SW/SW
Flett Dairy	461-A	S	A	250 (supp)	204 (54 primary, 150 supp)	CI IR		T20N/R02E-25 SE/SW
Flett Dairy	462-A	P	?	175	204	CI		T20N/R02E-36 NE/NW
Flett Dairy	3713-A	S	A	1000	800 total, including amounts used under 460, 461 and 462	CI		T20N/R02E-25 SW SW
Well Q-3	G2-27280C	S	A	350	280	MU	Maximum mitigation credit = 350 gpm, 6.6 acre-feet/year, the maximum amount of beneficial use of this well in 1988	T19N/R02E-04 SE/SE
Well I-4	G2-23869C	S	C	1,500	1,200	DM	Rest for mitigation credit up to maximum of 166 gpm, 267.4 acre-feet/year	T20N/R02E-34 SW/NW

Note: P = Primary, S = Supplemental

Beneficial Use of Flett Dairy Water Rights. The District proposes that mitigation credit be given to the District each year in a quantity equal to the extent that the Flett Dairy water rights were beneficially used in the five-year period leading up to the year 2000, when a determined future development was fixed by the District for mitigation use of these water rights. The water rights were acquired by the District by a deed from the then owner of the property, Tackwood LLC, in May 2002. A March 22, 2005 report from Burt Clothier, L.H.G, R.G. describes his interview with the former maintenance head of Flett Dairy, Dick Gratzler. The interview established the beneficial use of the Flett Dairy water rights in the last years of its operation for two houses and the dairy processing plant in the amount of 990 gpm, 465.7 acre-feet/year. This is found to be the existing scope of the Flett Dairy water rights for mitigation purposes.

Discussion of Mitigation Plan: The proposed mitigation plan provides a reasonable approach to mitigate the estimated impacts of the proposed change in points of withdrawal, as defined by the Aquifer E model. The primary mitigation approach is to reduce pumping from Aquifers A and C, thus equalizing the water available in these shallower aquifers for existing rights and for recharge to surface water. For example, the reduction in pumping of Well I-4 alone could account for 100% of the maximum additional induced leakage calculated from Layers C and D into Aquifer E.

A critical element of the mitigation plan is able to offset anticipated impacts to Aquifer C by reducing pumping by an equal amount in Aquifer C. The benefit of resting the District's Well I-4 well is more immediate in the vicinity of that well, whereas the impact of to Aquifer C from the changes is diffuse throughout the basin. The District has offered additional mitigation for any remaining unmitigated impacts to Aquifer A and surface water in the basin. The reduction in Aquifer A pumping by relinquishing the District's Well Q-3 right and by putting the Flett Dairy water rights into the Trust Water Right Program for instream flow purposes will have a more immediate and direct benefit to the shallow aquifer system (Aquifer A) than the estimated impacts resulting from increased pumping in Aquifer E. As a result, the mitigation proposed by the District and incorporated into the conditions of approval will likely benefit stream flows in an amount greater than any detriment caused by increased pumping in Aquifer E.

The District proposed the following formula for determining the total annual amount of water required to offset the potential impacts of increased pumping in Aquifer E.

$$TAO = (QaTE - QaEE) * (4.8\%)$$

where:

TAO = Total Annual Offset required in any given year

QaTE = total annual quantity of water pumped from the District's Aquifer E wells.

QaEE = the total annual quantity of water pumped from the District's Aquifer E wells under existing water rights

4.8% = the estimated leakage induced from overlying layers as a percentage of the proposed production in Aquifer E

This mitigation formula allows for a "pro-rated" offset; as total annual demand increases, the amount of offset from resting the I-4 well will be required to keep pace.

The additional shallow aquifer and surface water mitigation measures proposed by the District is a reasonable approach to providing certainty that surface water resources in the basin will not be negatively impacted by the proposed changes. As described in Table 10, these measures will either significantly improve surface water flows when necessary to aid salmon migration (Wells H-1 and H-2 pumped to Clover Creek), or they will reduce shallow aquifer withdrawals in areas proximate to closed streams and lakes, improving the natural recharge of these surface waters from the shallow aquifer systems. Overall, including the Well 1-4 mitigation to Aquifer C and the transfer of the Flett Dairy water right to the Trust Water Rights Program, the District is offering approximately a 4:1 mitigation ratio for the maximum estimated drawdown impact of the proposed changes.

The District has proposed providing an annual report to Ecology demonstrating the total annual amount of mitigation offset provided by resting the 1-4 well, and the additional mitigation provided by the remaining mitigation and resource management techniques outlined in the previous Table 10.

Other Hydrogeological Considerations:

In addition to moving the point of withdrawals inland, this transfer would move the place of use of the water inland also. Currently, the water associated with GWC 4585-A is used onsite at the Abitibi facility, located near sea level. This water rights transfer would move the place of use inland several miles to the area served by the District and several other water purveyors. While not considered as mitigation for the purposes of this evaluation, Ecology acknowledges that this transfer will fundamentally alter the movement of water in the Chambers-Clover basin.

There is a total of six MGD involved in this water rights transfer. Four of the six MGD involved in this transfer would initially be sold to the following purveyors:

- Fruitland Mutual Water Company (WRIA 10)
- City of Puyallup Public Works (WRIA 10)
- Rainier View Water Company (WRIs 11 and 12)
- Spanaway Water Company (WRIA 12)
- Summit Water and Supply Company (WRIs 10 and 12)

The District would retain two MGD from this water right for meeting demand growth within its own service area in WRIA 12. The purveyors listed above serve areas located in WRIs 10, 11 and 12. The following distribution of water is expected in this transfer:

- WRIA 10 – 1.5 MGD
- WRIA 11 – 0.5 MGD
- WRIA 12 – 4.0 MGD (includes two MGD retained by Lakewood Water District)

This transfer will likely benefit the groundwater system of the greater Lakewood area by leaving groundwater in shallow source aquifers that would otherwise be withdrawn. Additionally, increased water use will result in a corresponding increase in the amount of residential water discharged to the shallow groundwater via septic systems, leaking pipes and other related uses.

All of the water purveyors (with the exception of Lakewood Water District) included in this transfer currently produces a majority of their water from Aquifers A and C. If this transfer is approved and the wholesale agreements proceed as planned, each purveyor will initially diminish production from its existing wells by the amount of water purchased through the "take or pay" wholesale contractual agreement. At the beginning of the contract, the water would remain in the source aquifers and only be used as back-up or emergency sources for each purveyor. The sources would then be returned to service in the event that the purchase agreement ends or as a result of the growth in demand for that system.

Sewer system service is not continuous across the service areas of the purveyors. A review of Pierce County planning documents by Robinson, Noble and Saltbush determined the overall service area served by sewer systems (Robinson, Noble and Saltbush, 2003). Any areas not served by sewer were assumed to be served by septic systems. These current (2003) estimates were then projected under full build out of the County's Urban Growth Area (UGA). The distribution of septic return flow estimated in these scenarios is indicated in the following table:

Table 9. Estimated Septic Return Distribution of Proposed Transfer

Customer	Purchased Transfer Water (MGD)	Septic Return Flow by Location					
		WRIA 10		WRIA 11		WRIA 12	
		2003 (MGD)	Projected UGA Sewerage (MGD)	2003 (MGD)	Projected UGA Sewerage (MGD)	2003 (MGD)	Projected UGA Sewerage (MGD)
Fruitland Mutual Water Company	0.1	0.05	0	0	0	0	0
City of Puyallup Public Works	0.5	0.04	0	0	0	0	0
Rainier View Water Company	1.0	0	0	0.15	0.11	0.46	0.32
Spanaway Water Company	0.9	0	0	0	0	0.5	0
Summit Water and Supply Company	1.5	0.91	0.92	0	0	0.04	0.04
Totals:	4.0	1.0	0.92	0.15	0.11	1.0	0.36

The total amount of water estimated to be returned by septic tanks in 2003 was estimated to be 2.15 MGD or 54% of the purchased transfer water. This amount declines to approximately 1.4 MGD or 35% of the purchased transfer water under final build-out of the UGAs. It is important to note that under this transfer, the septic system return flows represents direct addition of groundwater from Aquifers E and G to shallow aquifers. The addition of groundwater through septic systems will serve to enhance and augment flow in the shallow groundwater regime.

Further, it is recognized that additional water will be returned to shallow aquifers through distribution pipeline leakage and exterior use, such as irrigation, washing and recreation. While difficult to quantify, it is believed that a significant amount of water is able to recharge shallow groundwater as a result of these activities. These benefits have not been calculated as a reduction in the mitigation requirement for this water right transfer because state policy is not adequately formed to accept the uncertainties of timing and permanence that each of these benefits involves.

Seawater Intrusion

Given the coastal nature of the Steilacoom-Lakewood area, seawater intrusion is a potential concern, not just for the District Wells but for other wells in the area screened below sea level and located near Puget Sound. Historical monitoring of the District Wells under DOH requirements has not detected any elevation of chloride levels above background concentrations. Moving the points of withdrawal inland and distributing the water rights amongst more sources would likely reduce the potential for seawater intrusion that may result from concentrated pumping in Aquifer G at the Abitibi site.

The degree of impact, if any that increased pumping in Aquifer E will have on the fresh water-salt water mixing zone is undefined but expected to be small. Water quality monitoring in wells completed in aquifers open below sea level and located close to Puget Sound is recommended. Lakewood Water District already maintains a water quality monitoring plan which will provide a baseline to measure any future changes.

Protests/Public Comment

Tacoma Public Utilities (TPU) protested the Abitibi transfer in a letter to Ecology dated March 3, 2003. TPU reminded Ecology that they hold senior water rights for their South Tacoma Wellfield within the Chambers/Clover Creek Basin and believes that these rights would be impaired and streamflows possibly reduced as a result of the Abitibi transfer.

With the exception of Well 13A, TPU's wells are completed in Aquifer C. In the March 3, 2003 letter to Ecology, TPU expressed concern about the "window" in Layer D that may allow for increased leakage from Aquifer C as a result of increased pumping in Aquifer E. TPU is also concerned about the District changing the place of use for the Abitibi rights, effectively creating a regional service area. TPU indicated a desire to review documentation regarding this change specified in WAC 246-290-100, including a SEPA checklist. TPU stated that the proposed transfer would involve transferring water from WRIA 12 to WRIA 10. The exact amount of water that would actually be transferred to WRIA 10 is unknown at this time, but is estimated to be 1.5 MGD. TPU did not comment on the proposed change in the purpose of use.

Additionally, Ecology received a comment letter from Pierce County Public Works, dated February 26, 2003. The County indicated that they supported the intent of these transfer requests, provided that the District's activities would not impact the County's ability to develop their own groundwater source, located adjacent to Abitibi property on the County owned Chambers Creek Properties.

The amount of water that would actually be transferred to WRIA 10 is unknown at this time, but is estimated to be on the order of 1.5 MGD (Purpose of Change Application section of this report). The primary mechanism for water to leave the basin is via wholesale sales to water purveyors such as Summit Water - which operate a service area that extends into the adjoining Puyallup-White basin. Nothing precludes transfers of this nature, provided that it not result in impairment to other water users. Since, currently all water withdrawn by the Mill leaves the basin as a direct discharge to the Tacoma Narrows, it is unlikely that the small percentage of water ultimately being used in WRIA 10 will result in an impairment within WRIA 12.

Since receiving the TPU protests, the District filed two responses intended to address Tacoma's concerns, (a March 3, 2003 letter from Thomas M. Pors, and a March 28, 2003 letter from Robinson, Noble and Saltbush, Inc.) The District met with Tacoma on November 17, 2004 to discuss Tacoma's concerns about the change applications. Robert E. Mack, representing Tacoma, sent an additional letter to Ecology on December 13, 2004. In this letter TPU stated that they expected Ecology's determination to be based on reliable and sufficient data and studies, and reiterated their concerns that Tacoma's senior rights be protected from impairment.

This letter also requested that conservation standards and conditions that have been applied to Tacoma's Permit No. S1-0076P also apply to the District's Applications for Change of Water Rights. Ecology has evaluated this statement, but is unable to find any formal directive to alter or change the standard planning requirements for regional public water systems. It appears that the conservation planning requirements applied to the issuance of an extension for the development of the Second Supply Project were drafted to address a specific set of agency concerns. TPU's additional conservation requirements are detailed in an Memorandum of Understanding which was applicable to the second supply project participants, the Department of Ecology, and the Department of Health. This MOU addresses the extension of surface water permit S1-0076P, a water right permit for a large surface water diversion from the regulated Green River. The conditions imposed as permit provisions in the extension of S1-0076 were intended to match those conditions imposed in the Green River Habitat Conservation Plan.

While the fact patterns surrounding TPU's Green River Permit is different than these Application for Change, Ecology acknowledges the important of stringent conservation planning requirements. Both TPU and Lakewood are required to collect and submit detailed water use records. While TPU is required to reduce water use by 10% over a 10-year period (from 2001 to 2011) we note that Lakewood Water District's Comprehensive Water System Plan (February 2005) commits the District to reach a goal of 14% water reduction (from 1994 to 2010). The District has already achieved an 8% reduction in average per capita water usage from 1994 to 2003.

We also note that Lakewood Water District's potential wholesale partners within the Water Cooperative of Pierce County have similar conservation goals. The City of Puyallup has already reduced it's per connection water demand 6% between 1997 and 2002, and projects an additional 5% reduction between 2003 and 2013. Spanaway Water has reduced it's per connection water demand by 11.7% between 1994 and 2004, and Summit Water has reduced it's per connection demand by 9.5% between 1991 and 1996. Both Spanaway and Summit have active conservation programs that are anticipated to result in additional water saving reductions.

While conservation requirements were imposed on the extension of TPU's the second supply project in 2001, we note that there new statutory conservation planning and water use efficiency requirements for public water systems were adopted since then. The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems, including Lakewood Water District. Ecology is required to coordinate approval procedures with the Department of Health under RCW 90.03.386(1), and finds that imposition of conservation requirements for TPU's Green River System on the District's use of the Abitibi water rights would potentially conflict with or be redundant to the District's Comprehensive Water System Plan and Department of Health's new water use efficiency rules, which both the District, its wholesale customers, and TPU must comply with. The requirements for conservation planning for systems like Lakewood are addressed in the section on Conservation Planning Requirements.

Tacoma's concerns about hydraulic connection between Lakewood's Aquifer E wells and Tacoma's South Tacoma wells have been addressed in the Hydrologic Analysis section of this report and the discussion of Neighboring Groundwater Rights. In particular, it is noted that the Layer D "window" in the Parkland area described in Tacoma's protest is located approximately 2.4 miles from the nearest District transfer well (Well J-2). The potentiometric surface maps for this region and water level data provided by Tacoma-Pierce County Health District show notable differences in water level elevation between Layers C and E throughout the Parkland area, which supports the conclusion that even in Layer C there are confined conditions, and that the window in Layer D does not, by itself, indicate a hydraulic connection between the District's Layer E wells and Tacoma's wells in Layer C.

DISCUSSION:

The transfer of water rights from the three Abitibi wells to several wells operated by Lakewood Water District would represent the transfer of five MGD from Aquifer G to Aquifer E. One MGD would be retained for production from Aquifer G. The Abitibi Wells lie near the western margin of the aquifer and the District wells are located up to several miles inland. This transfer of water rights would essentially reallocate most pumping to shallower locations upgradient (eastward) from the current withdrawals from the Abitibi Wells.

Shifting pumping to a shallower aquifer upgradient in a basin will change the hydrology of the basin and could possibly lead to increased leakage from overlying units and/or decrease discharge from the aquifer(s) at the local level near each proposed pumping center. However, at the regional, basin-wide scale, the total volume of the water used remains unchanged from Abitibi's original use of the water. In the case of the Lakewood area, the proposed pumping changes are from wells completed in Aquifer G near Puget Sound to wells completed in Aquifer E inland several miles. The hydraulic connection between the aquifers in the area is not fully understood. While the total amount of leakage through layers above Aquifer E will remain the same, the pattern of that leakage will change as a result of using different production locations.

During early pumping in Aquifer E, the potentiometric surface will begin to decline as water is removed from storage. As pumping continues, the cone of depression will expand from the pumping centers toward the recharge and/or discharge areas. The lowering of the potentiometric surface will result in either: increased recharge to the aquifer or reduced discharge from the aquifer, or both, in order to balance the withdrawals from pumping. The increased recharge to Aquifer E would come from downward leakage from overlying units. Decreased discharge from Aquifer E would likely result in reduced upward flow to overlying units near Puget Sound and/or a landward shift of the fresh water-salt water mixing zone. If leakage from the overlying units is induced, the overlying units will respond to the lowered potentiometric surface in Aquifer E and water levels in these overlying aquifers will continue to fall until a new "equilibrium" in aquifer pressure is established. Consequently, water levels in the pumping wells (Aquifer E) will only stabilize when a new balance of recharge and discharge is established.

Moving the point of withdrawal upbasin may change the pattern of induced leakage from layers above Aquifer E. However, moving the place of use of the water rights upbasin could potentially benefit the shallow aquifer system by providing groundwater recharge related to water usage (i.e., septic systems, irrigation, leaking water distribution lines and recreational uses).

Uncertainties about the pattern of induced leakage from the proposed changes can be managed by post-permit monitoring of water levels in several aquifers, coupled with a condition that requires additional mitigation or cessation of further withdrawals if water level declines in the shallow aquifers are attributed to the additional withdrawals from Aquifer E. See the Withdrawal Management Plan condition in the Provisions and Conditions section of this Report.

Conservation Planning Requirements

The Municipal Water Law amended sections of the State Board of Health Code, RCW 43.20; the laws governing Public Water Systems, RCW 70.119A; and sections of the state Water Code, RCW 90.03. These changes affect the Department of Health's water system planning process and include the development of new standards and requirements for water conservation and water use efficiency for public water systems, including Lakewood Water District.

The Washington State Department of Health (DOH) is specifically tasked with the development of a conservation/water use efficiency rule. RCW 90.03.386 requires municipal water suppliers to implement cost-effective water conservation in accordance with the DOH conservation/water use efficiency rules, as part of their approved water system plan, and sets minimum conservation requirements for water system plans. It also requires municipal water suppliers to meet current conservation requirements and continue implementing their current programs. Draft conservation/efficiency regulations are currently being prepared by DOH's Drinking Water Program and its Water Use Efficiency Subcommittee. These regulations are expected to be adopted by year-end 2005.

The current Conservation Planning Requirements published by the Departments of Ecology and Health in 1994 identifies the water use reporting, forecasting and conservation program requirements for public water systems. A water conservation plan meeting these requirements is a necessary element of a Water System Plan.

Currently, the elements of a Conservation Plan include 1) water use data collection, 2) water demand forecasting, 3) water conservation program. The Conservation Plan needs to identify goals and objectives, evaluate alternative conservation measures, and identify the selected measures including their schedule, cost, monitoring requirements, and estimated water savings. The Municipal Water Law adds additional requirements for conservation planning programs include increased evaluation of cost-effectiveness of conservation measures and through exploring opportunities for water reclamation.

The Lakewood Water District's water conservation program is called "Water Wise". The plan is outlined in the District's February 2005 Water System Plan. The program complies with the Departments of Ecology and Health's requirements for such programs.

High points of the District's conservation efforts include:

- Continued reduction of the average per capita water demand from 160 gallons per day per capita in 1994 to 147 gallons per capita in 2003 to a targeted 137 gallons per day per capita in 2010;
- Education programs;

- Maintain and further reduce the District's historically low amount of unaccounted for water. Current unaccounted for water is less than 6.5% (1996 – 2003);
- Conservation pricing; and,
- Utility Retro-fits

The Lakewood Water District is currently in compliance with its conservation planning requirements, and will be subject to the newly adopted requirements for systems over 1,000 connections. Specifically:

Section 5(3) – Conservation requirements for systems with 1,000 or more connections

This section provides direction on conservation to water systems with 1,000 or more connections. This includes reporting the conservation measures the utility has put into practice in the past and how those measures have increased their water use efficiency. It also directs water systems that are using inchoate portions of their water right certificates to describe how, through additional cost-effective conservation measures, they could delay the use of their inchoate water rights.

Section 7 – Current conservation programs and the conservation rule

This section directs DOH to develop water conservation rules by the end of 2005 and to involve key stakeholders in the process. It also directs municipal water suppliers to continue meeting the current conservation planning requirements and carry out their current conservation program.

FINDINGS AND CONCLUSIONS:

Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights including the process to amend or change existing rights. Laws specifically governing the water right permitting process are RCW 90.03.250 through 90.03.340 and RCW 90.44.060. Changes or amendments to these rights are covered primarily under RCW 90.03.380 and RCW 90.44.100.

• **Potential for Enlargement**

No enlargement of the water right will occur under this transfer application. The original certificate is for the instantaneous quantity of 2250 gpm, and an annual quantity of 3650 acre-feet/year. The rates of withdrawal from the proposed additional wells will not exceed these certificated rates, and will in fact be reduced to reflect beneficial use.

• **Same Body of Public Groundwater**

Groundwater in the aquifer system in which the Abitibi wells and the proposed new points of withdrawal (District wells Table 2) are located, is within the hydrogeologic basin that generally defines the Chambers-Clover Creek Basin/Tacoma-Puyallup area of northwestern Pierce County. The wells are all completed in a regional groundwater system consisting of multiple water producing layers and semi-confining units deposited in various glacial and interglacial periods during the last two million years. These units are considered to be hydraulically connected.

The conceptual model of hydraulically interconnected hydrostratigraphic units in the southern Puget Sound is supported in two modeling reports published by the USGS in the Tacoma-Puyallup area (Jones et. al, 1999) and Soos Creek Basin (Morgan and Jones, 1999). Therefore, the existing and proposed points of withdrawal wells should be considered parts of the same body of public water.

• **Potential for Impairment to Neighboring Rights and Instream Flows:**

In evaluating this application Golder Associates reviewed all relevant reports, data collections and information provided by the applicant such as results from a hydrogeological modeling study. Ecology's consultants have not identified any likely cause for impairment resulting from this Application for Change. While increases in leakage between aquifer system may occur as a result of this change they are buffered over a large regional area and are not anticipated to directly affect other water right holder's ability to exercise their rights.

Under the provisions of Chapter 173-512-050 WAC, the Instream Resources Protection Program for the Chambers-Clover Creeks Basin, Water Resource Inventory Area (WRIA) 12 any new applications for ground water must consider the potential impacts to surface water (WAC 173-512-040). Where a proposed groundwater withdrawal or a proposed change in the place of groundwater withdrawal would reduce the flow in surface waters closed to further appropriations, denial is typically required because water is unavailable and withdrawal would be detrimental to the public welfare. It is recognized however, that the District has proposed mitigation measures for this transfer to offset any potential impact of these change applications on the flow of streams closed to further appropriation.

• **Beneficial Use**

According to RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020, municipal supply is considered a beneficial use of water.

• **Public Interest**

No detriment to the public interest could be identified during the investigation of this Application for Change. This transfer will be beneficial to the public interest by providing a reliable drinking water source. Ecology recognizes the access to a reliable source of public water to benefit the public living within the central Pierce County region. Additionally, this transfer will likely benefit the ground water system of the greater Lakewood area by leaving groundwater in shallow source aquifers that would otherwise be withdrawn.

In accordance with chapters 90.03 and 90.44 RCW, it is concluded that these water rights are in good standing and are eligible to be changed. It is determined that the change to 299A will not enlarge the certificate and the water use will be beneficial. Approval of this change request will not cause impairment of existing rights or be detrimental to the public interest. Based on these conclusions, this change request should be approved subject to existing rights and provisions and a superseding certificate should be issued.

RECOMMENDATIONS:

It is recommended that this Application for Change be approved and authorization issued to allow maximum instantaneous appropriation outlined in Table 2 of this Report of Examination.

I recommend the issuance of Superceding Water Right Certificates in the following amounts:

- 4585-A issued to Lakewood Water District for municipal supply; 2945 gpm and 4750 acre-feet/year. The period of use is year-round as needed;
- 4585-B issued to Abitibi Consolidated for industrial supply in the amount of 955 gpm, and 1490 acre-feet/year. The period of use is year-round as needed; and,
- 299-A issued to Lakewood Water District for municipal supply in the amount of 1187.5 gpm and 1971 acre-feet/year. The period of use is year-round as needed.

The total amount of this water rights change is 6,721 acre-feet/year. It is recommended that a portion of GWC 4585-A (2945 gpm/4750 acre-feet/year) be transferred subject to the provisions in this Report of Examination. Approximately 955 gpm/1490 acre-feet/year will remain under GWC 4585-B. The transfer of the full amount of GWC 299-A that was beneficially used in 1997 and remains valid and transferable for municipal purposes (1187.5 gpm/1971 acre-feet/year) the period of use is year-round as needed.

PROVISIONS AND CONDITIONS:

The certificate, when issued, supersedes that of same number issued on May 26, 1949, and is subject to the following provisions.

1. Withdrawal Management Plan:

Approval of this authorization is contingent on the applicant's participation in an active *Withdrawal Management Plan*. The following sections discuss the recommended post-permitting monitoring conditions for the transfer under the pumping regimen proposed by the District. All requested monitoring, metering and mitigation data will be for the previous year shall be submitted in a report format to the Water Resources Program, Department of Ecology, Southwest Regional Office by January 31st each year. It is recommended that when applicable the applicant correlates the data related to surface water flows to a standard water year format.

(a) Water Level Monitoring

Well hydrograph analysis is possibly the best tool to determine the degree of hydraulic continuity between Aquifer E and shallower aquifers and surface water. Hydrographs of District Wells completed in Aquifer E and nearby wells screened in Aquifers A and C indicate that in some cases, the aquifers responded differently to pumping. This difference in response is likely a result of different sources of recharge (e.g., precipitation in shallow aquifers vs. leakage from overlying layers in deeper aquifers). In at least one case (Wells D-2 and D-3), the water level in Aquifer C did not respond to daily pumping of a nearby well in Aquifer E for a period of approximately one month. Comparing water levels in wells completed in Aquifer E to water levels in wells completed in Aquifers A and C will indicate how the shallower aquifers respond to pumping in Aquifer E. Ideally the wells will be "nested" (i.e., located very close to one another, but completed in different aquifers - as some of the District Wells are currently) in order to closely monitor effects of pumping. Aquifer A should be used as an indicator (although not a perfect indicator) for effects of pumping on surface water. If it is found that Aquifer A does not respond to pumping in Aquifer E, then the potential for impacts to surface water is low.

The District has already collected data comparing water levels between the aquifers (Figures 2 through 4) and this data should be expanded to include other wells. This will help determine the hydraulic relationship between Aquifer E and the shallower aquifers where a major confining unit is absent. Much of the future water level monitoring may be done using existing District Wells. A representative sampling scheme should include the following wells:

Well Combination	Relevant Aquifers	Location
Lakewood Water District J-1/J-2	C and E	T20N, R3E - Sec. 31
Lakewood Water District D-3/D-2	C and E	T19N, R2E - Sec. 10
Lakewood Water District V-1 and E-3/E-2	A, C and E	T19N, R2E - Sec. 9 and T19N, R2E - Sec. 10
Lakewood Water District L-1 (2 or 3) and S-1/S-2	A, C and E	T19N, R2E - Sec. 4
Steilacoom Well 2 and Lakewood Water District T-13	A and E	T19N, R2E - Sec. 5
Lakewood Water District H-1 or H-2 (or Nyanza Rd TW) and Lakewood Water District T-4	A and E	T19N, R2E - Sec. 11

In order to help better define the regional aquifer conditions and provide information on potential changes resulting from this transfer, the District will collect publicly available water level data for the wells listed in Table 13. This can include, but is not limited to, data

provided directly from the well owner, data collected as part of the Tacoma-Pierce County aquifer monitoring program, or through a cooperative agreement between the well owner and the District to allow the District access to collect measurements.

Table 13. Well Pairs to be Monitored to Determine Impacts to Aquifers A and C in Layer D "Window" (as Part of the Water Level Monitoring Provision)

Well Name	Screened Aquifer	Location
North Group		
Parkland Well 9	A	T19N, R3E - Sec. 8
Parkland Well 10	C	T19N, R3E - Sec. 8
Parkland Well 1	C	T19N, R3E - Sec. 8
Parkland Well 11	E	T19N, R3E - Sec. 8
Parkland TW*	A	T19N, R3E - Sec. 17
(No accompanying deeper well)	--	--
(No accompanying shallow well)	--	--
Parkland Well 14	E	T19N, R3E - Sec. 15
Parkland Wells 2, 3, 5	C	T19N, R3E - Sec. 9
Parkland TW-7*	E	T19N, R3E - Sec. 9
South Group		
Parkland Well 6	C	T19N, R3E - Sec. 17
Parkland Well 12	E	T19N, R3E - Sec. 17
Spanaway Well 5	C	T19N, R3E - Sec. 21
Parkland Well 8	E	T19N, R3E - Sec. 22
H2O Water System Wells **	?	T19N, R3E - Sec. 22

* This well has not been field verified and may have been abandoned.

** Status of wells is unknown, but wells may be useful for monitoring water levels

The following wells are potential monitoring locations if other wells are unavailable:

- Spanaway Well 6 (Aquifer C) T19N, R3E - Sec. 27
- Spanaway Well 9 (Aquifer C) T19N, R3E - Sec. 23

Spanaway Wells 6 and 9 may not be located on the "window" in Layer D, but may provide helpful water level information in determining the effects to Aquifer C as a result of increased pumping in Aquifer E.

Water level data should be measured weekly, and compiled and submitted to Ecology by January 31st of each calendar year in order to determine if there is any water level decline in Aquifers A and C as a result of increased pumping in Aquifer E. Water level monitoring should begin as soon as possible before increased pumping from Aquifer E commences, in order to establish "baseline" conditions.

The wells presented above are shown to indicate potential monitoring wells. The actual wells used for monitoring could be a subset of that depending on the availability of data and level of access granted to the District by the well owners. Only purveyor wells have been included, with the assumption that access would be easier and water level/pumping records may be easier to obtain and compile.

(b) Water Level Measurements

In order to maintain a sustainable supply of water as well as to ensure that shallow aquifers and surface water sources are not impaired, pumping must be managed so that static water levels do not progressively decline from year to year. Therefore, water levels shall be measured and recorded in all production wells as well as several observation wells, using a consistent methodology.

If pumping from the wells authorized by this water right change results in a decreasing water level trend over a period of three or more years (corrected for any long-term effects related to drought) in any of the subject aquifers, immediate action shall be required to prevent water level declines to continue. These actions include, but are not limited to:

- reducing the instantaneous withdrawal rate (gpm) of the wells, including those owned by the District and its municipal wholesale customers;
- lowering the annual quantity removed from such wells;
- rotating pumping cycles; or,
- turning off certain wells; or,
- implementing additional mitigation strategies; or

Static water levels data shall be recorded and submitted to Ecology in hard copy as well as in digital format and shall include the following elements for each well:

1. Water Right Number
2. Unique Well ID Number
3. Measurement date and time
4. Measurement method (air line, electric tape, pressure transducer, etc.)
5. Well status (pumping, recently pumped, etc.)
6. Water level accuracy (to nearest foot, tenth of foot, etc.)
7. Description of the measuring point (top of casing, sounding tube, etc.)
8. Measuring point elevation above or below land surface to the nearest 0.1 foot
9. Land surface elevation at the well head to the nearest foot.
10. Static water level below measuring point to the nearest 0.1 foot.

For all monitoring wells that will continue to be used as production wells, water levels shall be measured using pressure transducers. Data shall be collected so that minimum and maximum water levels can be determined on a daily basis. For all monitoring wells that are not used as production wells, water levels shall be measured and recorded on a weekly basis.

(C) Water Quality Monitoring

Monitoring chloride concentrations in wells completed in aquifers below sea level near Puget Sound will help determine if reduced discharge from Aquifer E (if any) will result in seawater intrusion. The wells would ideally be located near Puget Sound (e.g., within one-half mile). A review of well logs indicates that there are very few wells that fulfill these criteria. Installing a new "sentinel" well could provide important water quality information but could be quite expensive and must be carefully sited and designed to identify the fresh water-salt water mixing zone. However, since seawater intrusion has not historically been an issue in the Lakewood Area, it is recommended that existing wells be used for monitoring at this time. A minimum monitoring scheme should include annual monitoring in the following wells:

Aquifer	Proposed Well Locations
C	Lakewood Water District O-2 or O-3 (T20N, R2E Sec. 28) or Western State Hospital Well #3 (T20N, R2E Sec 33)
E	Lakewood Water District N-2 (T20N, R2E Sec. 32)
G	Abitibi Well 3 or 5 (T20N/R2E - Sec. 32) or Abitibi Well 4 (T20N/R2E - Sec. 29)

Water quality measurements should be taken twice yearly, and compiled and submitted to Ecology by January 31st of each calendar year. Lakewood Water District has stated that their current monitoring program includes analysis for seawater intrusion. These data should be compiled into a single repository and serve as a historical record for review by Ecology. Chloride monitoring should begin as soon as possible before increased pumping from Aquifer E commences, in order to establish "baseline" conditions.

If chloride concentrations are found to reach 100 mg/L or greater in the above mentioned wells, it is recommended that Ecology evaluate water level and water quality data in order that mitigative measures can be taken to reduce pumping from wells that may be responsible for the increase in chloride concentration.

(D) Metering Requirements

Approved measuring devices shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting water Use", Chapter 173-173 WAC. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows the water user to petition Ecology for modifications to some of the requirements.

It is recognized that individual wells will be pumped for short periods of time at rates higher than the total average instantaneous rate, but the annual quantity for each well will not exceed the amounts indicated in Table 2 of this Report of Examination. In accordance to WAC 173-173-060, it is recommended that the pumping wells involved with this transfer (see Table 2 of this Report of Examination) be individually metered in order to determine weekly and annual amounts of withdrawal, as well as maximum rate of withdrawal.

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

A water level monitoring plan developed and implemented prior to the start of pumping in Aquifer E would provide a mechanism to evaluate the accuracy of the groundwater model assumptions and conclusions

(E) Mitigation Provision

Issuance of this approval is contingent on the submittal of an annual report that details mitigation activities. The method of determining the total annual offset is outlined in the Mitigation Plan section of this Report of Examination. The plan should include:

- the total annual quantity of water pumped from the Abitibi water rights from Aquifer E wells;
 - the total annual quantity of water pumped from Aquifer E wells under authorization from the District's existing water rights; and,
 - the total annual amount of offset provided by one or more of the mitigation resources management techniques described in this Report of Examination (with mitigation itemized by each source)
2. "If water levels continue to decline as a result of this water right change, even after corrective measures are taken, the Department may initiate regulatory action under Chapter RCW 43.27A to prevent impairment of existing rights or violation of the WRIA 12 stream closures at WAC 173-512-030."
 3. "If it can be shown that the requested change has the effect of impairing existing rights, it shall be the responsibility of the water right holder to mitigate for this impact and/or alter or cease withdrawal of water to prevent such impairment."
 4. The water appropriated under this application will be used for public water supply. The State Board of Health rules require public water supply owners to obtain written approval from the Office of Water Supply, Department of Health, 1112 SE Quince Street, PO Box 47890, Olympia, Washington 98504-7890, prior to any new construction or alterations of a public water supply system.

5. Water System Planning

Issuance of this approval is subject to implementation of all required conservation and planning standards. The Department of Health (DOH), Office of Drinking Water is directed by the legislature to adopt water use efficiency rules by December 2005. This new rule is a requirement of the Municipal Water Supply - Efficiency Requirements Act, Chapter 5, Laws of 2003 First Special Session. DOH has drafted proposed revisions to the Group A Public Water Systems rule, chapter 246-290 WAC. Specifically:

- Water Use Efficiency Planning Requirements - As part of a water system plan or small water system management program, municipal water system will have to collect data, forecast demand, and evaluate leakage and water use efficiency measures (including rates that encourage water use efficiency).
- Distribution Leakage Standard - Municipal System will be required to meet a state leakage standard of 10% or less in order to minimize loss of water from leakage in the distribution system.
- Water Use Efficiency Goal Setting and Performance Reporting - Municipal System will be required to set water use efficiency goals through a public process and report to DOH and the public on their performance.
- Lakewood Water and all wholesale water customers are required to be in compliance with the standards adopted under WAC 246-290.

6. This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Tribes under treaty or settlement.

ATTACHMENTS*Figures*

- Figure 1 - Location of Selected Wells in the Lakewood Area
 Figure 2a-2c - District Well J-1/J-2 Hydrograph Comparison and Daily Production
 Figure 3a-3c - District Well D-1/D-2 Hydrograph Comparison and Daily Production
 Figure 4a-4c - District Well E-1/E-2 Hydrograph Comparison and Daily Production
 Figure 5 - USGS Steam Gage Data - North Clover Creek Average Daily Flow 1990-2003

Appendix A

- Figures 2, 3, and 4 - Robinson, Noble and Saltbush Cross-Sections, 2004

REPORT BY: _____



DATE: _____

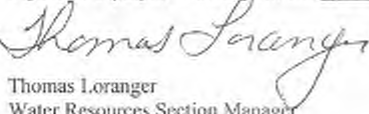
Feb 14, 2007

FINDINGS OF FACT AND DECISION

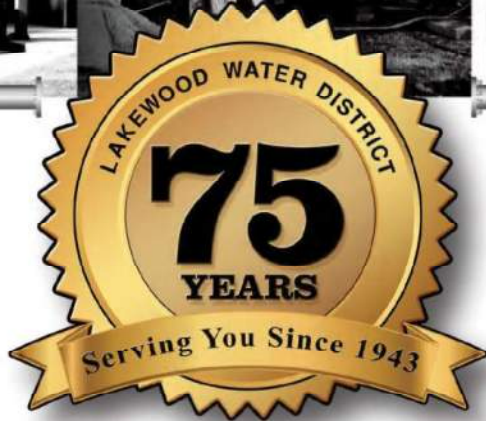
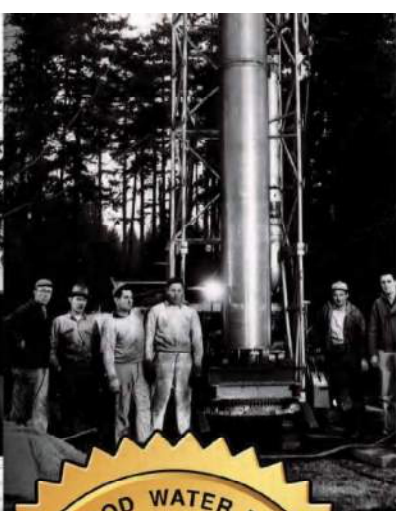
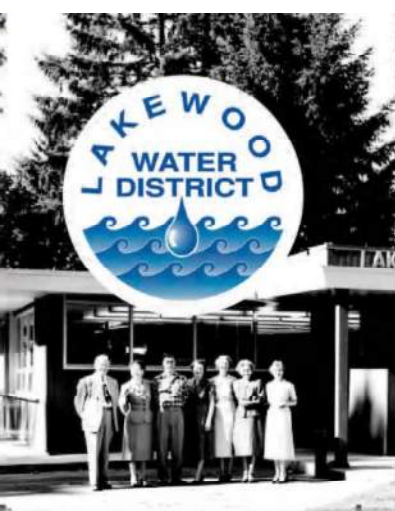
Upon reviewing the above report, I find all facts, relevant and material to the requested Application for Change have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a superseding certificate be issued under Water Right Number 299-A, subject to existing rights and indicated provisions, to allow appropriation of public water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 15th day of February, 2007.



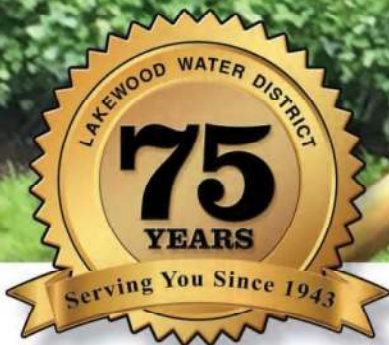
Thomas Loranger
 Water Resources Section Manager
 Southwest Regional Office



2017 Water Quality & Annual Business Report

Our Water, Our Community, Our Commitment





Dear Lakewood Water District Customers,

The Lakewood Water District, as we know it, is seventy-five (75) years old! Time flies (or should we say "flows") when we're having fun. It was in 1943 when this newly formed District assumed all the components of the water system then serving the Lakewood area, including water rights, wells, pumps, tanks, and mains, as well as the resulting obligation to maintain, repair, rehabilitate, and replace the components as they aged.

The District received the system free from debt and, consequently, has been able to provide water rates substantially lower than those of other water purveyors. But all good things must come to an end. In recent years, as the initial system aged, we have embarked on a rehabilitation and replacement program to meet the resulting effects of such aging.

The District has no taxing powers (lucky you!) Its primary source of revenue is money generated from our rate-payers by the sale of water to them.

Obviously, we can't accomplish our rehabilitation and replacement program all at once. In fact, we have prioritized our needs and are working with a fifty-(50)-year program. This has allowed us to increase our rates gradually to cover the costs of the program as they are incurred.

Not to overlook other sources of revenue, over the years, the District has entered into agreements with the Town of Steilacoom and Summit Water & Supply Co. (serving the Summit View area) to provide them with water on a wholesale basis. Since we have an excess of water to sell, we are currently working on expanding our wholesale market. The profit from these ventures is aimed at providing needed water to our neighbors while benefiting our rate-payers by minimizing future rate increases. We'll be reporting on this as we progress.

Have a pleasant summer...and enjoy the water.
Your Board of Commissioners

PS. Please see the next page for more information about our history and heritage and upcoming 75th Anniversary events and activities!



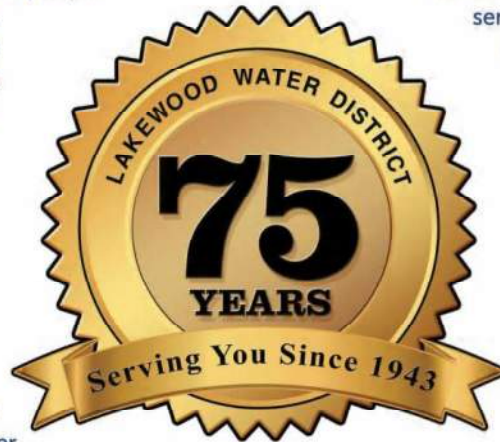
(Left to right) **Larry Ghilarducci**, President; **John Korsmo**, Vice President; **Greg Rediske**, Secretary

LWD Celebrates 75 Years...

The District's water system was acquired from the Federal Works Agency in 1943. When the District first started serving our 369 connections and 7,900 customers way back then, our 4 wells, 4 pumps, 3 tanks, and 40.8 miles of water main were plenty. Over the years, however, those 7,900 people multiplied, and so have our resources. Today we serve 16,913 connections and over 61,000 local customers (and thousands more wholesale customers) who rely on us every day when they turn on their faucet. In order to meet their needs, we now maintain 30 active wells, 30 pumps, a total pumping capacity of 34 million gallons per day, 13 tanks, a total possible storage capacity of 26 million gallons, and over 250 miles of water main. And, in keeping with our goal of quality customer service, we have maintained the lowest rates in Pierce County and, for any water utility serving over 15,000 connections, we have the lowest rates in the state.

Of course, customer service doesn't only apply to rates. Our Mission Statement is, "Lakewood Water District will provide its customers with water service that meets or exceeds all water quality standards, maintaining policies and practices that benefit the health and welfare of the community."

What good would the cheapest water be if it wasn't safe? That's why, over the years, we have made it a top priority to continue upgrading our system to ensure every gallon, every day, is as pure and safe as possible. We have continued to upgrade our water mains and services to ensure consistent service to the community. Nobody likes poor water pressure, so we have increased areas that were uncomfortably low. When it comes to paying your bill, we offer multiple options to make it convenient for you. If you have a question or concern, just give us a call. If need be, we'll send a State-certified technician to your home to assist and serve. We even have a friendly technician on call 24/7/365 to assist you with your needs. These are but a few of the ways we as your water district have strived over the past 75 years to exceed your expectations of what a water utility should be.



No one knows for sure what the future holds but, for what it's worth, there is one thing customers of Lakewood Water District can count on. For 75 years, we have served the community safe, potable drinking water with dedication and quality customer service, and we will continue to do that for the next 75 years and beyond. Thank you for letting us do so...and **Happy 75th Anniversary!**

Please join us...



City of Lakewood SummerFEST

Saturday, July 14,
10 a.m. – 5 p.m.
Fort Steilacoom Park

Please stop by for LWD
give-aways, fun water facts,
and a dunk tank!!

A dunk tank for "kids"
of all ages!

Refreshments

Multi-faceted tours
(including virtual tours of our
sites & facilities)

Lakewood Water District's 75th Anniversary Celebration

You are cordially invited to an Open
House Reception
at Lakewood Water District in
Celebration of our 75th Anniversary

Friday, August 24, beginning at 9 a.m.
in the District's Board Room
11900 Gravelly Lake Drive SW, Lakewood,
Washington 253/588-4423

MINUTES OF ORGANIZATION MEETING OF COMMISSIONERS
OF
LAKEWOOD WATER DISTRICT

Held at eight o'clock P.M. on Tuesday, June 1, 1943.
Present: Allan H. Link, H. W. McCann and F. D.
Metzger, being all of the commissioners of said district.
The Commissioners having been advised that the
... .. processed the returns of

Lakewood Water District Projects



Projects Completed in 2017

Sylvan Park Phase 2 Project:

This phase of the project replaced the mains running between Lorraine and Carol and from 88th to 92nd along Gayle, an approximate 3700 LF (linear feet) of main, along with updated services. The Project was awarded to Johnson & Maddox from Tumwater, Washington at \$643,156.00, who completed the project on schedule, under budget, and without any significant changes from construction.

Thorne Lane-Portland Avenue to Spruce:

This project included approximately 1,500 LF of 8-inch DI (ductile iron) water main with appurtenances to replace old AC (asbestos cement) mains, valves, hydrants, and water services; plus, transfer hydrants and water services from an old 4-inch water main to an existing 8-inch water main along Harry Todd Park. This project was awarded to Pape and Sons at \$372,000. This work was completed on time, with no changes, and under budget.

Arrow Head Main Replacement Project Phase 1:

This project replaced old AC mains, valves, hydrants, and water services with approximately 8,300 LF of 8-inch PVC water mains for about \$1,413,000.00. The project was awarded to Johnson & Maddox from Tumwater and was substantially completed on time and within budget.

Projects Completed in 2018

Silcox-Rose:

This project replaced approximately 3,500 LF of old 2-inch galvanized steel and 4-inch AC pipe in the Tillicum area with new 8-inch ductile iron pipe including new water services, fire hydrants, valves, and other appurtenances. Contractor Pape & Sons Construction, Inc. was awarded the project at a bid price of \$569,996.35 including tax and completed construction March 12, 2018 (on time) and under budget.

Sylvan Park, Phase 3:

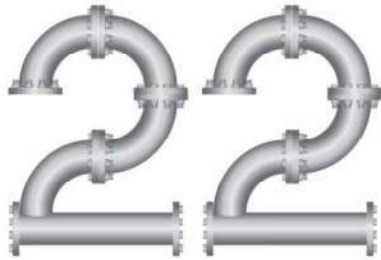
This phase of the project included replacement of approximately 3,900 LF of 6-inch and 8-inch AC pipe in the northeast part of the system with new 8-inch ductile iron pipe including new water services, fire hydrants, valves, and other appurtenances. With an Engineer's Estimate of \$746,297.93 including tax, Fenix Earthworks, LLC presented the low bid at \$788,409.41. Final completion is scheduled for July 7, 2018. At the time of this writing, the project is on time and within the bid budget.

Lake Steilacoom Drive/Tower Road:

This project, awarded to Pape & Sons in April at a total bid price of \$947,025.34, will replace approximately 4,600 LF of old 2-inch galvanized steel and 4-inch asbestos cement pipe along Lake Steilacoom with new 8-inch ductile iron pipe including new water services, fire hydrants, valves, and other appurtenances. Construction will begin in July and be completed by October.



The staff at Lakewood Water District today here to help you



Another Clean Audit...22 Years and Counting

The State Auditor's Office completed its annual audit of the District's accounts and records and again awarded the District a clean report. The SAO's official Accountability Audit and Financial Statement Audit Reports again noted no deficiencies and, again, complimented the District on its strong financial policies, precise accounting internal controls, and competent and cooperative staff. For more information on our audit history, please consult our website at www.lakewoodwater.org.

Lakewood Water District Balance Sheet Year Ended December 31, 2017 (unaudited)

Assets	(\$) Dollar amounts
Total Net Utility Plant	72,630,944
Cash and Investments	11,555,020
Other Current Assets	2,246,206
Total Current Assets	13,801,226
Deferred Outflows	280,203
TOTAL ASSETS	86,712,373
Current Liabilities	
Current Liabilities	2,532,062
Other Liabilities	1,973,204
Bonds Payable	24,920,678
Unappropriated Retained Earnings	56,903,505
Deferred Inflows	382,924
TOTAL LIABILITIES & EQUITY	86,712,373

The staff at Lakewood Water District in 1954



The Source of Your Water

The District's sole source of water is from underground aquifers—water-bearing strata of permeable rock, sand, or gravel. No surface water, desalinated water, or recycled water is used. The District has a total of 30 active wells which, together, provide a maximum production capacity of 34 million gallons per day (mgd), with a total water right capacity to pump up to over 60+ mgd.

The District's 30 active wells are in four aquifers—A, C, E, and G—with A being the shallowest and G being the deepest. Aquifers are generally of glacial origin and tend to be coarse-grained and highly permeable. There are three Aquitards—B, D, and F—layered between the four aquifers. Aquitards are strata of finer-grained and less permeable layers and usually of interglacial origin. The District's aquitards are made up of sediments deposited by the ancestral Nisqually and Puyallup rivers. Historical sedimentation is not unlike the alluvium presently being deposited by these rivers today.

Recharge (replenishing) of the aquifers comes from local rainfall in the Clover/Chambers drainage basin. The District's deepest aquifers—E and G—will most likely receive some additional, deep underflow recharge from the south Puyallup/Graham area westward to the Puget Sound, including snowpack from Mt. Rainier.

NOTE: To see a graphic depiction of the District's water source as referenced above, please visit the District website at www.lakewoodwater.org, under "Your Water."

For Your Health

Important Information from the Environmental Protection Agency (EPA)

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 the water poses a health risk.

Some may be more vulnerable to contaminants in drinking water than the general population. The following can be particularly at risk of infection: the immuno-compromised, such as those with cancer undergoing chemotherapy; those having had organ transplants, HIV/AIDS, or other immune system disorders; and some elderly and infants. These should seek advice about drinking water from their healthcare providers.

More information about contaminants and potential health effects, and EPA/CDC guidelines on appropriate means to lessen the risk for infections by cryptosporidium and microbial contaminants, is available from the Safe Drinking Water Hotline at 1.800.426.4791.



Tele takes a weekly sample to ensure highest water quality



Jake monitors levels on Gravelly Lake

Monitoring Our Lakes and Streams

We consistently keep an eye on the levels of select lakes and streams in our service area.

The lake levels are indicators of the water table level in the Steilacoom Gravel, deposited by the receding Vashon Glacier. Water in the gravel also leaks through the Vashon till or springs out above the till, adding to the flows of the area's major springs such as Ponce de Leon, Chambers, Garrison, and Sequelichew. The District collects monthly data from gauges on Ponce de Leon and on five lakes (American, Gravelly, Hidden, Louise, and Waughop). This information, together with the data collected from the Pierce County Stream Team, is vital to the District's Aquifer Management Program as well as the Tacoma-Pierce County Health Department's long-term groundwater monitoring program.

Water Use Efficiency Rule

The District is compliant with all facets of the Water Use Efficiency Rule. In 2017, the District's lost water was at 6.9 percent, bringing its three-year average to 9.4 percent. The continued success of our AMI System, 50-year R&R, and ever-expanded Leak Detection programs have assisted the District in meeting its WUE goals as set by the State Department of Health.

2017 Water Quality Sampling/Monitoring Report

Your water meets all federal, state, and local quality standards, ensuring that you enjoy safe, clean, potable water. Not listed are 63 volatile organic chemicals for which we tested, all resulting in either Not Detected (ND) or well below the Maximum Contaminant Level (MCL). The number and frequency of non-bacteriological samples are determined by the Water Quality Monitoring Schedule (WQMS) issued by the Washington State Department of Health (DOH).

Sample Type	Samples Taken Per Year	Last Sample Year	Next Sample Year	EPA/DOH MCL (max level allowed)	LWD Highest Level Detected	LWD Lowest Level Detected	Number of Samples Over MCL	AL	Typical Sources
Arsenic ¹	DOH WQMS List	2016	2018	10 ppb	5 ppb	<1 ppm	0		Erosion of natural deposits
Asbestos	1 every 9 yrs	2011	TBD	--	--	--	--	--	Friable fiber
Copper	30 every 3 yrs	2017	2020	N/A	0.35 ppm	<.05 ppm	0	1.3 ppm	Household plumbing
Fecal Coliform	840 per yr	2017	2018	0	ND	ND	0	0	Human and animal fecal waste
Total Coliform	840 per yr	2017	2018	<5% positive	ND	ND	0	0	Found throughout the environment
Haloacetic Acids	2 per yr	2017	2018	60 ppb	ND	ND	0	0	Disinfectant by-product
Lead ²	30 every 3 yrs	2017	2020	N/A	8 ppb	<1 ppb	0	15 ppb	Household plumbing
Nitrates	22 per yr	2017	2018	10 ppm	2.2 ppm	<0.2 ppm	0	0	Erosion of natural deposits
Total Trihalomethanes	2 per yr	2017	2018	80 ppb	5.9 ppb	ND	0	0	Disinfection by-product

Our Testing Resulted In No Violations

The chart above only reflects a portion of the testing LWD performs. Complete Source Water Assessment (testing result information) is available at the District office.

Table Term Definitions:

AL: Federal Action Level. Must take action to minimize levels if concentrations exceed these numbers.

MCL: Maximum Contaminant Level. The highest level of a contaminant allowed in drinking water.

ND: Not Detected

ppb: parts per billion, or micrograms per liter (ug/L)

ppm: parts per million, or milligrams per liter (mg/L)

TBD: To Be Determined

WQMS: Water Quality Monitoring Schedule

One part per million corresponds to one minute in two years or a single penny in \$10,000.

One part per billion corresponds to one minute in 2,000 years or a single penny in \$10,000,000.

¹ Your drinking water currently meets the EPA's revised drinking water standard for arsenic; however, it does contain low levels of arsenic. There is a small chance that some people who drink water containing low levels of arsenic for many years could develop circulatory disease, cancer, or other health problems. Most types of cancer and circulatory diseases are due to factors other than exposure to arsenic. The EPA's standard balances the current understanding of arsenic's health effects against the costs of removing arsenic from drinking water.

² 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. Lakewood Water District 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 800.426.4791 or at www.epa.gov/safewater/lead.

If you would like to learn more about our water, or have questions regarding water quality or what you can do to help keep our water supply clean and safe, please contact us at Lakewood Water District or any of the following:

Lakewood Water District
11900 Gravelly Lake Drive SW
Lakewood, WA 98499
www.lakewoodwater.org, 253.588.4423

Randall M. Black, General Manager
Email: rblack@lakewoodwater.org

Washington State Department of Health (WDOH)
www.doh.wa.gov/ehp/dw

Environmental Protection Agency (EPA)
www.epa.gov/safewater

Safe Drinking Water Hotline
800.426.4791, email: hotline-sdwa@epa.gov

To request additional copies of this year's Water Quality & Annual Business Report, please contact the District office at 253.588.4423 or csweb@lakewoodwater.org

You can also access this report on our website at www.lakewoodwater.org

New Look Coming Soon to Your LWD Bill

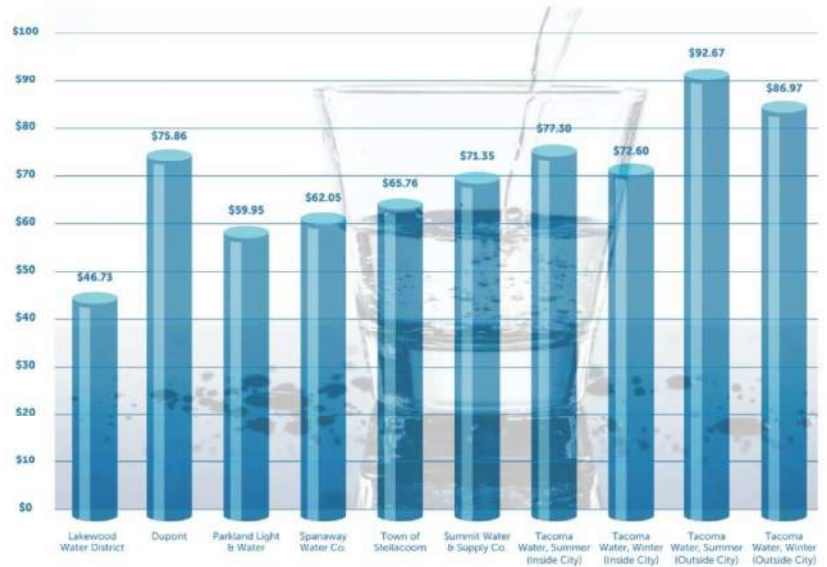


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Comparisons of Lakewood Water District Rates with Surrounding Utilities

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Visit the website www.lakewoodwater.org for all up to date news, customer service and questions

WATER QUALITY MONITORING PLAN

Introduction

This Water Quality Monitoring Plan presents the requirements for monitoring water quality at the sources and in the 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.

Existing Water System Description

Water System Ownership and Management

The Lakewood Water District (District) 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 District's system is shown below in **Table 1**.

Table 1
Water System Ownership Information Summary

Information Type	Description
System Type	Group A – Community – Public Water System
System Name	Lakewood Water District
County	Pierce
DOH System ID Number	45550 C
Owner Number	003231
Address	11900 Gravelly Lake Drive SW Lakewood, WA 98499
Contact	Randall M. Black, General Manager
Contact Phone Number	253-588-4423

Water System Operation and Control

Water supply to the District's system is provided by 30 active groundwater wells from a total of 34 wells. Three inactive wells, the Hemlock Hill L-1 Well, Oakbrook O-1 Well, and Hipkins I-4 Well, are currently not being used, but can be placed in service if desired. The Deepwood Q-3 Well is abandoned and unusable. All wells are equipped with telemetry and control technology called WellSaver, which continuously monitors aquifer levels and adjusts pumping rates or shuts down wells to avoid excessive water level drawdown in the well.

Wells are called to operate according to preset tank drawdown levels and are called to turn off according to preset fill elevations. This is accomplished automatically through the transfer of tank elevation data produced by a pressure transducer to the site Remote Telemetry /Transmitting Unit (RTU) and then to the main office Master Telemetry /Transmitting Unit (MTU). The MTU is primarily responsible for command and control, data acquisition and alarm monitoring. In addition, all RTUs are capable of local command and control and site operation in case of a communications interruption between the MTU and the RTU.

Pressure Zones

A list of the District's existing pressure zones and their respective maximum hydraulic elevations is presented in **Table 2**. The table also shows the estimated connections and population in each pressure zone in 2016, based on a review of 2016 water supply data.

Table 2
Pressure Zone Data Summary

Pressure Zone	Population	Connections
516	2,574	697
490	5,018	1,359
470	126	34
455	3,958	1,072
460	377	102
404	47,820	12,931
Total	59,873	16,940

A general discussion of the operation of each pressure zone is presented below.

404 Zone

The 404 Zone is supplied with water from all the District's wells, except the Hemlock L-3 Well which supplies the 516 Zone and the J-1, J-2 and J-3 wells which supplies the 455 Zone. (The tank is actually in the 404 Zone but supplies water exclusively to the 455 Zone through a booster pump) Operation of the 404 Zone wells is controlled by water levels in the 404 Zone tanks. These wells are called to operate according to preset tank drawdown levels and are called to turn off upon reaching a certain level. This is accomplished automatically through the transfer of tank level data from the tank site's RTU to the well site's RTU. The RTUs also send well and tank data to the MTU at the District office for data collection and alarm notification purposes.

455 Zone

The 455 Zone is typically supplied by the Steilacoom Blvd 455 Booster Pump Station, the 88th and Pine Booster # 2 or a combination of both. The 88th and Pine Booster # 1 as well as the 88th and Pine J-1, J-2, and J-3 Wells can supply water to the zone in certain high demand conditions. The 455 Zone is located in the northeast quadrant of the District's service area. It is bordered by I-5 to the east, 80th Street to the north, Lakeview Avenue to the west, and 108th Street to the South. Since the 455 Zone is a closed zone at least one of the booster pump stations must be operating at all times. The operation of the pumps is controlled by the pressure in the zone monitored at three locations: 88th and Pine Booster # 2, Steilacoom Blvd Booster Station, and the Scotts G-1 and G-2 Wells Site. Water pumped in excess of 455 Zone demands is recirculated back to the 404 Zone through a pressure sustaining control valve located in a below-grade vault near the intersection of Montgrove Avenue and Pacific Highway. Check valves at various locations will allow reverse flow from the 404 Zone to the 455 Zone during emergency situations when the hydraulic grade in the 455 Zone is suppressed below the hydraulic grade in the 404 Zone.

460 Zone

The 460 Zone is supplied with water from the Nyanza Hill Pump Station, which pumps water from the 404 Zone. Since the 460 Zone is a closed zone, at least one of the three pumps in the pump station is in continuous operation mode. The operation of the pumps is controlled by the pressure in the 460 Zone. Therefore, pumps are called on to operate as needed to meet the demands of the zone and to maintain adequate pressures. Water pumped from this station in excess of 460 Zone demands is recirculated back to the 404 Zone through a pressure relief control valve located in a below-grade vault in Nyanza Park Drive.

470 Zone

The 470 Zone is a closed zone, supplied by the 516 Zone through a single pressure reducing station. The pressure reducing station maintains a set downstream pressure in the 470 Zone, regardless of system demands, up to the flow capacity of the control valve.

490 Zone

The 490 Zone is supplied with water from the Farwest Drive Tank, Hemlock Hill Pump Station and 114th St Booster Station. (The Philip Reservoir Boosters can also be configured to pump to the 490 Zone if needed) The source of water to the 490 Zone is from the 404 Zone through one or a combination of these pump stations. The operation of the pump stations is controlled by the water level in the Farwest Drive 490 Zone Tank, which establishes the pressures in the 490 Zone.

516 Zone

The 516 Zone is supplied with water from the Hemlock L-3 Well, Hemlock Hill Boosters, Philip Reservoir Boosters and Deepwood Booster Station. The operation of the booster pump stations is controlled by the water level in the Hemlock Hill Elevated Tank and the Hemlock Hill Hydropillar. The water level in these tanks establish pressures in the 516 Zone.

Water System Facilities

A general description of the water system facilities is presented below. More detailed information about the water system facilities is presented in Chapter 2 of the District's Comprehensive Water System Plan.

Water Sources

A list of the District's existing water sources is presented in **Table 3**. All the District's water is provided by groundwater wells.

Pressure Reducing Stations

A list of the District's existing pressure reducing stations is presented in **Table 4**

**Table 3
Supply Facility Data Summary**

DOH No.	Source Name	Location	Depth (BGS)	Avg. Flow Rate (gpm)	Current Status
S01	A-3 Tillicum	T19N/R2E/S21	481	925	ACTIVE
S02	D-2 Interlaken/Yard	T19N/R2E/S10	497	875	ACTIVE
S03	D-3 Interlaken/Yard	T19N/R2E/S10	224	875	ACTIVE
S04	E-2 Washington Boulevard	T19N/R2E/S10	489	868	ACTIVE
S05	E-3 Washington Boulevard	T19N/R2E/S10	275	768	ACTIVE
S06	F-2 104th & Bridgeport Way	T19N/R2E/S2	535	983	ACTIVE
S07	G-1 Scotts	T19N/R2E/S4	173	1,250	ACTIVE
S07	G-2 Scotts	T19N/R2E/S4	180	875	ACTIVE
S08	H1 Ponders	T19N/R2E/S14	110	1,370	ACTIVE
S08	H-2 Ponders	T19N/R2E/S14	105	1,125	ACTIVE
S09	I-1 Hipkins	T19N/R2E/S34	267	620	ACTIVE
S09	I-3 Hipkins	T19N/R2E/S34	277	750	ACTIVE
S09	I-4 Hipkins	T19N/R2E/S34	332	--	INACTIVE
S11	J-1 88th & Pine	T19N/R2E/S31	157	1975	ACTIVE
S12	J-2 88th & Pine	T19N/R2E/S31	605	720	ACTIVE
S41	J-3 88th & Pine	T20N/R2E/S31	180	800	ACTIVE
S13	K-1 Lake Avenue	T19N/R2E/S2	571	963	ACTIVE
S13	K-2 Lake Avenue	T19N/R2E/S2	572	1,188	ACTIVE
S14	L-1 Hemlock Hill	T19N/R2E/S4	--	--	INACTIVE
S14	L-2 Hemlock Hill	T19N/R2E/S4	213	785	ACTIVE
S14	L-3 Hemlock Hill	T19N/R2E/S4	245	525	ACTIVE
S15	N-1 View Road	T19N/R2E/S32	1,064	988	ACTIVE
S16	N-2 View Road	T19N/R2E/S32	566	913	ACTIVE
S25	O-1 Oakbrook	T19N/R2E/S28	255	--	INACTIVE
S25	O-2 Oakbrook	T19N/R2E/S28	314	850	ACTIVE
S25	O-3 Oakbrook	T19N/R2E/S29	201	938	ACTIVE
S18	P-1R Steilacoom Boulevard	T19N/R2E/S36	496	550	ACTIVE
S18	P-2 Steilacoom Boulevard	T19N/R2E/S36	488	1,400	ACTIVE
S19	Q-1 Deepwood	T19N/R2E/S4	540	945	ACTIVE
S19	Q-3 Deepwood	T19N/R2E/S4	71	--	ABANDONED
S21	R-1 112th Street	T19N/R2E/S11	565	1,308	ACTIVE
S22	S-1 Angle Lane	T19N/R2E/S4	355	650	ACTIVE
S23	S-2 Angle Lane	T19N/R2E/S4	546	825	ACTIVE
S27	U-1 Country Place	T19N/R2E/S4	304	813	ACTIVE

**Table 4
Pressure Reducing/Sustaining Valve Data Summary**

Location	Upper Zone	Lower Zone	Current Status
8900 Farwest Dr	490	404	Active
104th Ave & Butte Dr	404	404	Active
Elwood Dr & 100th Ave	404	404	Active
9101 112th Street SW	516	470	Active
6424 Nyanza Pk Dr	460	404	Active
Montgrove & South Tacoma Way	455	404	Active
10901 Pacific Highway	455	404	Active

Water Storage

A list of the District's existing water storage facilities is presented below in **Table 5**.

**Table 5
Storage Facility Data Summary**

Facility Name	Overflow Elevation (ft)	Zone Served	Total Volume (MG)	Material	Current Status
American Lake Gardens Tank	404	404	3.54	Steel	Active
Steilacoom Boulevard Tank	404	404	3.50	Steel	Active
Washington Boulevard Tank	404	404	3.72	Steel	Active
Washington Boulevard Tank	358	404	1.00	Steel	Abandoned
Hemlock Hill/Dunbar Reservoir	404	404	1.30	Concrete	Active
Hemlock Hill Elevated Tank	516	516	0.10	Steel	Active
Hemlock Hill Hall Hydropillar	516	516	0.50	Steel	Active
104 th & Bridgeport Way Hydropillar	404	404	0.50	Steel	Active
Farwest Drive Tank	490	490	0.50	Steel	Active
Oakbrook Elevated Tank	404	404	0.50	Steel	Active
88 th & Pine Tank	404	455	0.50	Steel	Active
Nyanza Hill Tank	404	404	0.44	Steel	Active
Tillicum Elevated Tank	404	404	0.15	Concrete	Abandoned
Forster Reservoir	239	404	3.50	Concrete	Active
Philip Reservoir	411	404	8.00	Concrete	Active

Pump Stations

A list of the District's existing booster pump stations is presented in **Table 6**.

**Table 6
Booster Pump Station Data Summary**

Name	Suction Zone	Discharge Zone	Capacity (gpm)	Above or Below Grade
Forster	295	404	1,000	Above
Ponder's Relift	H-1, H-2 Wells Clearwell	404	2,700	Above
104 th & Butte Rd	404	516/404	800-1,000	Below
Hemlock Hill	404	490 & 516	5,400	Above
Philip Reservoir	404	490 or 516	850-900	Above
Steilacoom Blvd	404	455	3,600	Above
88th & Pine #1	404	455	700	Below
88th & Pine #2	404	455	1,200	Below
Nyanza Hill	404	460	1,825	Above
Deepwood	404	516	650	Above

Water Treatment

All the water from the District's wells is chlorinated before it enters the distribution system. Re-chlorination is also used at the District's Philip Reservoir and American Lake Gardens tanks through automatic recirculation pumps. If the chlorine residual level at the three separate sampling elevations inside each tank is lower than a user-determined set-point, the recirculation pumps are called to run.

Filtration and Adsorption Treatment

Several of the District's wells have relatively high concentrations of iron and manganese. To remove these minerals from the water, filtration and adsorption techniques are used. The View Road Treatment Plant uses a low rate, multiple layered filtration process consisting of four anthracite/silica sand pressure filter cells. Water from the N-1 Well is treated at this site and supplied to the District's 404 Zone and to the Town of Steilacoom. Sodium Hypochlorite (NaOCl) is added to the raw water to oxidize the soluble iron and manganese, as well as oxidizing any hydrogen sulfide or ammonia before the water enters the pressure filter. The sodium hypochlorite solution also provides for desired chlorine residual in the system. The disinfected water is filtered through the four anthracite/silica sand pressure filter cells to remove or adsorb the iron and manganese. The filter cells are backwashed regularly to remove particulates that clog the media. The backwash water is retained, treated and returned to the system so that minimal water is wasted.

Adsorption Treatment

Adsorption is the second iron and manganese removal technology used by the District applied through individual filters in parallel. The total number of filters used at a single site depends on the production capacity and raw water concentrations of iron and manganese in a well. The District employs these filter systems at the Q-1, S-1, D-3 and U-1 Wells. Adsorption removal mechanisms adsorb dissolved iron and manganese onto a manganese dioxide medium. This process also includes the injection of NaOCl prior to the filters for oxidation and to provide chlorine residual in the distribution system.

Aeration Treatment

The third type of treatment facility used by the District is at the Ponders H-1 and H-2 Well field. Aeration tower technology was added to the well field, because of the contamination of an aquifer in the Ponders Corner vicinity in the 1980's, after it was discovered that a dry-cleaning business was dumping waste products to a private dry groundwater well. Over time, these products contaminated the aquifer with a substantial amount of detergent by-products.

The contaminated water from the wells is pumped to the top of two 30-foot high packed towers where the water is evenly distributed over the full surface of the packing media, which in this case are 2-inch diameter perforated plastic balls. The media disperses the water into droplets allowing more surface contact from air that is blown from the bottom and up each tower. The lighter detergent molecules are separated from the heavier water molecules and blown off to the atmosphere. The water droplets drop down through the media and

collect at the bottom of the towers where they flow through a manifold into an approximately 7,000 gallon capacity clear well. The water is then treated again with granulated activated carbon (GAC) pressure cells to remove PFAS from the water. NaOCl is injected into the manifold prior to the stripping towers and again after the GAC system. The District owns and maintains the wells and the GAC system. The clear well, re-lift pumps and the air stripping towers are owned by the Washington State Department of Ecology (DOE), but are maintained by the District.

The District is required to perform water quality monitoring at each of the active sources for inorganic chemical and physical substances, organic chemical, unregulated inorganic and organic chemicals, and radionuclides. The monitoring requirements that the District must comply with are specified in WAC 246-290-300. The District must comply with the requirements for groundwater sources. Table 7 summarizes the source water quality monitoring requirements and distribution system monitoring requirements for the next several years. The table is based on information available at the time that this document was prepared and may change in the future. Results of recent water quality monitoring are summarized in Appendix A of this Water Quality Monitoring Plan.

Table 7
Monitoring Schedule for 2019-2022

Sample Type	Sample Frequency	Year Last Taken	2019 Sample Year	2020 Sample Year	2021 Sample Year	2022 Sample Year	Test Method	Monitoring Requirement Upon Violation
Nitrate	22/year	2018	X	X	X	X	NIT	Quarterly for 1 year
IOCs	22/9 years	2010	X				IOC	Quarterly for 2 quarters
VOCs	22/6 years	2018	X				VOC 524.2	Quarterly for 2 quarters
Stage 2 DBPS	2/year	2018	X	X	X	X	TTHM/HAA5	
Radium 228	22/6 years	2017				X	RAD	Quarterly
Gross Alphas	22/6 years	2016				X	RAD	Quarterly
Asbestos	1/9 years	2011		X			ASB	
Bacteriological	840/year	2018	X	X	X	X	TOC	
Lead & Copper	30/3 years	2017		X			LCR	(2)-6 month periods
Herbicides 515.1	22/9 years	2018					SOC	
Pesticides 525.2	22/9 years	2018					SOC	

Distribution System Water Quality

The District regularly conducts water quality monitoring throughout the distribution system for several potential contaminants. Applicable monitoring requirements are described below.

Coliform Monitoring

The District is required to collect a minimum of seventy (70) coliform samples per month from different locations throughout the system, based on a population served of 69,705 in 2019. The District collected only two positive samples between 2004 and 2019. All repeat samples taken within 24 hours had no detectable coliforms. Since the number of positive

samples did not constitute at least five percent of the total samples taken, no violation of the legal limit occurred.

Table 8 lists the addresses of the District’s routine sampling locations, including the upstream and downstream sampling locations in the event that repeat sampling is necessary. **Table 9** lists the monitoring schedule for each of the routine sampling sites. These locations are also shown in **Figure 1**.

**Table 8
Coliform Monitoring Sample Locations**

Sample Location #	Routine Sample Location	Repeat Sample Location, 5 Active Services Upstream	Repeat Sample Location, 5 Active Services Downstream
1	8500 Lake St	Tillicum Well site	8214 Lake St
2	14800 Spring St	Woodbrook Elementary School	Corner of 146th St & Spring St
3	12611 Pacific Hwy	Ponders Well Site	Corner of Lincoln St & Boston St
4	3310 88th St SW	88th and Pine Well Site	3206 88th St SW
5	9401 Lakewood Dr	10127 Lakewood Dr	Oak Grove Apartments
6	4813 80th St SW	5017 80th St SW	8100 48th Ave SW
7	7800 Bridgeport Way	Corner of Custer and Grange	8317 Bridgeport Way
8	10127 Lakewood Mall Blvd	Businesses in Towne Center	Businesses in Towne Center
9	6615 100th St	6423 100th St	9843 Dekoven Dr
10	6801 Mt Tacoma Dr	Corner of Waverly and Mt Tacoma Dr	6549 Mt Tacoma Dr
11	9200 Zircon Dr SW	Corner of Zircon Dr and 91st Ave SW	9516 Zircon Dr SW
12	7424 Phillips Rd	7432 Phillips Rd	7424 Phillips Rd
13	9300 Carver Rd	10506 94th St	Corner of 105th St & Marietta Ave
14	11107 107th St SW	10913 107th St SW	11201 107th St SW
15	10102 87th Ave SW	10122 87th Ave SW	10114 88th Ave SW
16	10800 Butte Dr	10924 Butte Dr	Corner of 107th St SW & Butte Dr
17	12018 Vernon Ave SW	12306 Vernon Ave SW	Corner of Forest Ave & Vernon Ave
18	5902 111th St SW	Clover Park High School	R-1 Well Site on 112th St
19	11101 South Tacoma Ave	Parkland Intertie	3723 112th St SW

Asbestos Monitoring

Asbestos monitoring is required if the sources are vulnerable to asbestos contamination or if the distribution system contains more than ten percent of asbestos cement pipe. Although none of the District’s sources are susceptible to asbestos contamination, asbestos cement

(AC) pipe composes more than ten percent of the District’s distribution system. Therefore, the District must monitor for asbestos in the distribution system. The current MCL for asbestos is seven million fibers per liter and greater than ten microns in length. Monitoring must be accomplished during the first three-year compliance period of each nine-year compliance cycle. The water sample must be taken at a tap that is served by an asbestos cement pipe under conditions where asbestos contamination is most likely to occur. The District’s most recent sample in 2011 did not contain asbestos contamination.

**Table 9
Coliform Monitoring Sampling Rotation Schedule**

Sampling Locations	Number of Samples Taken
Site 1	4 to 5
Site 2	4 to 5
Site 3	4 to 5
Site 4	4 to 5
Site 5	4 to 5
Site 6	4 to 5
Site 7	4 to 5
Site 8	4 to 5
Site 9	4 to 5
Site 10	4 to 5
Site 11	4 to 5
Site 12	4 to 5
Site 13	4 to 5
Site 14	4 to 5
Site 15	4 to 5
Site 16	4 to 5
Site 17	4 to 5
Site 18	4 to 5
Site 19	4 to 5

Disinfectant Residual Concentration Monitoring

Disinfection requirements for groundwater sources are contained in *WAC 246-290-451*, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system. The District has set a chlorination target to maintain a residual disinfectant concentration of at least 0.2 mg/L. The water samples collected by the District for coliform analysis are also tested for residual disinfectant concentration. The results of residual disinfectant concentration tests in 2018 indicate a range of 0.43 mg/L to 1.00 mg/L, with the average being 0.67 mg/L.

Lead and Copper Monitoring

The Lead and Copper Rule identifies the action level for lead as being greater than 0.015 mg/L and the action level for copper as being greater than 1.3 mg/L. The results of the tests from the monitoring period during 2017, which included 30 sample sites, indicate a range of

less than 0.001 mg/L to 0.008 mg/L for lead and a range of 0.05 mg/L to 0.35 mg/L for copper. These results indicate the 90th percentile concentration of neither lead nor copper exceeded the action level. Monitoring currently must be accomplished every three years.

Disinfectant/Disinfection By-Products

The District must take a minimum of two samples per year in the warmest month of the year. The samples must be taken from services representing the two farthest locations from ground water sources in the District's service area. In May 2012 the District amended its Disinfection By-product sampling regiment to meet the stage 2 disinfection by-products rule changes. A copy of the District's Stage 2 Disinfectants and Disinfection By-products Rule Monitoring Plan is included as Appendix B of this Water Quality Monitoring Plan.

Recent Water Quality Monitoring Results

Table 1
2010-2018 Inorganic Chemicals Monitoring Summary

Parameter	Antimony	Asbestos ¹	Barium	Beryllium	Cadmium	Chromium	Cyanide	Fluoride	Mercury	Nickel	Nitrate ²	Nitrite ²	Selenium	Sodium ³	Thallium
MCL	0.006	7	2.0	0.004	0.005	0.1	0.2	4.0	0.002		10	10	0.05		0.002
Units	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	N/A	mg/L	mg/L	mg/L	N/A	mg/L
Source	Maximum Detected Concentration														
A-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	8	<.002
D-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.5	<.2	<.005	8	<.002
D-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	8	<.002
E-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	8	<.002
E-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.8	<.2	<.005	9	<.002
F-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.7	<.2	<.005	7	<.002
G-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.0	<.2	<.005	8	<.002
G-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.0	<.2	<.005	8	<.002
H-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	2.0	<.2	<.005	9	<.002
H-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	2.0	<.2	<.005	9	<.002
I-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	9	<.002
I-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	9	<.002
J-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	2.1	<.2	<.005	11	<.002
J-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.5	<.2	<.005	13	<.002
J-3 Well	<.003	ND	<.01	<.0003	<.001	<.007	<.01	<.2	<.0002	<.005	1.8	1.8	<.002	9	<.001
K-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.2	<.2	<.005	8	<.002
K-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.2	<.2	<.005	8	<.002
L-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	2.9	<.2	<.005	12	<.002
L-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	2.9	<.2	<.005	12	<.002
N-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	<.2	<.2	<.005	18	<.002
N-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.5	<.2	<.005	15	<.002
O-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.0	<.2	<.005	8	<.002
O-3 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	1.0	<.2	<.005	8	<.002
P-1R Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	<.2	<.2	<.005	8	<.002
P-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	<.2	<.2	<.005	8	<.002
Q-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	<.2	<.2	<.005	9	<.002
R-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.8	<.2	<.005	9	<.002
S-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.4	<.2	<.005	10	<.002
S-2 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.8	<.2	<.005	8	<.002
U-1 Well	<.005	ND	<.01	<.003	<.002	<.01	<.05	<.2	<.0005	<.04	.6	<.2	<.005	10	<.002

ND = Not detected
1 – Asbestos is measured in million fibers/liter (longer than 10 microns)
2 – Nitrate and Nitrite are measured in units of mg/L as N
3 – The USEPA has established a recommended drinking water equivalent level 20 mg/L for sodium. This is a non-enforceable guidance level. Additionally, in 2003, the USEPA made a regulatory determination for sodium, indicating that setting an MCL would not provide “a meaningful opportunity to reduce health risk.”

Table 2
2010-2018 Synthetic Organic Chemicals Monitoring Summary

Parameter	Alachlor (Lasso)	Aldicarb (Temik)	Aldicarb sulfone	Aldicarb sulfoxide	Atrazine	Benzo[a]pyrene	Carbofuran	Chlordane	2,4-D	Dalapon	Di(2-ethylhexyl) adipate	Di(2-ethylhexyl)phthalate	Dibromochloropropane	Dinoseb	2,3,7,8-TCDD (Dioxin)	Diquat	Endothall
MCL	2.0	NA	NA	NA	3.0	0.2	40.0	2.0	70.0	200	400	6.0	0.2	7.0	3X10 ⁻⁵	20.0	100
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Source	Maximum Detected Concentration																
A-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
D-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
D-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
E-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
E-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
F-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
G-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
G-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
H-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
H-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
I-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
I-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
J-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
J-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
J-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
K-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
K-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
L-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
L-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
N-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
N-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
O-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
O-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
P-1R Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
P-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
Q-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
R-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
S-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
S-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV
U-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	WV	WV	WV

WV = Waiver
ND = Not Detected

Table 2 (Continued)
2010-2019 Synthetic Organic Chemicals Monitoring Summary

Parameter	Endrin	Ethylene dibromide	Glyphosate (Rodeo, Round-up)	Heptachlor	Heptachlor epoxide	Hexachlorocyclopentadiene	Hexachlorobenzene	Lindane (BHC-gamma)	Methoxychlor	Oxamyl (Vydate)	Pentachlorophenol	Picloram	Polychlorinated biphenyls (PCBs)	Simazine	Toxaphene	2,4,5-TP (Silvex)
MCL	2.0	0.05	700	0.4	0.2	50	1.0	0.2	40	200	1.0	500	0.5	4.0	3.0	50
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Source	Maximum Detected Concentration															
A-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
D-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
D-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
E-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
E-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
F-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
G-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
G-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
H-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
H-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
I-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
I-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
J-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
J-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
J-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
K-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
K-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
L-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
L-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
N-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
N-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
O-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
O-3 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
P-1R Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
P-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
Q-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
R-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
S-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
S-2 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND
U-1 Well	ND	WV	WV	ND	ND	ND	ND	ND	ND	ND	ND	ND	WV	ND	ND	ND

WV = Waiver
ND = Not Detected

Table 3
2010-2019 Volatile Organic Compounds Monitoring Summary

Parameter	1,1 – Dichloroethylene	1,1,1 – Trichloroethane	1,1,2 – Trichloroethane	1,2,4 – Trichlorobenzene	1,2 – Dichloroethane	1,2 – Dichloropropane	Benzene	Carbon tetrachloride	cis – 1,2 – Dichloroethylene	Dichloromethane (methylene chloride)	Ethylbenzene
MCL Units	7.0 µg/L	200.0 µg/L	5.0 µg/L	70.0 µg/L	5.0 µg/L	5.0 µg/L	5.0 µg/L	5.0 µg/L	70.0 µg/L	5.0 µg/L	700.0 µg/L
Source	Maximum Detected Concentration										
A-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
F-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
H-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
H-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-1R Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Q-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
R-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
U-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not Detected

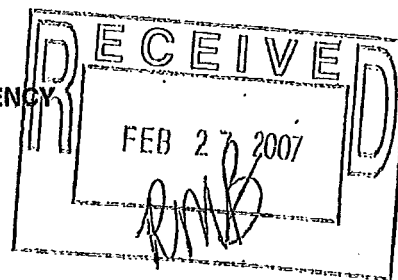
Table 3 (Continued)
2010-2019 Volatile Organic Compounds Monitoring Summary

Parameter	Monochlorobenzene (chlorobenzene)	o-Dichlorobenzene	p-Dichlorobenzene	Styrene	Tetrachlorethylene	Toulene	trans-1,2- Dichlorethylene	Trichloroethylene	Vinyl chloride	Zylenes (total)
MCL Units	100.0 µg/L	600.0 µg/L	75.0 µg/L	100.0 µg/L	5.0 µg/L	1,000 µg/L	100.0 µg/L	5.0 µg/L	5.0 µg/L	10,000 µg/L
Source	Maximum Detected Concentration									
A-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
F-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
H-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
H-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
J-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
L-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-3 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-1R Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Q-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
R-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-2 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
U-1 Well	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND = Not Detected										

Appendix B
Sgate 2 Disinfectants and Disinfection By-products Rule Monitoring Plan



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101



February 20, 2007

Reply to
Attn Of: OWW-136

Dave Hall
Lakewood Water District
11900 Gravelly Lake Drive
Lakewood, Washington 98499

RE: Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR)
Approval of 40/30 Certification for Lakewood Water District – Pierce County – ID#
45550

Dear Mr. Hall:

This letter is to provide confirmation that your 40/30 certification, submitted to meet the Initial Distribution System Evaluation (IDSE) requirement of the Stage 2 DBPR, has been approved.

Your next step will be to prepare a monitoring plan for Stage 2 DBPR compliance monitoring. This plan must be completed before you are required to begin Stage 2 DBPR compliance monitoring in the compliance year that begins October 1, 2012. The Department of Health will provide guidance pertaining to the preparation of this monitoring plan as your compliance date approaches. Until Stage 2 DBPR compliance monitoring begins, you must continue to conduct Stage 1 DBPR monitoring.

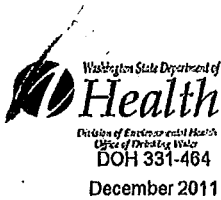
Additional information pertaining to choosing Stage 2 DBPR monitoring locations and preparing the Stage 2 DBPR monitoring plan is enclosed for your use. If you have questions regarding this letter, please contact me at (206) 553-1890 or marshall.wendy@epa.gov. For more information regarding this rule visit the Stage 2 DBPR website at www.epa.gov/safewater/disinfection/stage2.

Sincerely,

Wendy Marshall
Environmental Scientist

Enclosure

cc: Ethan Moseng - DOH



Stage 2 DBP Monitoring Plan - Groundwater (Reduced Monitoring)

System Name	<u>Lakewood Water District</u>
PWSID#	<u>45550c</u>
Date	<u>5/30/2012</u>
Completed by	<u>Dwayne Farmer</u>
Population	<u>67000</u>

Initial Stage 2 Sampling Period First sampling period following **October 1, 2012**

Number of Samples Required 2 Dual Sample Sets per Year
 Samples must be a dual sample set; one at the location and during the quarter with the highest TTHM single measurement and one at the location and during the quarter with the highest HAA5 single measurement.

	Stage 2 Compliance Monitoring Site ID	Projected Sampling Date	
Highest TTHM Site			If any annual or triennial sample exceeds the MCL (0.080 ug/l for TTHM or 0.060 ug/l for HAA5) you must begin quarterly monitoring for both TTHM and HAA5 for at least four consecutive quarters to determine if you exceed the MCL.
Highest HAA5 Site			

To remain on reduced monitoring:
 The TTHM LRAA must be less than or equal to 0.060 mg/l AND the HAA LRAA must be less than or equal to 0.045 mg/l at each monitoring location.

What happens if you exceed any of the above levels?
 You must return to routine monitoring.

Determining Compliance
 Our system is required to monitor annually (or triennially). For compliance, we will determine that each sample taken is less than the MCL. If any sample exceeds the MCL, we must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations. If the locational running annual average (LRAA) exceeds the MCL for either TTHM (0.080 mg/l) or HAA5 (0.060 mg/l), an MCL violation will have occurred. The LRAA is calculated based on four consecutive quarters of monitoring. Compliance will then be achieved if the TTHM and the HAA5 LRAA at each monitoring location for the four most recent quarters is less than or equal to 0.080 mg/l for TTHM and less than or equal to 0.060 mg/l for HAA5.

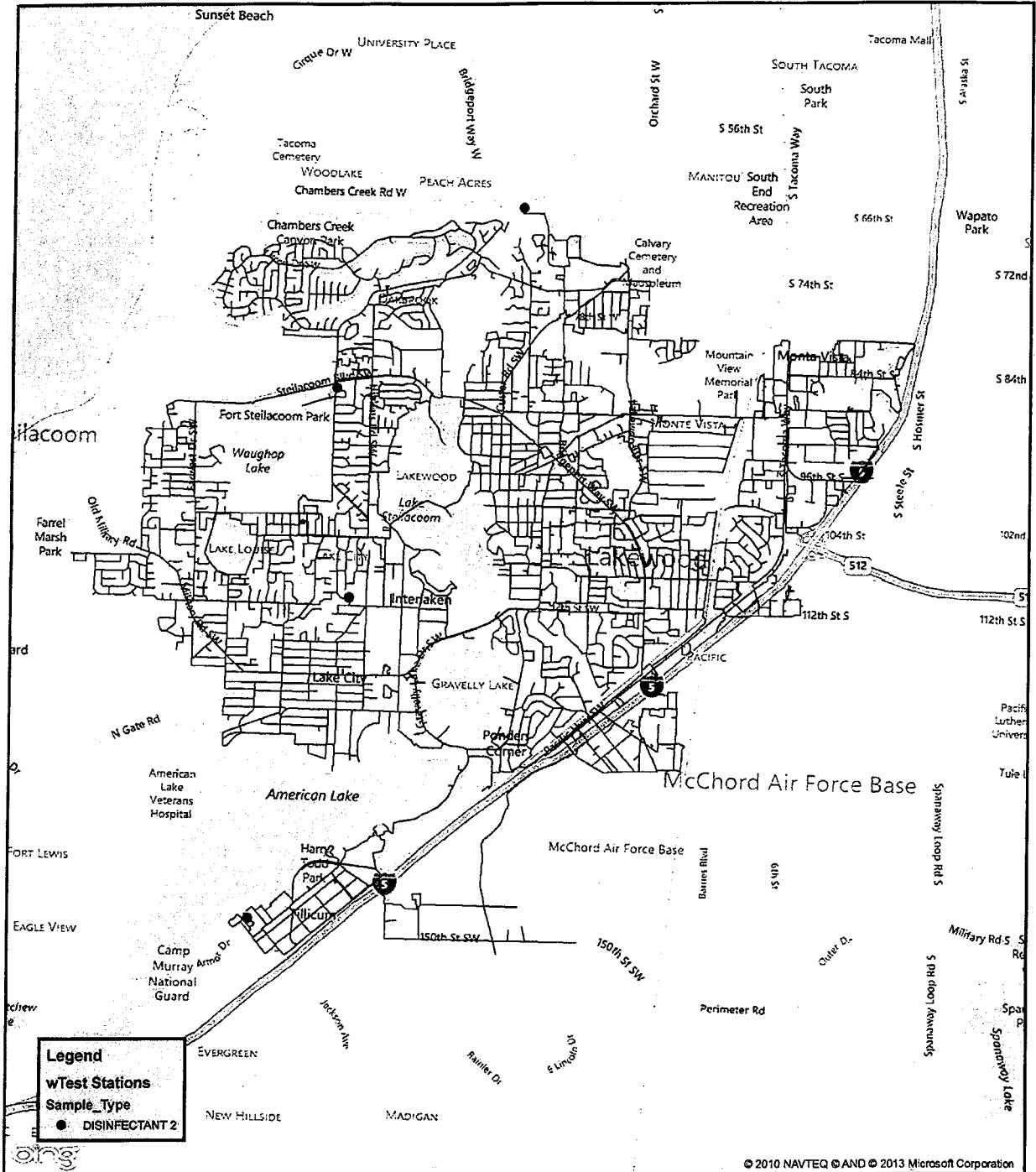
Disinfectant Monitoring for TTHM and HAA5
 Chlorine residuals must be measured at the same time and place as routine or repeat coliform samples
 MRDL for chlorine and chloramines = 4.0 mg/l as Cl₂

Determining Compliance for disinfectant residuals
 Compliance is based on the running annual average (RAA) of 12 consecutive months
 Daily residual measurements will / will not be included in the compliance calculations (circle one)

Attach a distribution map with sample locations

Comments

Disinfectant Byproduct 2 Sampling locations





WATER MAIN BREAK/DEPRESSURIZATION PROCEDURES

1.0 PURPOSE:

To establish Procedures relating to water main breaks that will safeguard Lakewood Water District's water supply and its customers.

2.0 REFERENCES:

Washington State Department of Health (WAC) Chapter 246-290

3.0 DISTRICT PERSON TO CONTACT (in order of priority)

3.1 Normal Business Hours:

1. Foreman
2. Construction Department Head
3. Superintendent
4. General Manager

3.2 After Business Hours:

1. On-call Technician
2. Pumping Backup
3. Foreman
4. Construction Department Head
5. Superintendent
6. General Manager

4.0 PROCEDURES IN ALL PRESSURE/MAIN BREAK CASES:

- 4.1 Investigate the site of the reported water main break. Test surfacing water for chlorine to confirm it is a main break, not something else.
- 4.2 Throttle or shutdown water main, depending on severity, to minimize damage.
- 4.3 Call out the appropriate crew for the circumstances.
- 4.4 Contact City or Pierce County for emergency permit.
- 4.5 Call for utility locates – 811 or (800) 424-5555.
- 4.6 Deploy silt socks, if needed.
- 4.7 Leave WHITE notice door hanger at affected customers.
- 4.8 Shut off all affected water services at the meter.

- 4.9 Test for chlorine residual in the area of the damaged water main both before and after water main repairs.
 - 4.10 Notify the Tacoma-Pierce County Health Dept. (253-798-2851) if restaurants, coffee shops, or other food places are affected.
 - 4.11 At the break location, excavate to two feet under the water main. Dewater to maintain the groundwater below the water main.
 - 4.12 If near a stream, lake or other sensitive area -- initiate de-chlorination.
 - 4.13 Notify the Fire Department (253-582-4600) if any hydrants out of service.
 - 4.14 Notify all customers when their water service is fully restored with a GREEN notice door hanger & post information on website.
- 5.0 PROCEDURES DEPENDING ON THE WATER MAIN PRESSURE AND TYPE OF BREAK:

5.1 **Type 1** - Positive pressure always maintained at break and affected area. (Full circle/half circle cracks, tree roots, broken corp.)

- Pressure maintained in pipe and for customers during repair.
- Very unlikely contamination intrusion.
- No “boil water advisory” (BWA).
- No bacteriological samples.

- 5.1.1 Notify affected customers with WHITE notice door hangers.
- 5.1.2 Where possible, repair the main with a repair clamp.
- 5.1.3 If a broken corp., replace while maintaining a small amount of flow.

5.2 **Type 2** - Controlled pipe repair with limited depressurization after shutdown. (Larger pipe cracks, tree roots, break with hit hydrant, system tie-ins during projects)

- Pressure maintained at break site and system until pipe is exposed and pit is dewatered, water main shutdown limited to immediate valved off area, no loss of pressure elsewhere in the system.
- Limited possibility of contamination intrusion.
- No “boil water advisory” (BWA)

- 5.2.1 Notify affected customers with the WHITE notice door hangers.
- 5.2.2 Maintain pit water level below the break.
- 5.2.3 If a section of main needs to be replaced -- completely shutdown as little main as possible, cut out the damaged section and replace with a new section of pipe with fittings that are fully swabbed with chlorine solution.

- 5.2.4 After the repair, open fire hydrants and pull selected meters to expel air from the water main as water flow is controlled by a valve at the end of the shutdown area. Expel all air and assure that the water is running clear.
- 5.2.5 Check chlorine residuals to confirm they are at proper levels. Recommend bacteriological samples (HPC) to validate procedure - service is restored prior to obtaining results.
- 5.2.6 Open the meter control valve for all affected premises only half way. Open an outside faucet of all premises or have the customer open up the nearest faucet inside the premise to remove any air and to confirm the water is clear. Then open the meter control valve completely.

5.3 **Type 3** - Loss of pressure at break site or depressurization elsewhere in the system. (Contractor break, property and/or road damage)

- Loss of pressure at the break site while the pipe is still buried or submerged and/or pressure loss elsewhere in the system.
 - Possible or actual contamination intrusion.
- 5.3.1 Call DOH and local health jurisdiction (Tacoma-Pierce County Health Department) – decide appropriate public notification message and methods.
 - 5.3.2 Collect bacteriological & chlorine residual samples.
 - 5.3.3 Notify affected customers with a **YELLOW** notice door hanger. Issue a “precautionary boil water advisory” (PBWA) – update utility website.
 - 5.3.4 If bacteriological samples come back positive, notify affected customers with a **RED** notice door hanger. Issue a “boil water advisory” (BWA) and relay information to DOH and the Tacoma Pierce County Health Department.
 - 5.3.5 Post repair disinfection may be necessary if an uncontrolled break has allowed contamination to enter the system. (Refer to new AWWA Std. C651 Section 4.11)
 - 5.3.6 A scour flush (5 feet/second) may be necessary to remove any break related sediment.
 - 5.3.7 Collect bacteriological and chlorine residual samples after flushing to confirm the water quality is acceptable.

5.4 **Type 4** - Catastrophic main break or water loss event resulting in complete loss of water service.

- Water loss is extensive compared to system capacity, resulting in no pressure or no water. Storage loss leaves limited flushing capacity.
- Possible and actual contamination intrusion.

5.4.1 Respond to a Type 4 break or event the same way you would respond to a Type 3 break with additional emphasis on fire flow capability and flushing capacity.

5.4.2 Consider sending a conservation message out with the “boil water advisory”.

- **WHITE Notice** (*Very little to no chance of contamination*) **Type 1 & 2 breaks**

There is a water main break in your neighborhood. Water service to your home or business has been shut-off until the situation has been assessed, the water main repairs are made and the good water quality is confirmed. We will get the water back on as soon as possible. We are sorry for the inconvenience. We will notify you when the water is back in service.

Today's date _____

- **YELLOW Notice** (*Precautionary Boil Water Advisory - PBWA*) **Type 3 & 4 breaks.**

The water main has been repaired, flushed and is back in service.

A water sample has been taken for analysis. The test results should be back on _____ by _____ am/pm. Water use can continue as normal EXCEPT for water used for consumption. The possibility of contamination due to the water outage is low, but as a precaution *we ask that you boil water that will be used for drinking, cooking or brushing teeth, or use bottled water until the test results come back from the testing facility.* We are sorry for the inconvenience.

Today's date _____

- **RED Notice** (*Boil Water Advisory – BWA*) **Type 3 & 4 breaks when water sample indicates contamination. Modify Notice wording if contamination is apparent or likely based on site conditions even without having taken samples.**

The results of the water sample taken for analysis indicates there likely is some contaminate in the water main recently placed back in service. Water service to you will be discontinued until we are certain no contaminate is present. *The water main will again be disinfected and flushed, and tests will be taken to confirm the water is clear and acceptable..* We anticipate test results will be back on _____ by _____ am/pm and water supply to you will be continued shortly after. We are sorry for the inconvenience.

Today's date _____

- **GREEN Notice** - when the repaired water main is ready for service and the water services have been turned back on. **All Types of breaks.**

The test results from the water quality samples taken after the recent water outage on _____ have returned from the testing facility as satisfactory. The water meets State and Federal standards. All water use in your home or business will return to normal shortly. Thank you for your patience.

Today's date _____



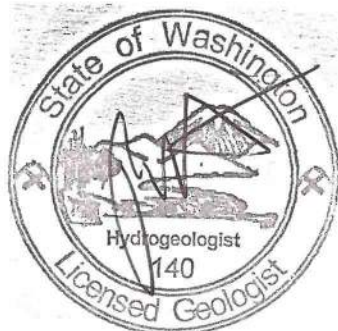
ROBINSON
NOBLE

LAKWOOD WATER DISTRICT
WELLHEAD PROTECTION PLAN
HAZARD INVENTORY UPDATE

MARCH 2013

by

Burt G. Clothier, LHG, RG, CPG
Principal Hydrogeologist



BURT G. CLOTHIER

Lakewood Water District
Wellhead Protection Plan – Hazard Inventory Update
March 2013

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Lakewood Water District

Wellhead Protection Plan – Hazard Inventory Update

March 2013

Introduction

In response to the 1986 amendments to Section 1428 of the Federal Safe Drinking Water Act, the Washington Administrative Code (WAC) was modified in July 1994 to include mandatory wellhead protection measures¹ for Group A public water systems (WAC 246-290). The overall goal of the state wellhead protection program is to prevent the contamination of groundwaters used by Group A public water systems. This is to be accomplished by the definition of management zones around public wells, detection of any existing groundwater contamination sources, and through the management of potential sources of groundwater contamination prior to their entry into the drinking water system. The state requires that a Wellhead Protection Plan (WHPP) shall, at a minimum, include the following aspects:

- A completed susceptibility assessment
- A delineated wellhead protection area
- An inventory of potential contamination threats
- Distribution of findings to required entities
- Contingency plans for alternative sources of drinking water
- Appropriate spill/incident response measures

Under the WAC, local public water systems have primary responsibility for developing and implementing local wellhead protection programs. Due to the limited jurisdictional and regulatory authority afforded most purveyors; it is essential that they work with other local, state, and federal agencies possessing the appropriate authority. The State Department of Health (DOH) oversees the wellhead protection program.

Lakewood Water District completed its initial wellhead protection program in 1997. Minor revisions to the wellhead protection area definitions were made in 2004 to add ½-year time-of-travel zones along with an updated inventory of hazard sites.

This report is primarily directed at updating the hazard inventory and prioritization of the identified known or potential hazards. Thus, it should be used in concert with the previous plan (2004), as the previous definitions of the study area and wellhead protection zones, discussions of hazard types and potential risk categories, and the management /implementation strategies all remain valid.

WHPA Delineation

A wellhead protection area (WHPA) defines the area surrounding a public water supply well where the well may be at risk from known or potential contaminants. It is based upon capture zones, which describe the area of the well's source aquifer (and all overlying material) that can contribute water to the well in a given period of time. Capture zones are typically defined for time-of-travel periods of one-half, one, five, and ten years. These four zones are defined by reg-

¹ The legislative authority to require wellhead protection planning can be found in the Revised Code of Washington (RCW) Chapters 43.20.050, 70.119A.060, and 70.119A.080.

ulation as a management tool; actual contaminants reaching the source aquifer may move faster or slower than the calculated time-of-travel².

Travel-time boundaries can be determined by either technical or non-technical methods, although technical methods are preferred so that the WHPP better protects the actual capture zones of protected wells. In general, there are four delineation methods available. They are, from generally least to generally most accurate: the calculated fixed radius method, analytical modeling, hydrogeologic mapping, and numerical modeling. The particular method employed (and the accuracy of that method) depends largely on the availability of hydrogeologic data. Numerical modeling, for example, can be highly accurate but also typically requires a relatively large amount of data. For areas with typical data availability, time-travel boundaries are often delineated using a combination of analytical modeling and hydrogeologic mapping, which provides a reasonably technical level of delineation.

For this project, the District retained its WHPAs from the original and updated WHP efforts. These WHPAs were created in 1997 using the hydrogeologic mapping approach. Minor updates were accomplished in 2004 to add the ½-year time-of-travel zones. The WHPAs defined for the City's well are shown on Figure 1.

Contaminant Source Inventory and Risk Assessment

The inventory of potential contamination sources within the WHPA was performed in general accordance with the Washington State Department of Health guidance document: *Inventory of Potential Contaminant Sources in Washington's Wellhead Protection Areas* (DOH, 1993). EDR, Inc. an environmental database research company, reviewed federal and state databases for any listed known or potential contaminant sites within a four-mile radius from the approximate center of the study area. An evaluation of various land-use categories and activities was also performed. The results of the contamination source inventory include a list of potential and known environmental hazards in proximity to District wells. From this process, 699 sites or categories of land-use activities were identified as known or potential hazards. These were prioritized and ranked such that the wellhead protection implementation process can address each site or land use in a systematic manner. Each site was ranked according to four factors: proximity of potential hazard to the WHPA, type of contamination, straight-line distance from nearest appropriate well to the potential hazard, and source aquifer of the target well.

A summary of potential contaminant sources presented in the DOH document is reproduced in Table 1. These sources were considered when performing the contaminant inventory for the District.

² Additionally, these calculated zones assume a contaminant has already reached the target aquifer. No accounting is made of the time for a contaminant to travel from land surface to the aquifer.

Table 1: Potential Contaminant Source listed by Type

Category I

Sources Designed to Discharge Substances

Subsurface Percolation (e.g. septic tanks and cesspools)
Injection Wells
Hazardous waste
Non-hazardous waste (e.g. brine disposal and drainage)
Non-waste (e.g. enhanced recovery, artificial recharge solution mining, and *in situ* mining)
Land Application
Wastewater (e.g. spray irrigation)
Wastewater by-products (e.g. sludge)
Hazardous waster
Non-hazardous waste

Category II

Sources Designed to Store, Treat, and/or Dispose of Substances; Discharge through Unplanned Release

Landfills
Industrial hazardous waste
Industrial non-hazardous waste
Municipal sanitary
Open Dumps, Including Illegal Dumping (Waste)
Residential (or Local) Disposal (Waste)
Surface Impoundments
Hazardous waste
Non-hazardous waste
Waste Tailings
Waste Piles
Hazardous waste
Non-hazardous waste
Materials Stockpiles (Non-waste)
Graveyards or Animal Burial
Above-ground Storage Tanks
Hazardous waste
Non-hazardous waste
Non-waste
Underground Storage Tanks
Hazardous waste
Non-hazardous waste
Non-waste
Containers
Hazardous waste
Non-hazardous waste
Non-waste
Open Burning Sites
Detonation Sites
Radioactive Disposal Sites

Category III

Sources Designed to Retain Substances during Transport or Transmission

Pipelines
Hazardous waste
Non-hazardous waste
Non-waste
Materials Transport and Transfer Operations

Category IV

Sources Discharging Substances as a Consequence of Other Planned Activities

Irrigation Practices (e.g. return flow)
Pesticide Applications
Fertilizer Applications
Animal Feeding Operations
De-icing Salt Applications
Urban Runoff
Percolation of Atmospheric Pollutants
Mining and Mine Drainage
Surface mine-related
Underground mine-related

Category V

Sources Providing Conduit or Inducing Discharge through Altered Flow Patterns

Production Wells
Oil (and gas) wells
Geothermal and heat recovery wells
Water supply wells
Other Wells (non-waste)
Monitoring wells
Exploration wells
Construction Excavation

Category VI

Naturally Occurring Sources whose Discharge is Created and/or Exacerbated by Human Activity

Ground Water - Surface Water Interactions
Natural Leaching
Saltwater Intrusion/Brackish Water
Upconing (or intrusion of other poor-quality natural water)

Contaminant Source Inventory Methodology

EDR, Inc. is a third-party environmental database research company that reviews federal and state environmental databases for any known or potential contaminant sites within a designated area. Table 2 lists the primary federal and state databases that were reviewed by EDR in order to locate sites of known or potential soil and groundwater contamination (in alphabetical order according to the database abbreviations used by EDR):

Table 2: Federal and State Databases

Washington Emissions Data System (AIRS)	Hazardous Materials Information Reporting System (HMIRS)
Ecology Facility/Site Identification System (ALLSITES)	Hazardous Site List (HSL)
Clandestine Drug Lab (CDL, Hist CDL, and US CDL)	Integrated Compliance Information System (ICIS)
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	Independent Clean-up Report (ICR)
CERCLIS No Further Remedial Action Planned (CERL NFRAP)	Institutional and Engineering Controls (INST CONTROL, US ENG CONTROLS, and US INST CONTROL)
Confirmed and Suspected Contaminate Sites (CSCSL)	Leaking Underground Storage Tank (LUST)
Confirmed and Suspected Contaminants Sites List No Further Action (CSCSL NFA)	Hazardous waste manifest data (MANIFEST)
Department of Transportation, Office of Pipeline Safety (DOT OPS)	Mines master index file (MINES)
Department of Defense sites (DOD)	National Pollutant Discharge Elimination System permits (NDPES)
Drycleaners and Inactive Drycleaners (DRYCLEANERS and INACTIVE DRYCLEANERS)	National Priority List (NPL)
Emergency Response Notification Systems (ERNS)	PCB Activity Database System (PADS)
Financial Assurance Information listing (FINANCIAL ASSURANCE)	RCRA Conditionally Exempt Small Quantity Generator (RCRA CESQG)
Facility Index System (FINDS)	RCRA Large Quantity Generator (RCRA LQG)
FIFRA/TSCA Tracking System (FTTS and Hist FTTS)	RCRA non-Generator (RCRA NonGen)
Formerly-used DOD sites (FUDS)	RCRA Small Quantity Generator (RCRA SQG)
Hazardous Waste Information System – CA Dept. of Toxic Substances (HAZNET)	Records of Decision (ROD)
	Reported spills (SPILLS)
	Solid Waste Facilities Database (SWF/LF)
	Toxic Chemical Release Inventory (TRIS)
	Underground Injection Controls (UIC)
	Brownfields Grant Sites (US Brownfields)
	Underground Storage Tank (UST)
	Voluntary Cleanup Program (VCP)

Additional databases were searched for which no listings were found. The full list of databases researched is included in the EDR report. As the full EDR report runs to over 3,300 pages, an electronic copy is included as Appendix A on the attached CD. Each EDR listing is identified with a unique site identification data key. However, since many sites are included on multiple databases and EDR reports often have separate listings for each database entry, some sites end up with multiple listings and identification keys. In most cases, EDR attempts to group

such listings in “clusters” so having one data key for a site will usually allow for easy identification of all the other listings for that site.

We have condensed the initial listings from EDR into a final list of sites, attempting to combine all related listings for each site into a single entry in the hazard list. One of the unique data keys for each mapped site is retained as the combined site ID for each cluster included in the final hazard list (Appendix B and Table 5 below). As noted above, this should allow for identification of associated listings in the EDR report. Figure 2 shows the locations of each site with their final ranking as an identifier.

Field Survey

A field survey of the ranked hazards within the study area is typically recommended in order to verify that listed sites are appropriately located and identifies and describes any additional sites of concern that were not included in the inventory. This informal “windshield” survey is usually accomplished by the purveyor staff as they have the most familiarity with the businesses and land uses within their service area and because field staff are routinely deployed in the field on other tasks which allows this survey to be accomplished more cost-effectively by combining it with other activities. Given the number of sites in the final hazard inventory and the size of the study area, it was impractical to accomplish the survey in the short timeframe before the final plan was complete. Therefore, the field survey will likely be accomplished as part of plan implementation tasks. Any new data or changes can then be accumulated and added to the plan at the next regular plan update.

Methodology for Establishing Risk Priority

The methodology for prioritizing risks in the District’s WHPA was partially based on the EPA Guidance document entitled “Managing Ground Water Contamination Sources in Wellhead Protection Areas: a Priority Setting Approach” (1991). The ranking effort was also based on the level of confidence in data and information that is currently available for known and potential contamination sites.

Note that this process is substantially different from the approach used in the District’s 1997 and 2004 reports. These previous efforts provided separate lists and maps for each main category of hazard types, ranked the categories, and then provided a listing of the number of sites under each category according to aquifer WHPA zone. This report combines all listed sites into one unified list, including criteria for location, hazard type, distance to the nearest well and aquifer, and then ranks them such that each site has an identified priority. This process attempts to avoid duplication of listings as many sites are listed on multiple databases and were previously shown on multiple hazard category maps. It also provides for a prioritized list to help the District better focus attention on sites of greater concern.

Each site was ranked according to four decision levels. The decision levels are listed below in Table 3 (Level I represents the highest hazard risk criteria, Level IV is the lowest).

Table 3: Overall Risk Prioritization

Decision Level	Available Data and Information
I	Proximity of potential hazard to the WHPA
II	Type of contamination
III	Straight-line distance from the wells to the potential hazard
IV	Type of contaminated media

Each known or potential hazard was first scored and then ranked using decision level one. Sites with equal level one rankings were then further scored and ranked using decision level two. If sites were still equal in priority, they were further sub-prioritized under decision level three, etc. Once sites were differentiated in priority, no further ranking was necessary. The criteria for scoring sites within each level are discussed below.

Decision Level I – Proximity to WHPA

For the first decision level, the sub-prioritization of contaminated sites was based on their location in the WHP zones; the shorter the travel time, the higher the priority. Scores for each site and hazard category are summarized in Table 4.

Table 4: Proximity to Source

Sub-Priority Score	Proximity to Source
1	½-year time-of-travel from the source (Zone 1)
2	1-year time-of-travel from the source (Zone 2)
3	5-year time-of-travel from the source (Zone 3)
4	10-year time-of-travel from the source (Zone 4)
5	WHPA Buffer Zone, outside of Zone 4

Decision Level II – Type of Contamination

For the second decision level, the sites were ranked as either known contamination or potential contamination sites. Known contamination sites were defined as those with known releases of contaminants according to the environmental database survey results. Potential contamination sites are sites or land areas that are used in ways that could pose a risk to the ground water. This category's scoring is summarized in Table 5.

Table 5: Type of Contamination

Sub-Priority Score	Known or Suspected Contamination	Type of Site	Assumption
1	Known	CSCSL, CERCLIS, HSL, LUST, NPL, and Spills	As a worst case scenario, contamination is assumed to be comprised of the most toxic chemical identified for the site, based on information contained in the Ecology and EPA databases.
2	Known	Institutional Controls, SWF/LF	All contamination sites assumed to contain petroleum products.
3	Potential	CDL & US CDL, Drycleaners, Septic systems	Nitrates and bacterial contamination are assumed to be health risks, along with potential chemical hazards, but it is not known what the likelihood is for sites to contaminate the wells.
4	Potential	Financial Assurance, FUDS, RCRA-LQG, UIC, UST, pipelines	It is assumed that petroleum products are stored in USTs, but contamination is not imminent. UICs are potential pathways for contamination but may not be specific sources.

Sub-Priority Score	Known or Suspected Contamination	Type of Site	Assumption
5	Potential	Accidental Spills, DBACRON, ERNS, HAZNET, HIMRS, RCRA (CESQG, NONGEN and SQG), and TRIS, Industrial and Commercial land uses	Hazardous chemicals may be stored on RCRA sites, but contamination has not necessarily occurred. This category also includes highways and railroad tracks that pass through the WHPA. The risk is based on the possibility of hazardous material spill (e.g., gasoline).
6	Potential	FINDS, HIST FTTS, public and mixed commercial/residential land uses	
7	Potential	ALLSITES, DOT OPS, HIST CDL, PADS, and herbicide/ pesticide application, transportation corridors	Non-residential herbicide/pesticide use appears to be concentrated along transportation corridors and power lines.
8	Potential	HIST FTTS, open-space/recreational land uses, storm water	This category includes the potential release of lead, petroleum products, and/or solvents via a storm water system.
9	Potential	AIRS, MINES, NPDES, residential uses	
10	Potential	CERC-NFRAP, NFA, Delisted NPL	Sites achieving a no-further action ranking are presumed to have been cleaned up sufficiently to longer pose a threat. Therefore, this ranking will take precedence over other categories listed for the same site.

Decision Level III – Straight-line Distance from Wells

For potentially hazardous sites with similar characteristics for prioritization decision levels I and II, the straight-line distance from the site to the well was used to further rank the sites. Those sites closest to the wells were given a higher priority.

Decision Level IV – Source Aquifer of Target Wells

The final decision level was applied in cases where ranking under the three previous levels still resulted in a tie. The DOH guidelines suggest using the type of contaminated media (sand, gravel, glacial till, etc.) as decision level IV. However, the surface geology is generally uniform throughout much of District’s service area and, given the locations of many of the tied sites, we determined that the media would not serve as an adequate decision level. Accordingly, we identified the target aquifer of the nearest well as a fourth criterion. For each tied site within Zones 1 and 2, we used the nearest appropriate well (from decision level III) and ranked sites near wells in shallower aquifers higher than those where the well taps a deeper one. This was adequate to resolve most of the ties. The few ties (in Zones 3, 4, and 5) that remained were refined under decision level III criteria by attempting a closer-order determination of distances.

At the conclusion of the ranking process, there are still some sites that are equivalently ranked through all four of the criteria. This should only be true for sites that likely represent the same location but we retained multiple listings due to a name change. Since we cannot easily identify the most recent name for a given site from the EDR report, we kept multiple listings wherever we thought the additional information may be needed. Field verification of the sites should be able to identify which of the multiple listings for a site is the most appropriate. Thus, we expect the final number of sites to be further reduced somewhat.

Land Use

Land zoning within the study area includes (in general order of prevalence) residential, commercial, industrial and various types of open-space or recreational uses. Since most of these zones share many features and types of uses, many of the potential contaminants will likewise be similar. The large majority will fall into one of the categories listed below. Figure 3 shows the City of Lakewood zoning map in relation to the District’s wells and Zone 4 (10-year time-of-travel) WHPAs. Copies of the Town of Steilacoom, JBLM and Pierce County zoning maps are included in Appendix C.

Residential Land Use

Residential zoning varies across the study area and each jurisdiction classifies it differently. Since most residential uses will pose the same basic risks to the District’s sources, most categories are combined into a single listing for this ranking process. Table 6 lists the zoning categories for each jurisdiction

Table 6: Commercial Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood JBLM	Residential 1, 2, 3, and 4 and Multifamily 1, 2, and 3 Housing
Town of Steilacoom	Housing and Housing/Open Space
Pierce County	Residential (HRD, MHR, HSF, MSF, and SF)

The Pierce County zones are unique among this land-use type in that the county zones are ranked higher due to the presence of septic systems. Residential uses in the other three jurisdictions are presumed to be served by sewer systems. Potential contaminant sources related to these listings include: chemical fertilizer, herbicide, and pesticide application, leaking sewer mains, and a leaking storm water system.

Business, Commercial, and Public Land Use

The majority of commercial land use is found along major arterials and bordering the I-5 corridor. Designated urban centers and business districts such as the Lakewood Towne Center are included in this category. The mixed residential zones for the City of Lakewood are included here to account for the occasional commercial uses allowed in those zones (Table 7).

Table 7: Commercial Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood	Central Business District; Commercial 1, 2, 3/Neighborhood Commercial; Mixed Residential 1, 2
JBLM	Community (Commercial); Administrative/Community (service) / Medical
Town of Steilacoom	Commercial/Housing & Commercial/Recreation
Pierce County	Commercial (CE, MUC, AC, UV, NC, MUD, CMUD, ROC and RO)

The most likely potential contaminants related to these land uses include, but are not limited to, petroleum hydrocarbons and metals. These potential contaminants are generally due to the presence, historical or current, of heating oil and fuel in underground storage tanks (USTs) and listings of businesses as RCRA small quantity generators of hazardous materials (dry cleaners for example). Additional potential contaminants could also be associated with the presence of auto and marine repair facilities.

Petroleum hydrocarbons can become a serious concern for wellhead protection in business, commercial, and public areas, as well as residential. There are numerous potential sources for petroleum hydrocarbons within the WHPA. These include commercial operations that fuel and maintain equipment and vehicles, home/commercial heating oil tanks, and bulk transport of such fuels. Petroleum hydrocarbons are typically stored in USTs in volumes ranging from 100s of gallons (residential use) to up to 1,000s of gallons per tank (gasoline service stations).

Groundwater contamination from metals is a potential threat at commercial and public sites which handle or use materials with significant metallic constituents (paints, waste oil, etc.), historical pesticide use areas (historical pesticides were typically metal-based compounds), and high-volume parking lots.

Public institutions or facilities are included here as they will often have similar contamination potentials to commercial uses. These zones include things such as schools/universities, public services buildings (city hall, police, fire stations), and transportation or transit maintenance facilities (Table 8). Public institutions are ranked slightly lower priority than commercial because while similar activities may take place, they are usually less concentrated over a given area and often more compliant with material handling protocols and regulatory requirements.

Table 8: Public Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood	Public Institutional
JBLM	Administrative/Community (service)/Medical
Town of Steilacoom	Public Facilities
Pierce County	–

Industrial

Like commercial zones, industrial areas can host a range of activities with potential to cause contamination. These zones are typically ranked higher than commercial areas because industrial activities usually occur at a larger scale than most commercial-zoned uses (Table 9). Industrial areas are often more established and more concentrated than commercial zones as many jurisdictions tend to stick their industrial activities together and they are usually reluctant to move or start new industrial zones once the initial zoning is established.

Table 9: Industrial Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood	Industrial 1, 2/Industrial Business Park
JBLM	Industrial, Airfield/Airfield Pavements/Aircraft O&M
Town of Steilacoom	Industrial
Pierce County	–

Transportation Corridors

Major transportation routes are included due to the transport of potential contaminants by road or rail (Table 10). Obviously, large spills involving petroleum hydrocarbons or hazardous materials are a greater risk than small spills (leaks, over application of de-icing salt, etc.), so the main transportation corridors are a specific concern. Interstate 5 runs through several wells WHPA zones, is upgradient from several shallow aquifer wellfields (G, H, and J), and, therefore, represents a medium to high risk if a spill were to occur there. Railroad lines serving JBLM and Lakewood’s industrial areas are another potential source of contamination from accidental releases.

Table 10: Transportation Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood	Arterial Corridor/Transit Oriented Commercial
JBLM	Highway Right-of-Way
Town of Steilacoom	–
Pierce County	–

A related potential risk is pipelines. As noted in previous year’s WHP documents, a major petroleum pipeline runs from the Port of Tacoma to McChord airfield delivering JP-8 fuel for use in aircraft operations. The pipeline is operated by US Oil and Refinery Company and is included as an individual listing in the hazard ranking. This potential hazard is classified slightly higher than transportation spills because the pipeline constantly full and a pipeline break would result in some minimum amount of product release (see discussion in 2004 WHPP).

Open Spaces and Recreational Uses

The final category of land-use categories are open spaces and recreational areas such as parks, golf courses, hobby farms, sports fields, and cemeteries (Table 11). The main risk from these land uses are the application of fertilizers, herbicides and pesticides.

Table 11: Open Space Land-use Zoning Designations

Jurisdiction	Land-use categories included
City of Lakewood	Open Space/Recreation 1, 2
JBLM	Open Space/Outdoor Recreation
Town of Steilacoom	Open Space (housing, industrial, & recreation)
Pierce County	Parks and Recreation (PR)

Identified Contaminant Sources

In the federal and state databases reviewed by EDR, 255 sites within the WHPP study area are identified as sites where contamination has occurred. These sites are scattered among all five of the WHPA zones. Table 12 below shows the top 39 sites in the ranking. These represent the sites of known contamination within the Zone 1 WHPA (1/2-year time of travel) and, therefore, are the sites of greatest concern to the District’s resources. The hazard sites are mapped in Figure 2. The complete hazard inventory list can be found in Appendix B.

Table 12: Identified Contaminant and Potential Sources

Ranking Number	Reference Number	Name	Address	Database
1	BG 277	LAKWOOD WATER DISTRICT	11900 GRAVELLY LAKE DRIVE SW	CERCLIS
2	HU1171		14436 WASHINGTON AVENUE SOUTHWEST	SPILLS
3	HU1201		14514 WASHINGTON AVE SW	SPILLS
4	GA 925		131 VIEW DRIVE, APARTMENT B	SPILLS
5	DH 550	UNKNOWN	5607 BOSTON AVENUE #A16	SPILLS
6	321		12124 GRAVELLY LAKE DR	SPILLS
7	BD 264	TACOMA PUBLIC UTILITIES	8616 HIPKINS RD. SW	SPILLS
8	175		104TH STREET SOUTHWEST AND HIPKINS ROAD	SPILLS
9	AS 249	PIERCE COUNTY FIRE DIST 2 STATION 2-1	5000 STEILACOOM BLVD SW	ICR

Ranking Number	Reference Number	Name	Address	Database
10	AL 197	UNKNOWN	7918 LESCHI DRIVE SOUTHWEST	SPILLS
11	DR 674	UNKNOWN	5509 MCCORD DRIVE	SPILLS
12	IO1235	PRIVATE RESIDENCE	14516 UNION AVENUE SOUTHWEST, TILlicUM,	SPILLS
13	417		7801 51ST AVENUE	SPILLS
14	AG 161	SAUROS CLEANERAMA OF LAKEWOOD	10523 BRIDGEPORT WAY SW	SPILLS
15	AM 182		9213 51ST AVENUE SOUTHWEST	SPILLS
16	341	UNKNOWN	10810 LAKEVIEW AVE SW	SPILLS
17	HO1160	PRIVATE CITIZENS	14413 UNION AVE SW, APT A	SPILLS
18	HO1148		14405 UNION AVE SW, UNITS B, C, & D	SPILLS
19	590	UNKNOWN	12814 LINCOLN AVE SW	SPILLS
20	BV 350		4402 110 ST SW #4	SPILLS
21	FU 893		9040 GALEY AVENUE SOUTH	SPILLS
22	250		8601 104TH ST SW	SPILLS
23	CI 452		4215 SHARONDALE STREET SOUTHWEST	SPILLS
24	AL 179	ABITIBI CONSOLIDATED	8705 WELLER RD SW	SPILLS
25	CI 483	LAKEWOOD UNION 76	11191 PACIFIC HWY SW	SPILLS
26	CR 514	PENNEY MANOR APTS	4001 112TH STREET SW, APT3	SPILLS
27	IG1216	RESIDENT	14623 MURRAY RD. SW, APT. #13	SPILLS
28	CU 491	WA DOT LAKEVIEW MAINTENANCE FACILITY	11211 41ST AVE SW	CSCSL
29	CN 469	PIERCE COUNTY FIRE DIST 2 STATION 2-4	8310 87TH AVE SW	LUST
30	AD 145	OAKBROOK CHEVRON	7501 STEILACOOM BLVD SW	CSCSL
31	JB1292	CLOVER PARK TECH COLLEGE FT LEWIS	14800 MURRAY ROAD SW	SPILLS
32	AT 221	CHEP'S GREAT WIDE	9704 47TH AVENUE SW	SPILLS
33	587	FLETT DAIRY	8006 VERDE ST SW	LUST
34	BM 347	PIERCE COUNTY FIRE DIST.	8710 87TH AVE. SW	ICR
35	FR 884		9613 SALES ROAD	SPILLS
36	BS 339		8010 83RD SW	SPILLS
37	ID1197	UNKNOWN	14709 SPRING STREET SW.	SPILLS
38	ID1199	N/A	14715 SPRING STREET SW TACOMA	
39	AR 204	LAKEWOOD AREA COMMUNITY SHELTER	9106 HIPKINS RD SW	CSCSL

Potential Groundwater Concerns

For wellhead protection planning, it is important to understand the potential sources and types of contamination that threaten the District's WHPAs. It is also important to understand the potential pathways for contaminant migration since these contaminant pathways can increase the vulnerability of an aquifer by decreasing travel time from a source to a wellhead. The following section will briefly summarize the main mechanisms for transport of contaminants to the subsurface.

Discharge onto the ground surface: Direct discharge to the ground surface occurs when products or waste materials are spilled onto the ground. With the help of rainfall infiltration, the materials percolate into the subsurface and, if a sufficient volume of material is released, they eventually reach the water table and migrate downgradient within the shallow aquifer. In large enough quantities, spills can impact the deeper aquifers where water supply wells are completed.

Direct discharge to the subsurface: Discharge to the subsurface occurs from septic systems and dry wells. Discharge into the subsurface is a more direct mechanism for transport because contaminants are discharged closer to the water table and because subsurface discharge bypasses the upper layers of soil, which have the ability to absorb and disperse many types of contaminants.

Abandoned wells: Old, improperly constructed, or improperly abandoned wells³ can act as direct conduits for contaminant transport to the aquifer. In such wells, transport can occur between the ground surface and aquifer zones because of a lack of a well seal or an inadequately constructed seal.

Stormwater runoff: Rainfall onto the ground either induces infiltration into the subsurface or runoff. The quality of the water which infiltrates or runs off is dependent on the type of land use and the potential presence of contaminants which may be located on the ground surface. Stormwater infiltration issues are similar to those of discharge to the ground surface. Stormwater runoff is considered differently because it runs over the surface of the ground, picking up and dissolving potential contaminants, and may eventually discharge these contaminants to groundwater via infiltration from ditches or ponds designed to percolate water or into surface-water bodies nearby.

The potential concerns due to water infiltration or runoff are diverse and reflect the land use activities in the area of interest. Paved roadways, parking areas, and residential developments can contribute heavy metals and petroleum hydrocarbons which originate primarily from vehicle-related emissions. Industrial and commercial operations commonly process and release a variety of organic pollutants (e.g., solvents, paints, and dry cleaning solutions) as well as petroleum products which are potential hazards to WHPAs.

Management Strategies and Implementation Tasks

The completion of wellhead protection planning provides no safeguards unless effective management strategies are implemented to prevent potential contamination of groundwater sources. The District does not have land-use regulatory control within its WHPAs. Therefore, the District should endeavor to maintain close, cooperative ties with the City of Lakewood, the Town of Steilacoom, Pierce County, and JBLM in order to maximize the effectiveness of implementing the WHPP. Regular interaction with the state and local agencies which regulate potentially harmful activities will also be beneficial.

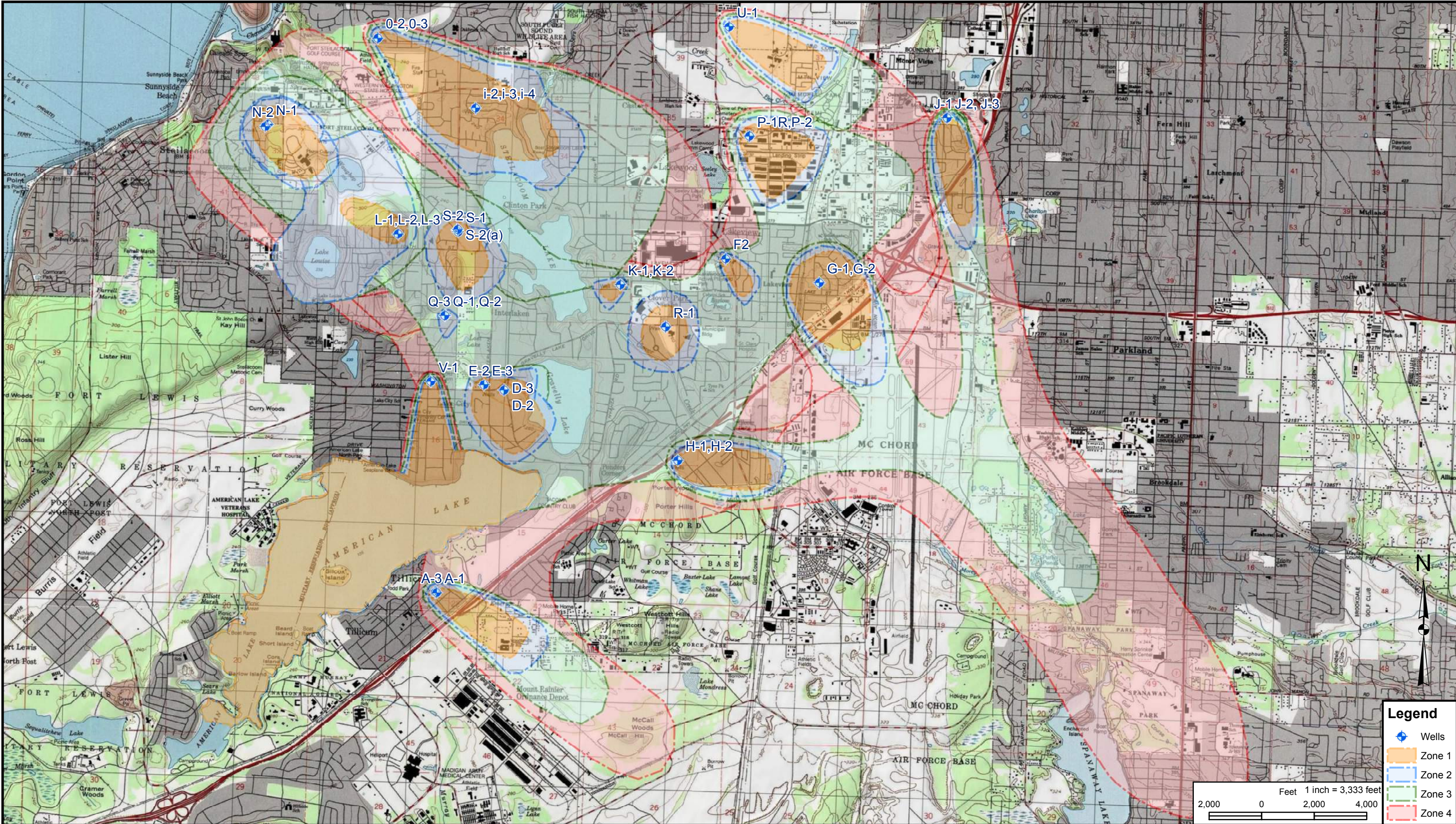
³ Washington State has standards for construction and abandonment of wells, WAC 173-160.

References

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- HDR/EES, 2004, Lakewood Water District Wellhead Protection Plan, 6 chapters, tables & appendix
- Washington State Department of Health, 1995, Wellhead Protection Program Guidance Document, DOH publication 331-018, 78 p.
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- U.S. Environmental Protection Agency, Office of Water, 1991. *Managing Ground Water Contamination Sources in Wellhead Protection areas/A Priority Setting Approach*. Washington D.C. EPA 570/9-91-023. 252 p.

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic practices and are the result of analysis by Robinson Noble staff. This report, and any attachments to it, is for the exclusive use of the Lakewood Water District. Unless specifically stated in the document, no warranty, expressed or implied, is made.

FIGURES



Legend

- Wells
- Zone 1
- Zone 2
- Zone 3
- Zone 4

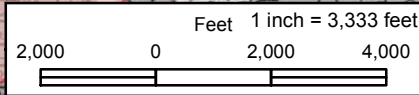
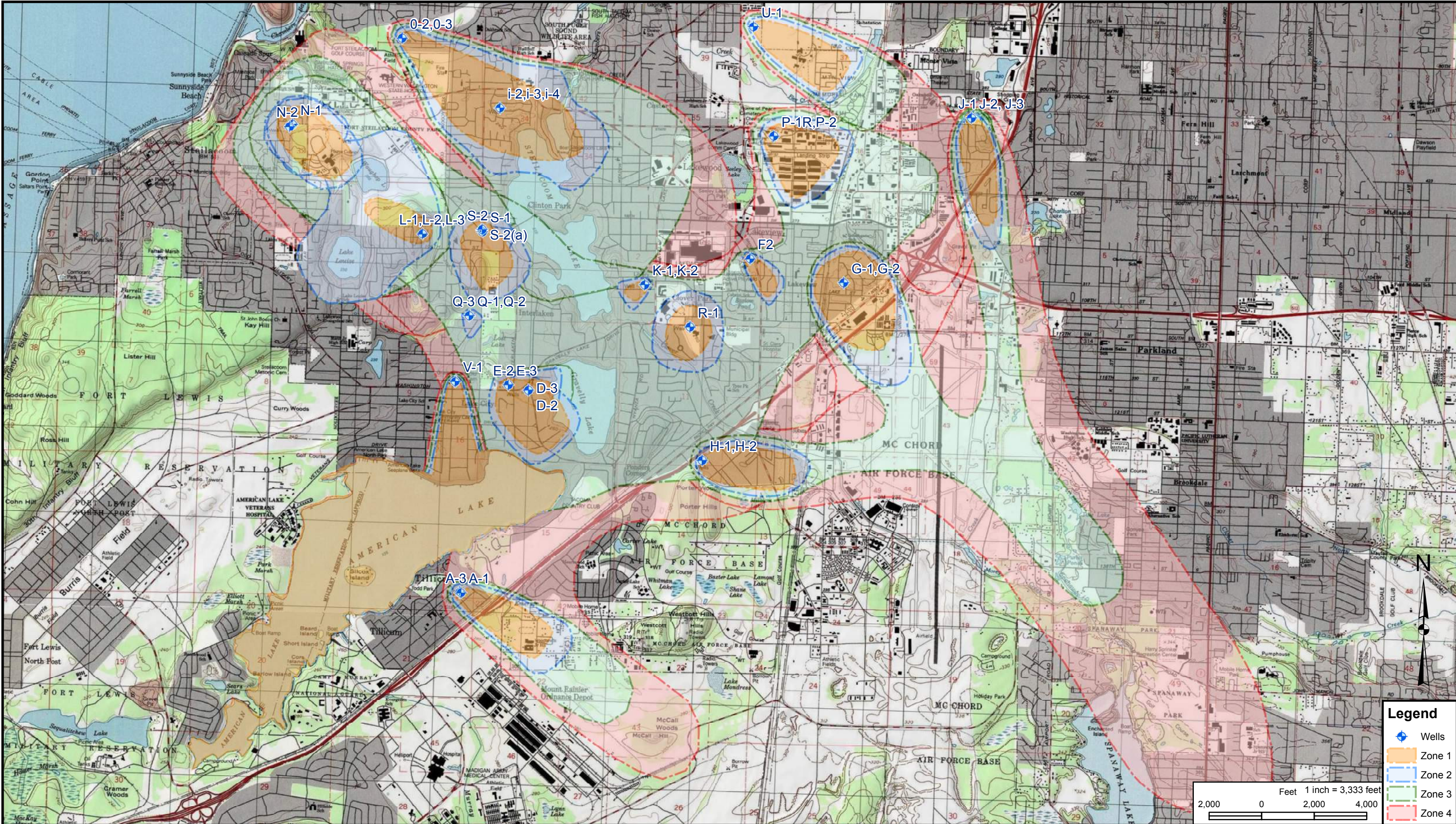


Figure 1



PM: BGC
 March 2013
 1531-026B

Wells and Wellhead Protection Areas
 Lakewood Water District - Wellhead Protection Plan
 Hazard Inventory Update 2012



Legend

- Wells
- Zone 1
- Zone 2
- Zone 3
- Zone 4

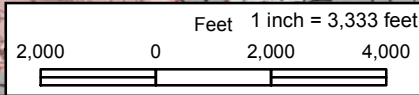
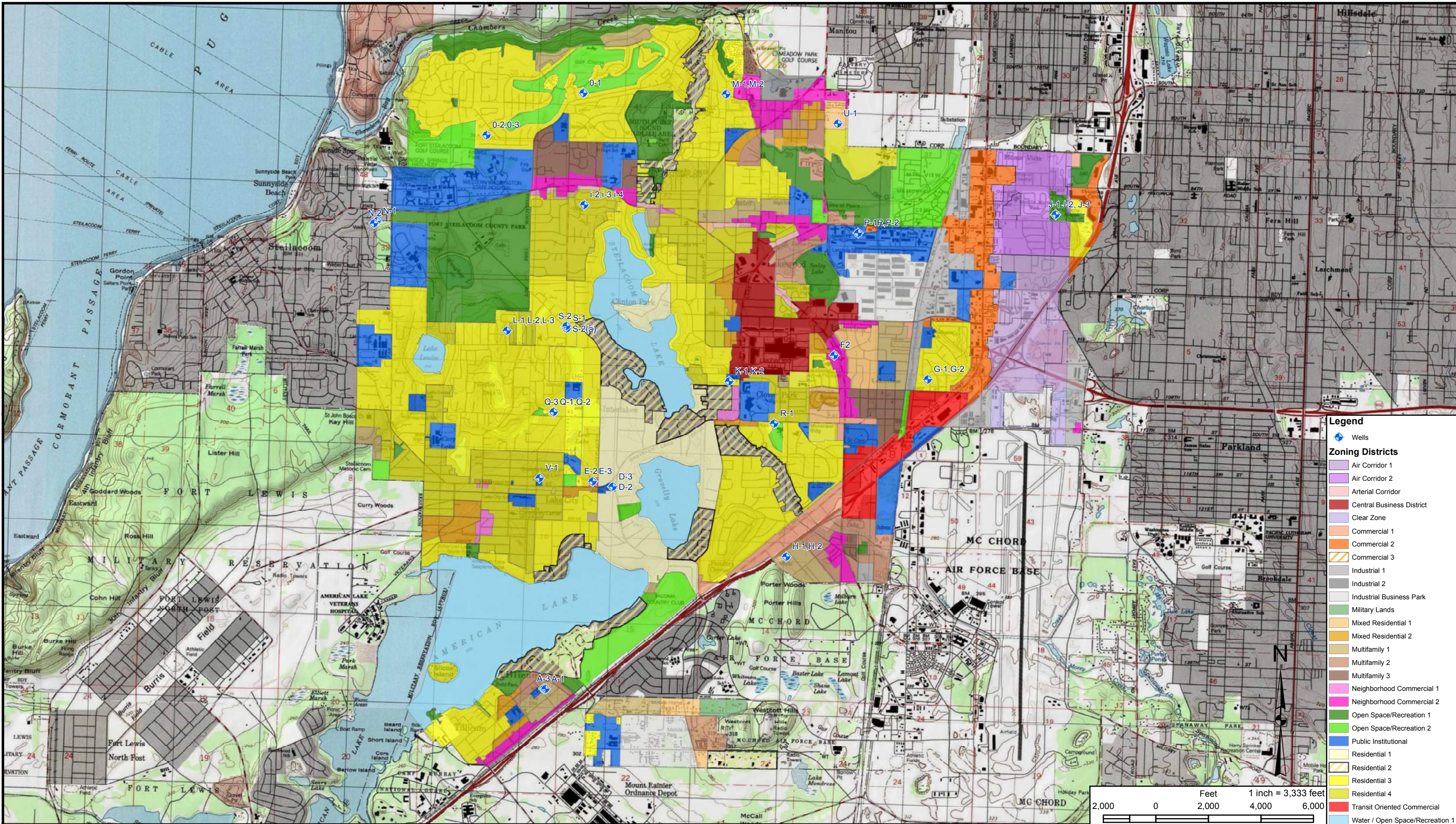


Figure 1



PM: BGC
 March 2013
 1531-026B

Wells and Wellhead Protection Areas
 Lakewood Water District - Wellhead Protection Plan
 Hazard Inventory Update 2012



PM: BGC
 March 2013
 1531-026B

Figure 3
 City of Lakewood Zoning Districts
 Lakewood Water District - Wellhead Protection Plan
 Hazard Inventory Update 2012

APPENDIX B

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
1	1	1	100	C	BG 277	1007372490	LAKEWOOD WATER DISTRICT	11900 GRAVELLY LAKE DRIVE SW	LAKEWOOD	WA	98499	- 122.53925	47.14899	269	CERCLIS
2	1	1	245	E	HU1171	S105398941	Village Green Apts.	14436 WASHINGTON AVENUE SOUTHWEST	LAKEWOOD	WA		- 122.54776	47.12705	285	SPILLS
3	1	1	260	E	HU1201	S108544591	Residence	14514 WASHINGTON AVE SW	LAKEWOOD	WA		- 122.54903	47.12626	281	SPILLS
4	1	1	520	E	GA 925	S106083007	Windermere apts.	131 VIEW DRIVE, APARTMENT B		WA		- 122.57889	47.17601	241	SPILLS
5	1	1	650	A	DH 550	S108674127	Lakewood Estates Apts.	5607 BOSTON AVENUE #A16	LAKEWOOD	WA		- 122.51170	47.14163	284	SPILLS
6	1	1	650	C	321	S108672319	Residence	12124 GRAVELLY LAKE DR	LAKEWOOD	WA		- 122.53893	47.14731	270	SPILLS
7	1	1	700	C	BD 264	S107155515	TACOMA PUBLIC UTILITIES	8616 HIPKINS RD. SW	LAKEWOOD	WA		- 122.54768	47.17876	251	SPILLS
8	1	1	750	E	175	S108672126	Residence	104TH STREET SOUTHWEST AND HIPKINS ROAD	LAKEWOOD	WA		- 122.54734	47.16307	261	SPILLS
9	1	1	770	E	AS 249	1000354347	PIERCE COUNTY FIRE DIST 2 STATION 2-1	5000 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.50291	47.17654	267	ICR
10	1	1	800	C	AL 197	S107474423	Residence	7918 LESCHI DRIVE SOUTHWEST	LAKEWOOD	WA		- 122.54199	47.17854	227	SPILLS
11	1	1	820	A	DR 674	S108674115	Residence	5509 MCCHORD DRIVE	LAKEWOOD	WA		- 122.51037	47.13929	284	SPILLS
12	1	1	848	E	IO1235	S108672549	PRIVATE RESIDENCE	14516 UNION AVENUE SOUTHWEST, TILlicum,	LAKEWOOD	WA		- 122.54772	47.12520	282	SPILLS
13	1	1	950	C	417	S106238915	Residence	7801 51ST AVENUE	LAKEWOOD	WA		- 122.50488	47.18470	246	SPILLS
14	1	1	950	E	AG 161	1004793837	SAUROS CLEANERAMA OF LAKEWOOD	10523 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50519	47.16172	263	SPILLS
15	1	1	950	E	AM 182	S105992010	Industrial Park	9213 51ST AVENUE SOUTHWEST	LAKEWOOD	WA		- 122.50479	47.17345	268	SPILLS
16	1	1	1000	A	341	S107476657	Village Square Apts.	10810 LAKEVIEW AVE SW	LAKEWOOD	WA		- 122.49518	47.15934	283	SPILLS
17	1	1	1080	E	HO1160	S107476799	Apartments	14413 UNION AVE SW, APT A	LAKEWOOD	WA		- 122.54514	47.12671	284	SPILLS
18	1	1	1120	E	HO1148	S106783031	Apartments	14405 UNION AVE SW, UNITS B, C, & D	LAKEWOOD	WA	98498	- 122.54498	47.12681	279	SPILLS
19	1	1	1170	A	590	S108672396	Apartments	12814 LINCOLN AVE SW	LAKEWOOD	WA		- 122.50852	47.14164	292	SPILLS
20	1	1	1255	A	BV 350	S106200521	Village Studio Apts.	4402 110 ST SW #4	LAKEWOOD	WA	98499	- 122.49552	47.15743	283	SPILLS
21	1	1	1300	A	FU 893	S107153707	Residence	9040 GALEY AVENUE SOUTH	LAKEWOOD	WA		- 122.47317	47.17469	300	SPILLS
22	1	1	1450	E	250	S108278643	Residence	8601 104TH ST SW	LAKEWOOD	WA		- 122.55164	47.16309	291	SPILLS
23	1	1	1460	A	CI 452	S105789897	America's Best Value Inn	4215 SHARONDALE STREET SOUTHWEST	LAKEWOOD	WA		- 122.49381	47.15645	283	SPILLS
24	1	1	1525	C	AL 179	S107154147	Residence	8705 WELLER RD SW	LAKEWOOD	WA		- 122.54010	47.17836	241	SPILLS
25	1	1	1650	A	CI 483	S108163360	LAKEWOOD UNION 76	11191 PACIFIC HWY SW	LAKEWOOD	WA		- 122.49236	47.15629	283	SPILLS
26	1	1	1730	A	CR 514	S105384975	PENNEY MANOR APTS	4001 112TH STREET SW, APT3	LAKEWOOD	WA		- 122.49133	47.15581	283	SPILLS

27	1	1	2003	E	IG1216	S107475081	S&K Apts.	14623 MURRAY RD. SW, APT. #13	LAKEWOOD	WA		- 122.54273	47.12463	281	SPILLS
28	1	1	2100	A	CU 491	1007080788	WA DOT LAKEVIEW MAINTENANCE FACILITY	11211 41ST AVE SW	LAKEWOOD	WA	98499	- 122.49217	47.15567	283	CSCSL
29	1	1	2200	C	CN 469	U003355356	PIERCE COUNTY FIRE DIST 2 STATION 2-4	8310 87TH AVE SW	LAKEWOOD	WA	98498	- 122.55313	47.18143	247	LUST
30	1	1	2240	C	AD 145	1001806737	Sun Pacific Energy	7501 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	- 122.53710	47.17790	240	CSCSL
31	1	1	2290	E	JB1292	1001092051	CLOVER PARK TECH COLLEGE FT LEWIS	14800 MURRAY ROAD SW	LAKEWOOD	WA	98439	- 122.54280	47.12304	283	SPILLS
32	1	1	2400	E	AT 221	S110066778	CHEP'S GREAT WIDE Industrial Park	9704 47TH AVENUE SW	LAKEWOOD	WA		- 122.49999	47.16956	273	SPILLS
33	1	1	2500	C	587	U003355094	FLETT DAIRY (Closed)	4410 80 th St SW	TACOMA	WA	98409	- 122.49556	47.18467	242	LUST
34	1	1	3250	C	BM 347	S103503063	PIERCE COUNTY FIRE DIST.	8310 87TH AVE. SW	LAKEWOOD	WA	98498	- 122.55325	47.17749	256	ICR
35	1	1	3340	A	FR 884	S105788518	Warehouse	9613 SALES ROAD	TACOMA	WA		- 122.47276	47.16921	315	SPILLS
36	1	1	3350	C	BS 339	S108674465	Oakridge Apts.	8010 83RD SW	LAKEWOOD	WA		- 122.54769	47.18189	246	SPILLS
37	1	1	3352	E	ID1197	S105392728	Residence	14709 SPRING STREET SW.	LAKEWOOD	WA		- 122.53738	47.12406	279	SPILLS
38	1	1	3400	R	ID1199	S107485282	Residence	14715 SPRING STREET SW TACOMA	LAKEWOOD	WA		- 122.53738	47.12400	279	SPILLS
39	1	1	4950	C	AR 204	S107565969	Residence	9106 HIPKINS RD SW	LAKEWOOD	WA	98498	- 122.54761	47.17449	251	CSCSL
40	1	2	1450	C	BK 330	1004793576	CARRAGE CLEANER	8505 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	- 122.55010	47.17971	262	ALLSITES
41	1	4	100	A	BT 344	U003355354	PIERCE COUNTY FIRE DIST 2 STATION 2-2	8017 WASHINGTON BLVD SW	LAKEWOOD	WA	98498-5432	- 122.54473	47.14927	282	ALLSITES
42	1	4	190	E	HY1184	U003355353	PIERCE COUNTY FIRE DISTRICT 2 STA 2-3	14505 GRANT AVE SW	LAKEWOOD	WA	98498-2306	- 122.55037	47.12733	281	ALLSITES
43	1	4	450	A	450	U003354022	GEO SCOFIELD CO INC UST 3003	108TH & HALYCON	LAKEWOOD	WA	98406	- 122.49230	47.15940	283	ALLSITES
44	1	4	450	E	Y 125	1007074256	Lakewood Racquet Club	5820 112TH	LAKEWOOD	WA	98499	- 122.51392	47.15583	263	FINDS
45	1	4	680	E	FQ 879	1004794485	Shell Oil/PC DELI MART	3025 STEILACOOM BLVD	STEILACOOM	WA	98388	- 122.57567	47.17688	240	RCRA-CESQG
46	1	4	1000	A	CX 553	1007071006	7 ELEVEN 230326198A	10822 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.48782	47.15912	283	ALLSITES
47	1	4	1000	C	BD 286	U003355880	ANTHONYS SHELL/ MONTYS EXXON	8305 STEILACOOM BLVD S	LAKEWOOD	WA	98498	- 122.54771	47.17988	254	RCRA-CESQG
48	1	4	1300	A	CY 539	U003354803	AUTO Cost Less WRECKING	11030 PACIFIC HWY SW	LAKEWOOD	WA	98499-4643	- 122.48908	47.15750	283	ALLSITES
49	1	4	1370	A	FU 890	U003984536	PERSHIA PROPERTY	2707 92ND ST S	LAKEWOOD	WA	98499	- 122.47300	47.17387	296	UST
50	1	4	1650	A	DX 631	S110036142	NO WAKE ZONE/EDWARD B JOHNSON	8702 VETERANS DR SW	LAKEWOOD	WA	98498	- 122.55267	47.14494	267	ALLSITES
51	1	4	1770	E	FH 838	1000393990	PIERCE COLLEGE FT STEILACOOM	9401 FARWEST DR SW	LAKEWOOD	WA	98498	- 122.57426	47.17248	305	ALLSITES
52	1	4	1800	E	BE 265	1012129457	TACOMA STORAGE SITES, USGS	95TH ST SW	TACOMA	WA	98499	- 122.49778	47.17222	273	FUDS
53	1	4	2100	A	US Oil		US Oil and Refinery Co.	JP-8 Fuel pipeline	MCCHORD AFB			- 122.48873	47.15586		Pipeline

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
54	1	4	2400	A	DZ 660	1007074070	Texaco/MACS DELI	12706 BRIDGEPORT WAY SW	LAKESWOOD	WA	98499	- 122.50357	47.14179	283	ALLSITES
55	1	5	100	C	LW LU3		City of Lakewood Land-use category	Central Business District / Commercial 1, 2, 3				- 122.54359	47.14893		Commercial
56	1	5	100	E	GA 921	1011971631	LAKESWOOD WATER DIST VRTP	200 VIEW RD	STEILACOOM	WA	98388	- 122.57880	47.17541	243	RCRA-NonGen
57	1	5	275	E	266	1000220524	LAKES BODY SHOP INC	4724 STEILACOOM BLVD SW	LAKESWOOD	WA	98499	- 122.50051	47.17652	270	ALLSITES
58	1	5	300	E	LW LU2		City of Lakewood Land-use category	Neighborhood commercial				- 122.52203	47.16080		Commercial
59	1	5	450	A	LW LU4		City of Lakewood Land-use category	Industrial 1, 2, / Industrial business park				- 122.49390	47.16042		Industrial
60	1	5	690	E	AG 156	1000839037	FOSS TIRE INC/DAVES AUTO LUBE & REPAIR	10514 BRIDGEPORT WAY SW	LAKESWOOD	WA	98499	- 122.50530	47.16186	263	RCRA-CESQG
61	1	5	700	E	ST LU2		Town of Steilacoom Land-use category	Commercial / housing & Commercial / recreation				- 122.57564	47.17701		Commercial
62	1	5	800	C	BN 331	1000422878	BESTWAY ENTERPRISES CORP/RTS AUTO SERVICE	10529 LAKEVIEW AVE SW	LAKESWOOD	WA	98499	- 122.49501	47.16060	283	ALLSITES
63	1	5	850	A	BN 323	1000878843	WASTE DISPOSAL INC	10503 B LAKEVIEW AVE SW	LAKESWOOD	WA	98499	- 122.49494	47.16134	282	RCRA-NonGen
64	1	5	880	A	CX 518	1000229792	HOFFMANS AUTO BODY INC	3910 108TH ST SW	LAKESWOOD	WA	98499	- 122.48912	47.15941	283	ALLSITES
65	1	5	900	C	AX 260	1004793647	THUNDERBIRD CLEANERS	8019 STEILACOOM BLVD SW	LAKESWOOD	WA	98498	- 122.54418	47.17998	242	ALLSITES
66	1	5	1050	A	CX 540	1000218844	Insurance Co.	3853 108TH ST SW	LAKESWOOD	WA	98499	- 122.48815	47.15944	283	ALLSITES
67	1	5	1300	A	DL 594	1000199698	LAKESWOOD DRUG LAB (closed)	3702 108TH STREET SW	LAKESWOOD	WA	98499	- 122.48629	47.15938	283	RCRA-NonGen
68	1	5	1600	A	294	1001491141	FOAMEX INTERNATIONAL LAKESWOOD DIV	4500 92ND ST CT SW BLDG 19	LAKESWOOD	WA	98499	- 122.49693	47.17437	273	ALLSITES
69	1	5	1650	E	AW 227	1000879002	AMPAC ENTERPRISES INC 47TH	9370 47TH AVE SW BLDG 9	Lakewood	WA	98499	- 122.50005	47.17160	273	ALLSITES
70	1	5	1800	E	AV 239	1001490525	APPLIED FINISHING INC TACOMA	4680 95TH ST SW BLDG 6	LAKESWOOD	WA	98499	- 122.49960	47.17101	273	RCRA-CESQG
71	1	5	2300	A	JB LU1		JBLM Land-use category	Airfield / Airfield pavements / Aircraft O&M				- 122.49155	47.15408		Industrial
72	1	5	2350	E	AV 256	1004794677	RELM WEST INC LAKESWOOD	4620 95TH SW STE C	LAKESWOOD	WA	98499	- 122.49870	47.17070	273	ALLSITES
73	1	5	2350	E	AV 259	1010338294	PREFLEX DIGITAL PREPRESS SERVICES CO	4620 95TH ST SW STE D	LAKESWOOD	WA	98499	- 122.49870	47.17070	273	RCRA-CESQG
74	1	5	2400	E	AV 222	1000422726	JUSTUS CO INC	9616 47TH AVE SW	TACOMA	WA	98499	- 122.49999	47.17020	273	ALLSITES
75	1	5	2500	E	196	1004793863	PENSKE TRUCK LEASING CO LP	4927 95TH ST SW STE A BLDG 5	TACOMA	WA	98498	- 122.50193	47.17104	273	ALLSITES
76	1	5	2650	E	AT 220	S110486234	NORTHWEST BUILDING LLC	9726 47TH AVE SW BLDG 17 BAY 9	LAKESWOOD	WA	98499	- 122.50001	47.16940	274	ALLSITES
77	1	5	2900	C	BY 362	1010337828	Hagans Grocery	8611 STEILCOOM BLVD SW	LAKESWOOD	WA	98498	- 122.55190	47.17952	259	RCRA-CESQG
78	1	5	3100	A	JB LU4		JBLM Land-use category	Industrial				- 122.50540	47.13500		Industrial
79	1	6	100	C	LW LU5		City of Lakewood Land-use category	Mixed residential 1, 2				- 122.50603	47.18652		Residential
80	1	6	100	C	LW LU8		City of Lakewood Land-use category	Public Institutional				- 122.54053	47.14840		Pesticide Application

81	1	6	500	E	ST LU3		Town of Steilacoom Land-use category	Public Facilities				-	47.17651		Pesticide Application
												122.57870			
82	1	6	550	A	343	1005528760	Residence	103 CRESTWOOD DRIVE SW	Lakewood	WA	98498	-	47.16598	395	FINDS
												122.55734			
83	1	6	650	E	AS 207	1008250727	FOUR HEROES ELEMENTARY	9101 LAKEWOOD BLVD	LAKEWOOD	WA	98499	-	47.17656	271	FINDS
												122.50478			
84	1	6	650	E	AS 208	1008250288	HARRISON PREP	9101 LAKEWOOD BLVD	LAKEWOOD	WA	98499	-	47.17656	271	FINDS
												122.50478			
85	1	6	870	A	CX 524	1012132430	BP AUTOMOTIVE	3906 108TH ST SW	LAKEWOOD	WA	98499	-	47.15941	283	FINDS
												122.48906			
86	1	6	950	E	AM 180	1007075886	OREGON PACIFIC BUILDING PRODUCTS WASH	9213 51ST SW LAKEWOOD TACOMA IND P	LAKEWOOD	WA	98499	-	47.17344	268	FINDS
												122.50481			
87	1	6	1170	C	BK 306	S110040143	O'REILLY AUTO SUPPLY STEILACOOM BLVD	8404 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	-	47.17973	262	ALLSITES
												122.54951			
88	1	6	1200	A	CY 519	1012294772	UNITY MOTORS	10922 PACIFIC HWY SW	LAKEWOOD	WA	98499	-	47.15796	283	FINDS
												122.48979			
89	1	6	1200	E	AG 174	1012284638	PRO WEST AUTO SELECT	10605 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-	47.16064	263	FINDS
												122.50480			
90	1	6	1320	A	CX 545	1012132503	O'REILLY AUTO SUPPLY 10901 PACIFIC HWY	10901 PACIFIC HWY SW	LAKEWOOD	WA	98499	-	47.15864	283	FINDS
												122.48836			
91	1	6	1600	C	AP 199	S110036780	PRECISION TUNE AUTO CARE LAKEWOOD	7701 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	-	47.17966	242	ALLSITES
												122.54091			
92	1	6	1750	A	CI 479	S110040621	VISTA AUTO SALES & LEASING	11102 PACIFIC HWY SW	LAKEWOOD	WA	98499	-	47.15628	283	ALLSITES
												122.49265			
93	1	6	1950	C	AP 202	1008249841	CUSTER ELEMENTARY SCHOOL	7700 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	-	47.17968	242	FINDS
												122.54107			
94	1	6	2000	A	CI 477	1012300224	ADAM CAR SALES INC	11215 PACIFIC HWY SW	LAKEWOOD	WA	98499	-	47.15598	283	FINDS
												122.49287			
95	1	6	2345	E	IG1256	1011478442	SPECIAL EDUCATION SERVICES/RELIFE	14721 MURRAY ST	LAKEWOOD	WA	98439	-	47.12376	284	FINDS
												122.54277			
96	1	6	2450	E	JB1348	1012291646	A1 TRANSMISSIONS LAKEWOOD	14907 MURRAY RD SW	LAKEWOOD	WA	98439	-	47.12204	283	FINDS
												122.54281			
97	1	6	2500	C	CL 466	1008250285	ECHELON	5101 88 TH St Ct	LAKEWOOD	WA	98498	-	47.17885	249	FINDS
												122.55561			
98	1	7	300	A	LW LU1		City of Lakewood Land-use category	Arterial Corridor / Transit-oriented commercial				-	47.14201		Pesticide Application
												122.51487			
99	1	7	1000	A	JB LU7		JBLM Land-use category	Highway right-of-way				-	47.14070		Pesticide Application
												122.51561			
100	1	7	1047	E	HO1162	S106083149	Apartments	14417 UNION AVE SW, UNITS A, B, & D	LAKEWOOD	WA	98498	-	47.12669	284	HIST CDL
												122.54516			
101	1	7	1095	E	HO1154	S106783034	Apartments	14409 UNION AVE SW, Units A, B & C	LAKEWOOD	WA	98498	-	47.12677	282	HIST CDL
												122.54504			
102	1	7	1100	A	DR 606	S106782914	Residence	5509 BOSTON AVENUE SW	LAKEWOOD	WA		-	47.14045	285	HIST CDL
												122.51022			
103	1	7	1230	A	DL 578	S110123811	CANDLEWOOD SUITES	108TH ST SE & PACIFIC HWY SW	LAKEWOOD	WA		-	47.15941	283	ALLSITES
												122.48706			
104	1	7	1750	A	DF 573	S106083051	Lincoln Ave Apts.	12635 LINCOLN AVE SW APT #5	LAKEWOOD	WA		-	47.14297	290	HIST CDL
												122.50627			
105	1	7	1971	E	IG1203	S106083407	S&K Apts.	14607 MURRAY RD SW APT #13,	LAKEWOOD	WA		-	47.12477	280	HIST CDL
												122.54272			
106	1	7	2050	C	CN 484	S110625870	FT STEILACOOM GOLF COURSE	8202 87TH AVE SW	LAKEWOOD	WA	98498	-	47.18245	244	ALLSITES
												122.55312			

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
107	1	7	2850	A	748	S110036992	HOLROYD COMPANY MCCHORD PLANT 2	ADDISON ST & BRIDGEPORT WAY	LAKEWOOD	WA	98496	-122.50193	47.13940	285	ALLSITES
108	1	8	100	A	LW LU7		City of Lakewood Land-use category	Open space/Recreation 1, 2				-122.47405	47.17778		Storm water
109	1	8	550	A	JB LU6		JBLM Land-use category	Open space / Outdoor Recreation				-122.51417	47.14056		Storm water
110	1	9	100	A	LW LU6		City of Lakewood Land-use category	Residential 1, 2, and 3; Multi-family 1, 2, 3				-122.51412	47.14138		Fertilizer
111	1	9	100	E	ST LU5		Town of Steilacoom Land-use category	Housing				-122.57761	47.17575		Fertilizer
112	1	9	2050	E	JB LU5		JBLM Land-use category	Housing				-122.54371	47.12709		Fertilizer
113	1	10	620	E	FQ 883	1007074395	ROLIN AUTOMOTIVE INC	3040 STEILACOOM BLVD SW	STEILACOOM	WA	98498	-122.57570	47.17690	240	CSCSL NFA
114	1	10	1600	E	AW 231	S104972035	ARCA SYSTEMS	9314 47TH AVE SW	LAKEWOOD	WA	98499	-122.50007	47.17182	273	CSCSL NFA
115	1	10	1600	E	AW 233	S104972034	XYTEC CLOROX LAKEWOOD	9314 47TH AVE SW	LAKEWOOD	WA	98499	-122.50007	47.17182	273	CSCSL NFA
116	1	10	2100	C	BM 315	U003353375	FORT STEILACOOM PARK SHOP	9115 Angle Lane	LAKEWOOD	WA	98498-8522	-122.55179	47.17766	260	CSCSL NFA
117	1	10	3700	A	FR 900	1000658884	WASHINGTON TREE SERVICE	9716 26TH AVE S	TACOMA	WA	98444	-122.47167	47.16819	314	CSCSL NFA
118	1	10	3850	A	FR 892	1000839063	SUTHERLAND DISTRIBUTING CO	9818 SALES RD S	TACOMA	WA	98498	-122.47189	47.16823	314	CSCSL NFA
119	2	1	850	C	BB 261	S107153683	Thunderbird Parkway	8123 STEILACOOM BLVD	LAKEWOOD	WA		-122.54523	47.17998	242	SPILLS
120	2	1	1000	E	IO1286	S110998347	Moose's Auto Tech	14612 UNION AVE. SW	LAKEWOOD	WA	98498	-122.54875	47.12460	283	CSCSL
121	2	1	1100	C	AX 235	U003353814	ALS THUNDERBIRD ARCO/AUTOMOTIVE REPAIR INC	7901 STEILACOOM BLVD SW	LAKEWOOD	WA	98498-6150	-122.54290	47.17994	242	ALLSITES
122	2	1	1175	E	EX 795	S103508881	ROLIN AUTOMOTIVE, INC.	10310 STEILACOOM AVE.	TACOMA	WA	98498	-122.57100	47.17685	247	ICR
123	2	1	1500	E	BQ 337	S106495791	CLOVER PARK TECHNICAL COLLEGE BLDG 25	4500 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	-122.49717	47.17649	271	CSCSL
124	2	1	1650	C	282	S108163537	Casa Cabana Apts.	25 THUNDERBIRD PARKWAY	LAKEWOOD	WA		-122.54347	47.18224	242	SPILLS
125	2	1	1700	E	BE 289	S105889415	FOAMEX	4500 92ND STREET COURT SOUTHWEST	LAKEWOOD	WA		-122.49711	47.17339	274	SPILLS
126	2	1	2050	C	281	S108429803	Residence	8610 NIXON AVE SW	LAKEWOOD	WA		-122.55191	47.17496	255	SPILLS
127	2	1	2250	E	AJ 170	S106705562	Residence	10821 IDLEWILD RD. SW	LAKEWOOD	WA		-122.54461	47.15916	259	SPILLS
128	2	1	2400	A	DF 576	1009628720	Demolished Mobile Home Park	12613 BRIDGEPORT WAY SW #54	LAKEWOOD	WA		-122.50444	47.14354	283	SPILLS
129	2	1	2950	C	95	S107475215	Residence	8904 EDGEWATER DR	LAKEWOOD	WA		-122.53371	47.17575	244	SPILLS
130	2	1	3000	A	FE 852	S108894109	Empty Lot (old dumping area?)	96TH ST & FRONT ST	LAKEWOOD	WA		-122.47495	47.17023	304	SPILLS
131	2	1	3150	E	EX 826	1000244145	WESTERN STATE HOSPITAL	9601 STEILACOOM BLVD SE	LAKEWOOD	WA	98498	-122.57225	47.17681	250	ALLSITES
132	2	1	3400	C	O 79	S107474902	Residence	9020 WAVERLY DR. SW	LAKEWOOD	WA		-122.53210	47.17515	246	SPILLS
133	2	1	3675	A	781	S108545106	JBLM Fuel Depot	47TH AND MCCHORD DRIVE	LAKEWOOD	WA		-122.49920	47.13947	301	SPILLS

134	2	1	3720	A	719	S108673662	Residence	335 LAKE LOUISE DRIVE	LAKEWOOD	WA		- 122.56842	47.15871	274	SPILLS
135	2	1	3760	A	EO 733	S107485191	Evergreen Apts.	12809 47TH AVE SW APT #2	LAKEWOOD	WA		- 122.49920	47.14110	301	SPILLS
136	2	1	3800	C	O 65	S108894638	Residence	7020 FOSTER ST SW. - LAKEWOOD	LAKEWOOD	WA		- 122.53095	47.17423	248	SPILLS
137	2	1	4100	A	757	S105889494	Residence	397 LAKE LOUISE DRIVE SOUTHWEST	LAKEWOOD	WA		- 122.57099	47.15968	296	SPILLS
138	2	1	4150	E	JK1331	S106083164	Residence	7411 150TH ST SW	LAKEWOOD	WA		- 122.53517	47.12123	283	HIST CDL
139	2	3	2700	A	583	S106783027	Demolished Trailer Park	12623 BRIDGEPORT WAY SW SP 54	LAKEWOOD	WA	98498	- 122.50441	47.14338	284	CDL
140	2	4	750	C	AZ 253	U004020836	WEYERHAEUSER RESIDENCE	11801 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	- 122.53858	47.15054	269	ALLSITES
141	2	4	2830	A	EG 701	S110486002	BURKHART DENTAL SUPPLY	11101 S TACOMA WAY STE D	LAKEWOOD	WA	98499	- 122.48350	47.15712	283	RCRA-LQG
142	2	4	3450	E	AT 215	1007063789	LAKEWOOD TACOMA INDUSTRIAL PARK	9317 47TH AVE SW BLDG 9	LAKEWOOD	WA	98499	- 122.50000	47.16885	275	ALLSITES
143	2	5	1300	E	HO1128	1000659129	MATLACK INC I5 SPILL	I5 MP 123 SOUTHBOUND	TACOMA	WA	98466	- 122.54388	47.12674	268	ALLSITES
144	2	5	1900	A	BC 280	1000659558	PAC TECH PRODUCTS (Industrial Park)	4590 95TH ST SW	LAKEWOOD	WA	98499	- 122.49670	47.17099	273	ALLSITES
145	2	5	2100	C	178	1000878860	PUBLIC STORAGE MGMT D	8520 PHILLIPS RD SW	LAKEWOOD	WA	98498	- 122.53708	47.17979	253	ALLSITES
146	2	5	4500	A	FB 807	1007265334	LAKES HS	10320 FARWEST DR SW	LAKEWOOD	WA	98499	- 122.57391	47.16246	356	ALLSITES
147	2	6	400	C	AQ 200	S110036411	CHAMBERS CREEK FISH HATCHERY	8315 PHILLIPS ROAD SW	TACOMA	WA	98498	- 122.53705	47.18143	251	ALLSITES
148	2	6	1700	E	AO 194	1012132495	O'Reilly AUTO SUPPLY	10915 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50451	47.15843	263	FINDS
149	2	6	1850	E	187	1011907632	BRIAN HODGSON - RESIDENCE	11713 MOUNTBROOK LANE SW	LAKEWOOD	WA	98499	- 122.51850	47.15124	269	FINDS
150	2	6	1930	A	DF 543	S110038874	MAYNARD PROPERTY	5303 SOLBERG DR SW	LAKEWOOD	WA	98499	- 122.50635	47.14350	287	ALLSITES
151	2	6	2050	E	BP 329	1007068142	CASCADE SONOCO INC TAC	4500 95TH ST SW	LAKEWOOD	WA	98499	- 122.49458	47.17100	277	ALLSITES
152	2	6	2150	E	AJ 169	1008279722	IDLEWILD ELEMENTARY SCHOOL	10806 IDLEWILD RD SW	LAKEWOOD	WA	98498	- 122.54463	47.15929	259	FINDS
153	2	6	2402	E	1322	1011478283	WOODBROOK MIDDLE SCHOOL	14920 SPRING ST	LAKEWOOD	WA	98439	- 122.53732	47.12163	283	FINDS
154	2	6	2450	A	BC 263	1007062564	MCLANE NORTHWEST 45TH	9611 45TH AVE SW BLDG 4	TACOMA	WA	98499	- 122.49748	47.16987	273	ALLSITES
155	2	6	2900	A	BJ 309	1012278555	FORWARD MOTION	10313 LAKEVIEW AVE SW STE B	LAKEWOOD	WA	98499	- 122.49461	47.16335	282	FINDS
156	2	6	2910	A	BJ 311	S110037856	MIRROR IMAGE AUTO DETAIL	10313 LAKEVIEW AVE SW STE A	LAKEWOOD	WA	98499	- 122.49461	47.16335	282	FINDS
157	2	6	3100	A	FE 849	1007064887	TOWER INDUSTRIES	3004 96TH ST S	TACOMA	WA	98499	- 122.47507	47.17022	304	ALLSITES
158	2	6	3450	E	AT 216	S108108171	MARATHON RECOVERY	9317 47TH AVE SW	LAKEWOOD	WA	98499	- 122.49998	47.16882	275	ALLSITES
159	2	6	3700	C	100	1011932492	Residence	7011 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.53048	47.17705	248	ALLSITES

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
160	2	7	1050	C	BT 403	S110040842	KINCADES AUTO REPAIR (Abandoned)	8118 WASHINGTON BLVD SW	LAKEWOOD	WA	98498	-122.54535	47.14853	280	ALLSITES
161	2	7	1300	E	Q 83	1006817993	CLOVER PARK HIGH SCHOOL	11023 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.52044	47.15700	267	ALLSITES
162	2	7	1450	E	Q 94	1007072644	B & B GLASS CO INC	11104 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	-122.52089	47.15604	267	ALLSITES
163	2	7	2700	A	EG 722	S110036885	TRANSMISSION MAIN & BOOSTER PUMP	S TACOMA WAY & 112TH ST	LAKEWOOD	WA	98445	-122.48338	47.15583	283	ALLSITES
164	2	7	2800	C	120	S110036286	BOYLES FOREIGN CAR REPAIR	7202 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	-122.53378	47.17773	244	ALLSITES
165	2	7	2900	A	BJ 304	U003354179	City of Lakewood	10309 LAKEVIEW SW	LAKEWOOD	WA	98499-0313	-122.49462	47.16339	282	ALLSITES
166	2	7	2900	C	422	1000983725	ALL ENVIRONMENTAL INC	8222 WASHINGTON BLVD SW	LAKEWOOD	WA	98498	-122.54638	47.14848	277	ALLSITES
167	2	8	1200	E	ST LU4		Town of Steilacoom Land-use category	Open space (Housing, Industrial, & recreation)				-122.58187	47.17680		Storm water
168	2	10	780	C	BB 271	1001226276	WALGREENS 4064	8224 STEILACOOM BLVD SW	LAKEWOOD	WA	98498	-122.54645	47.17994	248	CSCSL NFA
169	2	10	1000	C	BB 267	1000660595	SHELL STATION 121589	8223 STEILACOOM BOULEVARD	LAKEWOOD	WA	98498	-122.54639	47.17996	247	CSCSL NFA
170	2	10	1100	E	AK 177	1000892003	BRIDGEPORT WAY DELI MART/RENTAL MART	10712 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.50469	47.16002	263	CSCSL NFA
171	2	10	1450	E	AK 185	1000659087	BP SERVICE STATION 11260	10801 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.50450	47.15930	263	CSCSL NFA
172	2	10	1600	E	AW 228	1000264848	PERSTORP PLASTIC SYSTEMS	9350 47TH AVE	LAKEWOOD	WA	98499	-122.50005	47.17167	273	CERC-NFRAP
173	3	1	100		AA 133	S105401123	Tattoo Parlor	10321 - BRIDGEPORT WAY SW	LAKEWOOD	WA		-122.50598	47.16310	263	SPILLS
174	3	1	200		AA 128	S108163339	Residence	10317 BRIDGEPORT WAY SW	LAKEWOOD	WA		-122.50626	47.16347	263	SPILLS
175	3	1	1250		X 122	1009628718	Residence	10706 DOUGLAS DR SW	LAKEWOOD	WA		-122.50920	47.16025	263	SPILLS
176	3	1	2000		186	S105686133	Abundant Life Church	5300 111TH STREET EAST	LAKEWOOD	WA		-122.50715	47.15645	263	SPILLS
177	3	1	2350		AY 244	U003355612	NORTHWEST BUILDING CORP	4700 100TH ST SW	LAKEWOOD	WA	98499	-122.49868	47.16659	278	LUST
178	3	1	2450		AU 223	S109891269		BRIDGEPORT WAY & 112TH ST SW	LAKEWOOD PIERCE	WA		-122.50445	47.15583	263	SPILLS
179	3	1	2550		W 111	1007077146	SE 17 LAKEWOOD/CELLULAR ONE	5717 SW 108TH ST	TACOMA	WA	98499	-122.51203	47.15945	263	ICR
180	3	1	2600		CV 500	1007074138	MOUNTAIN VIEW MEMORIAL PARK	4100 STEILACOOM BLVD SW	LAKEWOOD PIERCE	WA	98499	-122.49139	47.17645	277	LUST
181	3	1	2600		AU 224	S108672217	Gas Station (Abandoned)	112TH & BRIDGEPORT WAY	LAKEWOOD PIERCE	WA		-122.50445	47.15583	263	SPILLS
182	3	1	2600		AU 225	S105394898	Gas Station (Abandoned)	112TH ST. SW & BRIDGEPORT	LAKEWOOD PIERCE	WA		-122.50445	47.15583	263	SPILLS
183	3	1	2700		118	S106705302	Duplex (residence)	11220 GRAYSTONE DR SW	LAKEWOOD PIERCE	WA		-122.52913	47.15425	267	SPILLS
184	3	1	3030		DN 599	S106082999	Residence (Abandoned)	12518 ADDISON STREET SW	LAKEWOOD	WA		-122.50183	47.14389	283	SPILLS
185	3	1	3150		GF 949	S108673301	ALLSTAR PAINTING	2410 96TH ST S	TACOMA	WA		-122.46914	47.17021	312	SPILLS
186	3	1	3250		BF 292	1000456057	TYEE CLEANERS & LAUNDROMAT	4924 115TH ST CT SW	LAKEWOOD	WA	98499	-122.50278	47.15269	271	CSCSL

187	3	1	3250	DV 641	S110039341	MELODY AUTO MART LLC	10011 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48345	47.16649	308	SPILLS
188	3	1	3300	124	S106846572	Residence	7101 87TH ST SW	LAKEWOOD	WA		- 122.53194	47.17866	247	SPILLS
189	3	1	3350	DK 567	S110039438	TACOMA TOWING LLC	9118 39TH AVE SW	LAKEWOOD	WA	98499	- 122.48799	47.17470	282	SPILLS
190	3	1	3350	DV 636	S106083145	Abandoned	9915 S TACOMA WAY #105 BUDGET MOTEL	LAKEWOOD	WA	0	- 122.48349	47.16733	305	SPILLS
191	3	1	3450	BU 393	1000344885	US EPA LAKEWOOD SUPERFUND SITE PACIFIC	12059 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50710	47.14769	272	CERCLIS
192	3	1	3500	BX 356	S104487717	Valero Petroleum	11910 PACIFIC HIGHWAY SW	LAKEWOOD	WA	98444	- 122.50557	47.14870	272	ICR
193	3	1	3550	BU 407	S105685704	Colonial Motel	12117 PACIFIC HIGHWAY SW	LAKEWOOD PIERCE	WA		- 122.50779	47.14724	272	SPILLS
194	3	1	3550	BX 357	S109893415	PIERCE TRANSIT	PACIFIC HWY & BRIDGEPORT WAY	LAKEWOOD PIERCE	WA		- 122.50438	47.14935	273	SPILLS
195	3	1	3600	DJ 560	S109524948	Jack-in-the-Box	3906 STEILACOOM BLVD	LAKEWOOD PIERCE	WA		- 122.48907	47.17651	278	SPILLS
196	3	1	3615	BU 388	S108678816	American Auto	12001 PACIFIC HWY SW	LAKEWOOD PIERCE	WA		- 122.50698	47.14778	272	SPILLS
197	3	1	3650	33	S107156022	Residence	7143 INTERLAAKEN DR.	LAKEWOOD PIERCE	WA		- 122.53328	47.16786	239	SPILLS
198	3	1	3700	BU 379	1010338834	76 Service Station SITE 253588	11919 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50634	47.14814	272	ICR
199	3	1	3700	DI 558	1011848074	LAKEWOOD TRANSFER STATION	3869 94TH ST SW	LAKEWOOD	WA	98499	- 122.48713	47.17218	286	SPILLS
200	3	1	3750	BU 410	1004612713	VINSON VILLAS MHP	12129 PACIFIC HWY	LAKEWOOD	WA	98499	- 122.50800	47.14709	272	ICIS
201	3	1	3750	BU 397	1012064554	Mazatlan Restaurant	12039 PACIFIC SW HWY	LAKEWOOD	WA		- 122.50680	47.14780	273	SPILLS
202	3	1	3780	419	S107475111	Fort Lewis Hotel (partially abandoned)	12215 PACIFIC HWY SW	LAKEWOOD	WA		- 122.50970	47.14611	274	SPILLS
203	3	1	3800	DK 570	S110066617	LS TIRE COMPANY	9215 39TH AVENUE SW	LAKEWOOD PIERCE	WA		- 122.48804	47.17482	281	SPILLS
204	3	1	3900	CF 431	U003355669	KWIKI Mart 232414469/SOUTHLAND #14469	12336 PACIFIC HWY SW	LAKEWOOD	WA	98499-1021	- 122.51145	47.14522	270	CSCSL
205	3	1	3900	1167	S109524825	PUGET SOUND ENERGY	7312 146TH AVE SW	LAKEWOOD PIERCE	WA		- 122.53404	47.12478	274	SPILLS
206	3	1	4000	FG 828	S107153491	WSDOT Vehicle Emissions testing	3003 107TH ST S	LAKEWOOD PIERCE	WA		- 122.47681	47.16006	313	SPILLS
207	3	1	4200	BZ 395	S107487071	Abandoned trailer park	11701 PACIFIC HIGHWAY SOUTHWEST	LAKEWOOD PIERCE	WA		- 122.50072	47.15141	276	SPILLS
208	3	1	4300	CP 508	S101189718	LAKEWOOD PONDERS CORNER		LAKEWOOD	WA		- 122.51567	47.14207	278	CSCSL
209	3	1	4350	283	S106083154	4-plex residence	10924 KENDRICK ST SW	LAKEWOOD	WA	0	- 122.49813	47.15824	279	SPILLS
210	3	1	4550	EN 769	S106083161	Mobile Manor	3214 - 96TH STREET SOUTH, TRAILER 33	LAKEWOOD	WA	98499	- 122.47859	47.17027	309	SPILLS
211	3	1	4600	DD 538	S108023844	PIERCE TRANSIT	3701 96TH ST SW	LAKEWOOD	WA	98499	- 122.48719	47.17016	283	ICR
212	3	1	4650	AN 189	S106783046	Residence	8418 97TH STREET SOUTHWEST	LAKEWOOD	WA	98498	- 122.54873	47.16888	250	SPILLS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
213	3	1	4800		876	1011240736	WOODWORTH & CO INC			WA		-122.47361	47.16056	316	CSCSL
214	3	1	4800		F 31	S109525022	Residence	9543 DEKOVEN DR SW	LAKEWOOD PIERCE	WA		-122.52913	47.17072	250	SPILLS
215	3	1	4850		EI 712	S106409472	Legacy Park Apts.	3502 92ND ST S, UNIT 8B3	LAKEWOOD	WA	98499	-122.48220	47.17360	294	SPILLS
216	3	1	4900		U 106	S106783041	Residence	6610 88TH ST. SW, UNIT 3	LAKEWOOD	WA	98499	-122.52551	47.17783	254	SPILLS
217	3	1	5200		62	S105392644	Residence	6522 ARDMORE DR SW	LAKEWOOD PIERCE	WA		-122.52482	47.17485	256	SPILLS
218	3	1	5250		EJ 714	S107486897	True Green Lawn Care	8203 DURANGO STREET SW	LAKEWOOD PIERCE	WA	98499	-122.48759	47.18251	269	SPILLS
219	3	1	5350		1	S106083146	Residence	10219 MEADOW RD SW	LAKEWOOD	WA	98499	-122.52597	47.16424	247	SPILLS
220	3	1	5500		DQ 624	U003354625	NORTHWEST TRANSMISSION	9724 TACOMA WAY S	LAKEWOOD	WA	98499-4456	-122.48373	47.16914	300	ICR
221	3	1	5700		FX 911	1011848053	SM METALS/BETTER PC RECYCLE LLC	2608 104TH ST CT S STE J3	LAKEWOOD	WA	98499	-122.47119	47.16270	314	ICIS
222	3	1	5800		ET 752	U003354820	NORTHWEST BOTTLING COMPANY	3318 S. 92ND ST.	TACOMA	WA	98409	-122.47996	47.17390	294	ICR
223	3	1	5900		EV 783	S107153686	S&B Furniture	8204 S TACOMA WAY	LAKEWOOD PIERCE	WA		-122.48384	47.18244	282	SPILLS
224	3	1	6000		GH1001	1007074112	TRANS NATIONAL LEASING CO INC	2310 104TH CT S	TACOMA	WA	98444	-122.46739	47.16272	316	LUST
225	3	1	6100		ES 758	1007066374	Taco Bell	8401 S TACOMA WAY	LAKEWOOD	WA	98499	-122.48371	47.18112	281	LUST
226	3	1	6100		1300	S106783321	Laurel Garden Apts.	6615 150TH STREET SW #145	LAKEWOOD	WA		-122.52620	47.12129	283	SPILLS
227	3	1	6100		ES 754	S110276773	Starlite Drive-in	8406 S TACOMA WAY	LAKEWOOD PIERCE	WA		-122.48388	47.18112	281	SPILLS
228	3	1	6100		ES 755	S105554100	Meyer Floor Covering	8400 SOUTH TACOMA WAY	LAKEWOOD	WA		-122.48388	47.18117	280	SPILLS
229	3	1	6120		DV 643	S106083148	Motel (Abandoned)	10005 S TACOMA WAY #16-B	LAKEWOOD	WA	98499	-122.48345	47.16657	308	SPILLS
230	3	1	6200		40	S108674639	8-plex residence	9504 WHITMAN AVE SW	LAKEWOOD PIERCE	WA		-122.52185	47.17209	261	SPILLS
231	3	1	6350		GT1098	S107487626		2200 109TH ST S	TACOMA	WA		-122.46658	47.15841	312	SPILLS
232	3	1	6400		GR1062	S108672194	ARCO	11109 S STEELE	LAKEWOOD	WA		-122.46778	47.15643	299	SPILLS
233	3	1	6700		GG 951	1000227568	USAF MCCHORD AFB BLDG 1173	N47 8 46.2 W122 30 8.35'	MCCHORD AFB	WA	98438	-122.47830	47.14492	290	CERCLIS
234	3	1	6700		GG 952	1000227569	USAF MCCHORD AFB BLDG 792	BLDG 792 VICINITY	MCCHORD AFB	WA	98438	-122.47830	47.14492	290	CERCLIS
235	3	1	6700		GG 953	1000227567	USAF MCCHORD AFB AREAS A, C, D, and E	AREA A	MCCHORD AFB	WA	98438	-122.47830	47.14492	290	CERCLIS
236	3	1	6700		GG 958	S101429475	USAF MAFB MTCA WP 34		TACOMA	WA		-122.47830	47.14492	290	CSCSL
237	3	1	6700		GG 959	S100562881	USAF MAFB AMERICAN LK GDN		MCCHORD AFB	WA		-122.47830	47.14492	290	CSCSL
238	3	1	6900		S 88	S108023433	LAKEWOOD MINI MART/DOBASHI MARKET & DELI	6101 STEILACOOM BLVD	LAKEWOOD	WA	98490	-122.51987	47.17651	260	ICR
239	3	1	6950		EB 668	S106083158	Billiard Parlor	9324 S TACOMA WAY	LAKEWOOD	WA	98499	-122.48378	47.17284	289	SPILLS
240	3	1	7000		E 32	1007073628	KENS TIRE SERVICE UST 100479	9601 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.51969	47.17006	265	CSCSL
241	3	1	7100		C 11	1000920539	WALTS RADIATOR & MUFFLER GRAVELLY LAKE	9810 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.52043	47.16815	264	LUST
242	3	1	7300		C 12	1012065165	Empty Lot	6141 LAKE GROVE SW ST	LAKEWOOD	WA		-122.52058	47.16844	264	SPILLS
243	3	1	8000		D 22	S107484308	Heritage Bank	10318 GRAVELLY LAKE DRIVE SW	LAKEWOOD PIERCE	WA		-122.52070	47.16370	258	SPILLS
244	3	1	8100		D 25	S104487949	UNOCAL #6064 (Abandoned)	10346 GRAVELLY LAKE DR.	LAKEWOOD	WA	98499	-122.52068	47.16321	253	ICR
245	3	1	8300		1283	S107477074	Zumar Industries lot	12201 STEELE ST. SOUTH - ENDS @ 116TH FE	LAKEWOOD PIERCE	WA		-122.46784	47.14478	292	SPILLS
246	3	2	3250		BF 293	1010788424	TYEE DRY CLEANERS & LAUNDROMAT	4924 115TH ST CT SW	LAKEWOOD	WA	98499	-122.50278	47.15269	271	Inactive Drycleaners
247	3	2	3550		DJ 559	1000225382	LAKEWOOD CLEANERS	3907 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	-122.48909	47.17652	278	Inactive Drycleaners
248	3	2	3800		DJ 571	1011848006	L & S TIRE CO	9215 39TH AVE SW	LAKEWOOD	WA	98499	-122.48826	47.17534	280	SWF/LF
249	3	2	4700		FN 868	S108108045	MILES RESOURCES, LLC DBA WOODWORTH AND CO	2800 104TH ST CT S	LAKEWOOD	WA	98499	-122.47370	47.16270	314	SWF/LF
250	3	2	5250		GK 977	1007075366	SALES ROAD TRANSFER STATION	10308 SALES RD S	LAKEWOOD	WA	98499	-122.46836	47.16418	315	SWF/LF
251	3	2	5300		FZ 919	1000660522	EDS MOVING & STORAGE INC	11104 26TH AVE S	TACOMA	WA	98444-1500	-122.47230	47.15650	293	VCP
252	3	2	6000		FZ 929	1007076369	TUCCI & SONS MCCHORD PLANT 26TH AVE	11105 26TH AVE S	TACOMA	WA	98444	-122.47145	47.15740	315	SWF/LF
253	3	2	6000		GR1023	1004793624	DIRKS TRUCK REPAIR INC	2421 110TH ST S	LAKEWOOD	WA	98499	-122.46828	47.15761	321	VCP
254	3	2	6600		A 5	1001969529	CHEVRON USA INC SS 94347 (Abandoned)	10202 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	-122.52073	47.16511	262	VCP
255	3	2	6900		E 28	1004793467	LAKEWOOD FABRICARE CLEANERS / DEKOVEN CLEANER	9622 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.51998	47.16971	265	Inactive Drycleaners
256	3	4	1050		AH 164	U003353286	PIERCE COUNTY - SHERIFFS WEST PRECINCT	5504 112TH ST SW	LAKEWOOD	WA	98499	-122.51090	47.15580	263	ALLSITES
257	3	4	1440		Q 91	1000179508	USWCOM TACOMA JUNIPER CO	11144 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.52247	47.15590	261	UST

258	3	4	1700		AO 193	1007065641	CAR WASH ENTERPRISES/BROWN BEAR CAR WASH 552	10913 BRIDGEPORT WAY	LAKEWOOD	WA	98499	-122.50453	47.15845	263	Financial assurance
259	3	4	1850		BO 327	1007068882	PSE LAKEWOOD SERVICE CENTER	11705 83RD AVE SW	LAKEWOOD	WA	98499	-122.54720	47.15120	292	UST
260	3	4	2100		910	S109589997	STEILACOOM SUBSTATION	10609 MT. TACOMA DR. SW	STEILACOOM	WA	98388	-122.57944	47.16987	310	UIC
261	3	4	2350		AU 212	1000696920	SHELL STATION 120498 (Abandoned)	11102 BRIDGEPORT WY SW	LAKEWOOD	WA	98499	-122.50446	47.15646	263	Financial assurance
262	3	4	2650		CT 516	1000658977	PEASE CONSTRUCTION INC	3815 100TH ST SW NO 12	LAKEWOOD	WA	98499	-122.48790	47.16725	289	RCRA-LQG
263	3	4	2700		BA 254	S108893250	ST CLAIRE HOSPITAL	11315 BRIDGEPORT WY SW	LAKEWOOD	WA	98405	-122.50440	47.15462	265	Financial assurance
264	3	4	2800		BF 275	U003352427	LAKEVIEW LIGHT & POWER	11509 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.50439	47.15277	265	Financial assurance
265	3	4	2950		BF 284	1007067748	LAKEWOOD CAR WASH	11621 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.50445	47.15200	265	UST

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
266	3	4	3000		CV 502	U003355947	FUDS TACOMA STO SITES USGS	8914 LAKEVIEW AVE SW	LAKEWOOD	WA	98499	-122.49105	47.17614	277	UST
267	3	4	3100		472	U003352769	USGS UST 101902		LAKEWOOD	WA	98397	-122.49118	47.17335	281	UST
268	3	4	3250		DW 620	U003352574	SECURITY PACIFIC BANK OF WASHINGTON	9816 S TACOMA WAY	LAKEWOOD	WA	98499	-122.48372	47.16842	301	UST
269	3	4	3300		CQ 507	1004793659	PRECISION PREHUNG DOOR INC	9402 39TH AVE CT SW	LAKEWOOD	WA	98499	-122.48922	47.17227	284	RCRA-LQG
270	3	4	3400		BR 334	1007062529	LAKEWOOD MASONRY SUPPLY	4610 113 TH SW	LAKEWOOD	WA	98499	-122.49816	47.15534	279	UST
271	3	4	3450		BX 361	U004021319	TUNE UP & LUBE KING	11924 PACIFIC HWY SW	LAKEWOOD	WA	98499-1039	-122.50525	47.14885	272	UST
272	3	4	3600		DJ 562	1007265691	LAKEWOOD REFUSE SERVICE INC/HAROLD LEMAY ENTE	3902 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	-122.48905	47.17649	278	Financial assurance
273	3	4	3700		BW 374	1007063391	SUN MART #3/FLYING B 18	11747 PACIFIC HWY SW	LAKEWOOD	WA	98499	-122.50220	47.15050	276	Financial assurance
274	3	4	3850		BI 296	U003352739	KENTUCKY FRIED CHICKEN	11717 BRIDGE PORT WAY SW	LAKEWOOD	WA	98499-4947	-122.50440	47.15100	267	UST
275	3	4	3900		BL 320	1004793282	Empty	10001 LAKEVIEW AVE SW	LAKEWOOD	WA	98499	-122.49412	47.16651	282	UST
276	3	4	4200		CD 447	1007072789	Auto Repair	4001 100 ST SW	LAKEWOOD	WA	98499	-122.49074	47.16729	281	UST
277	3	4	4550		EE 688	S110700432	TACOMA & COUNTRY CLUB	13204 COUNTRY CLUB DR SW	LAKEWOOD	WA	98498	-122.53325	47.13743	284	UST
278	3	4	4785		CS 486	1007068821	LAKEWOOD LUMBER CO INC	12710 PACIFIC HWY SW	LAKEWOOD	WA	98499	-122.51651	47.14225	278	UST
279	3	4	5000		DM 597	1000474040	GRAVELLY LAKE 76	13101 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.52600	47.13892	293	Financial assurance
280	3	4	5100		DM 596	U004110967	TOSCO 0314830138	13101 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	-122.52600	47.13892	293	UST
281	3	4	5250		GJ 969	S109396638	U FIX IT HONDA	2520 112TH STREET S.	LAKEWOOD	WA	98498	-122.47054	47.15590	295	UIC
282	3	4	5400		GH 971	S109554673	LAIDLAW TRANSIT SERVICES INC	2410 104TH ST CT S STE A	TACOMA	WA	98444	-122.46863	47.16271	314	Financial assurance
283	3	4	5450		GH 975	1007078501	RYDER ATE INC TACOMA	2410 104TH ST CT S	TACOMA	WA	98444	-122.46863	47.16271	314	UST
284	3	4	5500		947	U003355108	WASHINGTON ELECTRIC CO	10817 26TH AVE CT S	TACOMA	WA	98444-6720	-122.47029	47.15833	320	UST
285	3	4	5500		GH 960	U003354623	SIPES CONSTRUCTION CO INC	2403 104TH ST CT S	TACOMA	WA	98444-1579	-122.46881	47.16271	313	UST
286	3	4	5600		DV 618	S108022098	ARCO #4485 / BANWAIT MART III	10006 S TACOMA WY	LAKEWOOD	WA	984994613	-122.48370	47.16645	308	Financial assurance
287	3	4	6050		GR1055	S108024359	STEELE STREET CHEVRON	11122 S STEELE ST	LAKEWOOD	WA	98449	-122.46793	47.15646	300	Financial assurance
288	3	4	6250		GH1004	S108653782	STEELE STREET SHELL	10505 STEELE ST S	LAKEWOOD	WA	98444	-122.46727	47.16338	315	Financial assurance
289	3	4	6300		GR1068	U003354844	STEELE STREET 76 LLC/76 STEELE FOOD MART	11202 STEELE ST	LAKEWOOD	WA	98444-0000	-122.46793	47.15589	296	Financial assurance
290	3	4	6500		HM1116	U003355879	EXXON 77175	2219 S 112TH	TACOMA	WA	98444-1545	-122.46676	47.15588	293	UST
291	3	4	6800		B 6	U003355663	SOUTHLAND CORP 232418863	9923 GRAVELLY LAKE DR	LAKEWOOD	WA	98499-1705	-122.52048	47.16744	263	UST
292	3	4	7100		21	1007066273	PAULSONS INCORPORATED	6111 100TH ST SW	LAKEWOOD	WA	98499	-122.51920	47.16678	264	UST
293	3	4	7200		CZ 555	1007677802	PETER HUNGATE PROPERTY	12811 PACIFIC HWY SW	LAKEWOOD	WA	98499	-122.51680	47.14050	278	UST
294	3	4	7700		DM 580	1004794026	ARCO 4490/HARBOR OLYMPIC LAND 4490	13005 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	-122.52601	47.13947	297	Financial assurance
295	3	4	7850		K 56	1007071619	LAKEWOOD COLONIAL CENTER UST 101367	9540 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.51630	47.17024	268	UST
296	3	4	7950		D 18	U003997160	SAFeway #1645	10223 GRAVELLY LAKE DR	LAKEWOOD	WA	98494	-122.52056	47.16403	260	Financial assurance
297	3	5	1600		ST LU1		Town of Steilacoom Land-use category	Industrial				-122.57774	47.18016		Industrial
298	3	5	2350		AY 241	1000891784	LAKEWOOD INDUSTRIAL PARK	4700 100TH ST SW BLDG 16	LAKEWOOD	WA	98499	-122.49871	47.16657	278	RCRA-NonGen
299	3	5	2900		CC 427	1000891875	SHEPARD AMBULANCE TACOMA	9316 LAKEVIEW AVE SW B	LAKEWOOD	WA	98499	-122.49244	47.17235	280	ALLSITES
300	3	5	3000		CC 416	1000839043	SHEPARD AMBULANCE INC	9425 LAKEVIEW AVE SW	LAKEWOOD	WA	98499	-122.49263	47.17171	281	RCRA-NonGen
301	3	5	3100		BL 314	96482140	Fantasy World	10013 LAKEVIEW AVENUE SW	LAKEWOOD	WA		-122.49416	47.16646	282	ERNS

302	3	5	3100		BP 394	1001490775	PENNZOIL QUAKER STATE CO	4215 95TH ST SW STE D	LAKEWOOD	WA	98499	-122.49293	47.17103	281	RCRA-NonGen
303	3	5	3150		CC 420	1010788493	LAKEWOOD TOWING & TRANSPORTATION	9393 LAKEVIEW AVE SW	LAKEWOOD	WA	98499	-122.49253	47.17199	281	Manifest
304	3	5	3200		803	1004794174	MERCEDES AUTOMOTIVE SERVICES	3233 112TH ST S	LAKEWOOD	WA	98499	-122.47907	47.15586	284	RCRA-NonGen
305	3	5	3400		BU 401	1000225381	LAKEWOOD AUTO BODY INC	12126 PACIFIC HWY	LAKEWOOD	WA	98499	-122.50789	47.14730	272	Manifest
306	3	5	3450		BU 391	1001490342	Lakewood Tire service	12037 PACIFIC HWY SW	LAKEWOOD	WA	98499	-122.50698	47.14776	272	RCRA-NonGen
307	3	5	3500		BU 348	92263699	BRIDGEPORT WAY AND PACIFIC HIGHWAY BY PO	BRIDGEPORT WAY AND PACIFIC HIGHWAY BY PO	LAKEWOOD	WA		-122.50772	47.14791	271	ERNS
308	3	5	3500		BW 354	1000659814	U HAUL CO OF LAKEWOOD	11740 PACIFIC HWY S	LAKEWOOD	WA	98499	-122.50260	47.15045	275	RCRA-NonGen
309	3	5	3840		BZ 383	1004794617	ORIENTAL AUTO BODY	11618 PACIFIC HWY SW	LAKEWOOD	WA	98499	-122.50057	47.15163	276	RCRA-NonGen
310	3	5	4500		JB LU3		JBLM Land-use category	Community (Commercial)				-122.49716	47.13607		Commercial
311	3	5	4700		DD 536	2009926948	3701 96TH STREET SW	3701 96TH STREET SW	LAKEWOOD	WA		-122.48719	47.17016	283	ERNS
312	3	5	5200		DQ 605	1000109838	NORTHROP GRUMMAN INF TECHNOLOGY	3620 96TH ST SW	LAKEWOOD	WA	98499	-122.48462	47.17019	283	Manifest
313	3	5	5250		GJ 970	1004793275	U FIX IT AUTO WRECKING	2520 112TH ST S	LAKEWOOD	WA	98444	-122.47052	47.15590	295	RCRA-CESQG
314	3	5	5430		GH 972	1012208998	SPECIALTY PRODS INC	2410 104TH ST CT S SUITE D	TACOMA	WA	98499	-122.46863	47.16271	314	Manifest
315	3	5	5550		GH 961	1000891952	WAKE TECH	2418 104TH ST CT S BLDG H	TACOMA	WA	98444	-122.46874	47.16271	313	RCRA-NonGen
316	3	5	5600		FZ 923	1000658981	SHOTWELL IND PARK	1 BLK N OF 25TH AVE & 110TH ST	TACOMA	WA	98444	-122.47207	47.15658	293	RCRA-NonGen
317	3	5	5650		GJ 979	S107672252	WA STATE PATROL CRIM LABORATORY	2502 112TH ST E TRAILER IN PARKING LOT	TACOMA	WA	98445	-122.47033	47.15590	295	Manifest
318	3	5	5710		DV 645	1005445145	PROFESSIONAL SERVICE INDUSTRIES S TACOMA	10025 S TACOMA WAY H1	LAKEWOOD	WA	98499	-122.48345	47.16630	309	RCRA-NonGen

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
319	3		5800		GT1021	1001234074	MONIERLIFETILE	10920 S STEELE ST	TACOMA	WA	98444	-122.46789	47.15891	314	RCRA-NonGen
320	3		6000		PC LU1		Pierce County land-use category	Commercial (CE, MUC, AC, UV, NC, MUD, CMUD, ROC and RO)				-122.46743	47.15627		Commercial
321	3		6100		ES 761	1000878909	STARLITE MERCURY SPIL	84TH & S TACOMA WAY NE COR	LAKEWOOD	WA	98499	-122.48373	47.18117	281	RCRA-NonGen
322	3		6100		ES 775	1000659619	SOUTH TACOMA AUTOMOTIVE	8320 S TACOMA WAY	TACOMA	WA	98499	-122.48388	47.18171	281	RCRA-NonGen
323	3		6700		A 10	98453058	10115 GRAVELY LAKE DRIVE SW	10115 GRAVELY LAKE DRIVE SW	LAKEWOOD	WA		-122.52056	47.16501	262	ERNS
324	3		6700		IM1233	1005445344	RICHARD DELONG SITE	12202 S STEELE ST	TACOMA	WA	98444	-122.46741	47.14726	293	RCRA-SQG
325	3		6900		M 61	1000839064	BRIDGEPORT WAY SW DR	9314 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	-122.51845	47.17323	262	RCRA-NonGen
326	3		7050		HV1172	1000696896	WESTMARK PRODUCTS INC TACOMA	11615 STEELE ST S	TACOMA	WA	98444	-122.46800	47.15024	293	RCRA-NonGen
327	3		7250		HV1186	1005445555	WESTMARK PRODUCTS INC	11721 STEELE ST S	TACOMA	WA	98444	-122.46795	47.14922	293	Manifest
328	3		7350		C 23	1000660269	IMPORT REPAIR SPECIALISTS	6124 LAKE GROVE SW	TACOMA	WA	98499	-122.51960	47.16842	265	RCRA-NonGen
329	3		7700		IM1248	1001234336	ZUMAR INDUSTRIES INC STEELE ST	12015 STEELE ST	TACOMA	WA	98444	-122.46746	47.14663	293	Manifest
330	3		7900		D 20	1001082036	PAYLESS 2552 LAKEWOOD MALL TACOMA	10223 GRAVELLY LAKE DR SW NO 1	TACOMA	WA	98499	-122.52053	47.16401	260	RCRA-NonGen
331	3	6	600		N 63	1005622436	COLDWELL BANKER-HAWKINS POE	10810 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	-122.52063	47.15866	266	FTTS
332	3	6	800		N 70	1007273693	CLOVER PARK SD	10903 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	-122.52045	47.15800	266	FTTS
333	3	6	1150		GP 992	1011466236	STEILACOOM VIRTUAL ACADEMY	54 SENTINEL DRIVE	STEILACOOM	WA	98388	-122.58052	47.17751	233	FINDS
334	3	6	1150		GP 993	1008293880	STEILACOOM HIGH	54 SENTINEL DRIVE	STEILACOOM	WA	98388	-122.58052	47.17751	233	FINDS

335	3	6	1750		251	1008279723	LAKEVIEW ELEMENTARY SCHOOL	10501 47TH AVE SW	LAKESIDE	WA	98499	- 122.49943	47.16170	279	FINDS
336	3	6	1800		436	1008279724	SOUTHGATE ELEMENTARY SCHOOL	10202 EARLEY AVE SW	LAKESIDE	WA	98499	- 122.49104	47.16539	281	FINDS
337	3	6	2500		276	1008279725	TYEE PARK ELEMENTARY SCHOOL	11920 SEMINOLE RD SW	LAKESIDE	WA	98499	- 122.50906	47.14999	267	FINDS
338	3	6	2850		II1207	1000123003	JAM PARTNERSHIP PROPERTY	2111 116TH ST CT S	TACOMA	WA	98444	- 122.46556	47.15152	293	FINDS
339	3	6	3000		BP 367	1011932199	CASCASDES SONOCO	4320 95TH ST SW	TACOMA	WA	98499	- 122.49312	47.17100	280	FINDS
340	3	6	3300		CQ 481	1007064616	CONTRACTORS BUILDING SUPPLY INC	9516 39TH AVE CT SW	TACOMA	WA	98499	- 122.48992	47.17110	282	FINDS
341	3	6	3450		588	1008249846	LAKE CITY ELEMENTARY SCHOOL	8800 121ST ST SW	LAKESIDE	WA	98498	- 122.55413	47.14760	267	FINDS
342	3	6	3500		BU 389	1012267046	LAKESIDE TRANSMISSION INC	12015 PACIFIC HIGHWAY SW	LAKESIDE	WA	98499	- 122.50686	47.14783	272	FINDS
343	3	6	3500		JB LU2		JBLM Land-use category	Administrative / Community (service) / Medical				- 122.50118	47.13758		Residential
344	3	6	3600		BU 385	S109824264	TACOMA TORQUE & CONVERTERS	12001 PACIFIC HWY SW	LAKESIDE	WA	98499	- 122.50679	47.14787	273	FINDS
345	3	6	3650		BW 358	1012267045	LAKESIDE FOREIGN CAR SALES INC	11726 PACIFIC HWY SW	LAKESIDE	WA	98499	- 122.50241	47.15056	275	FINDS
346	3	6	3710		BW 386	1012299807	ALL NATIONS AUTO SALES	11711 PACIFIC HWY SW	LAKESIDE	WA	98499	- 122.50139	47.15099	277	FINDS
347	3	6	3860		BI 353	1007070145	U HAUL CO OF LAKESIDE 55	11748 PACIFIC HWY S	TACOMA	WA	98499	- 122.50275	47.15036	275	FINDS
348	3	6	3950		CJ 454	1007065336	BMC HOLDING INC	9721 40TH AVE SW	TACOMA	WA	98499	- 122.49069	47.16900	283	FINDS
349	3	6	4000		BL 318	1012233683	BUCKYS LAKESIDE	10002 LAKEVIEW AVE SW	LAKESIDE	WA	98499	- 122.49416	47.16652	282	FINDS
350	3	6	4000		BL 368	1007077563	LAKES AUTO WRECKING	4034 100TH ST SW	TACOMA	WA	98499	- 122.49244	47.16690	281	FINDS
351	3	6	4550		DV 646	1012233763	FLEET FORKLIFT	10029 S TACOMA WAY	LAKESIDE	WA	98499	- 122.48345	47.16625	309	FINDS
352	3	6	4700		U 97	1012259490	BROTHERS AUTO REPAIR	8825 MEADOW RD SW	LAKESIDE	WA	98499	- 122.52629	47.17749	254	FINDS
353	3	6	4900		CT 487	1012279167	ARTISTIC CREATIONS LAKESIDE	3818 100TH ST SW	LAKESIDE	WA	98499	- 122.48866	47.16717	283	FINDS
354	3	6	5100		EJ 723	1012294348	TALLER HERNANDEZ 2	8016 DURANGO ST SW	LAKESIDE	WA	98499	- 122.48758	47.18293	268	FINDS
355	3	6	5600		DO 615	S110040107	JOSES AUTOMOTIVE	8701 DURANGO ST SW	LAKESIDE	WA	98499	- 122.48753	47.17825	278	FINDS
356	3	6	5700		DO 603	1007072920	CANTEEN CO OF TACOMA	3858 87TH SW	TACOMA	WA	98499	- 122.48827	47.17827	276	FINDS
357	3	6	5800		FX 932	1012293752	MASONS SUPPLY CO	2506 104TH STREET CT S	LAKESIDE	WA	98499	- 122.46988	47.16270	313	FINDS
358	3	6	6000		DQ 649	1007071162	HARRIS & CO	9602 S TACOMA WAY	TACOMA	WA	98499	- 122.48374	47.17010	293	FINDS
359	3	6	6000		GH1011	S110123540	TACOMA SPEEDOMETER	10526 STEELE ST S STE A	LAKESIDE	WA	98499	- 122.46727	47.16224	316	FINDS
360	3	6	6000		GH1012	1012265562	B & K ENGINES INC	10526 STEELE ST S	LAKESIDE	WA	98499	- 122.46727	47.16224	316	FINDS
361	3	6	6100		ES 751	S110039425	UNIVERSAL TIRE & WHEELS LAKESIDE	8402 S TACOMA WAY	LAKESIDE	WA	98499	- 122.48390	47.18110	281	FINDS
362	3	6	6200		A 2	1011478284	ALFARETTA HOUSE	6423 ALFARETTA ST	LAKESIDE	WA	98499	- 122.52242	47.16515	258	FINDS

363	3	6	6300		HG1092	S110124186	TRANSMISSION DEPOT	11304 STEELE ST S STE A	LAKEWOOD	WA	98499	- 122.46806	47.15485	293	FINDS
364	3	6	6300		S 86	1011932539	LAKWOOD PRINTING	6111 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.52005	47.17652	260	FINDS
365	3	6	6550		HM1118	1007067074	MUTUAL MATERIALS PARKLAND	2201 112 ST S	TACOMA	WA	98444	- 122.46652	47.15585	293	FINDS
366	3	6	6650		B 3	1008250291	PARK LODGE ELEMENTARY SCHOOL	6300 100TH ST SW	LAKEWOOD	WA	98499	- 122.52114	47.16670	261	FINDS
367	3	6	6850		B 8	1012292335	AUTO LUBE OF LAKEWOOD	9901 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	- 122.52041	47.16761	263	FINDS
368	3	6	7100		M 73	1012293652	MIDAS AUTO SERVICE EXPERTS LAKEWOOD	9140 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	- 122.51657	47.17347	264	FINDS
369	3	6	7250		C 15	1008171805	HAROLD A ALLEN CO	9805 GRAVELLY DR SW	LAKEWOOD	WA	98499	- 122.52019	47.16835	265	FINDS
370	3	7	950		CS 494	1000214513	INTERCHECKS INC	12715 PACIFIC HWY SW	TACOMA	WA	98499	- 122.51644	47.14213	278	ALLSITES
371	3	7	1300		844	S106783038	Residence	3201 90TH ST S	LAKEWOOD	WA	98499	- 122.47689	47.17595	297	HIST CDL

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
372	3	7	2000		805	S109553658	MCNEIL ISLAND CORRECTION CENTER	35 SETTLER ST	STEILACOOM	WA	98388	- 122.57063	47.17904	229	ALLSITES
373	3	7	2600		AU 219	1001490398	ALS AUTO SUPPLY TACOMA	11111 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50445	47.15639	263	ALLSITES
374	3	7	2700		CT 511	S110037079	CHUCKS AUTO REPAIR	3823 100TH ST SW STE 11	LAKEWOOD	WA	98499	- 122.48802	47.16726	284	ALLSITES
375	3	7	2750		AT 209	1007074817	ASSOC PETROLEUM PRODUCTS INC UST 412871	9822 47TH AVE SW BLDG 18	LAKEWOOD	WA	98499	- 122.50003	47.16825	275	ALLSITES
376	3	7	3250		BF 290	S109824467	SKELLY PROPERTY	4925 115TH ST CT SW	LAKEWOOD	WA	98499	- 122.50278	47.15269	271	ALLSITES
377	3	7	3500		BU 370	U003353924	AAMCO TRANSMISSIONS	12006 PACIFIC HWY	LAKEWOOD	WA	98499-1016	- 122.50659	47.14807	272	ALLSITES
378	3	7	3500		BU 402	S110039312	JIMMY RAYS CYCLE LLP	12132 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50804	47.14723	271	ALLSITES
379	3	7	3610		BU 371	1000878787	BUDS MACHINE ENGINE SHOP	12019 C PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50672	47.14798	272	ALLSITES
380	3	7	3720		DW 639	U003355977	CAR WASH ENTERPRISES INC	9821 S TACOMA WAY	LAKEWOOD	WA	98499-4457	- 122.48351	47.16790	303	ALLSITES
381	3	7	4000		CD 425	S109553857	DELTA PAINTING & PREFINISH CO INC	4025 100TH ST SW	LAKEWOOD	WA	98499	- 122.49147	47.16727	281	ALLSITES
382	3	7	4010		BL 319	U003353594	BUDGET CAR & TRUCK RENTAL 100TH & LAKEVI	100TH & LAKEVIEW AVE	LAKEWOOD	WA	98499	- 122.49412	47.16657	282	ALLSITES
383	3	7	4300		DI 584	U004021331	JOE CLESSONS ROOFING INC	3803 94TH SW	LAKEWOOD	WA	98499-0417	- 122.48633	47.17217	285	ALLSITES
384	3	7	4900		EB 679	1007069619	EUGENE L MYERS	9212 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48381	47.17378	290	ALLSITES
385	3	7	5200		EB 678	S110625614	B & M AUTO SALES LAKEWOOD	9313 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48360	47.17294	289	ALLSITES
386	3	7	5400		EC 670	1001806513	INTERBAKE FOODS INC TACOMA DIVISION	8500 DURANGO ST SW	LAKEWOOD	WA	98499	- 122.48757	47.17991	274	ALLSITES
387	3	7	5550		GH 962	1000850407	AIR DATA EXPRESS INC TACOMA	2418 104TH ST CT S BLDG G	TACOMA	WA	98444	- 122.46874	47.16271	313	ALLSITES
388	3	7	5550		GH 963	S109556743	DURHAM COMPRESSION MOLDING	2418 104TH ST CT S	TACOMA	WA		- 122.46874	47.16271	313	ALLSITES

389	3	7	5600	GJ 976	1007070217	AMERICAN AUTO PARTS	2518 112TH ST S	TACOMA	WA	98444	- 122.47052	47.15590	295	ALLSITES
390	3	7	5700	DV 644	1011932269	3V PRECISION MACHINING INC	10025 S TACOMA WAY H4	LAKEWOOD	WA	98499	- 122.48345	47.16630	309	ALLSITES
391	3	7	5900	GJ 996	S110037304	Pick-n-PULL	2416 S 112TH ST	LAKEWOOD	WA	98499	- 122.47000	47.15520	293	ALLSITES
392	3	7	6000	GH 997	1000659901	INDUSTRIAL LUBRICANTS INC	2323 104TH ST CT S	TACOMA	WA	98444	- 122.46758	47.16272	316	ALLSITES
393	3	7	6000	GH1000	1000292469	CARLSON PAVING PRODUCTS INC	2311 104TH ST CT S	TACOMA	WA	98444	- 122.46741	47.16272	316	ALLSITES
394	3	7	6200	GH1010	1007063524	BRITISH AUTO	10506 STEELE S	TACOMA	WA	98444	- 122.46726	47.16241	316	ALLSITES
395	3	7	6700	B 4	1000430790	CLOVER PARK SCHOOL DIST	10020 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499	- 122.52071	47.16655	262	ALLSITES
396	3	7	6800	M 69	S110038076	DR PARKER	9114 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.51845	47.17432	263	ALLSITES
397	3	7	6900	CZ 527	U004151380	AAA LOANS & GUN SHOP	12831 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51813	47.14113	278	ALLSITES
398	3	7	6900	V 110	1000696847	EUROPEAN MOTOR	5911 STEILACOOM BLVD SW	LAKEWOOD	WA	98499-3120	- 122.51754	47.17654	262	ALLSITES
399	3	7	7100	C 27	U003355375	FRED L POWERS (Vacant)	9642 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499-1516	- 122.52007	47.16939	265	ALLSITES
400	3	10	800	N 64	1003880425	BRAIZER FOREST INDUSTRIES	10828 GRAVELLY LK DR SW	LAKEWOOD	WA	98444	- 122.52061	47.15853	266	CERC-NFRAP
401	3	10	1050	Q 80	1000179512	QWEST JUNIPER	6330 111TH ST SW	LAKEWOOD	WA	98499	- 122.52212	47.15689	266	CSCSL NFA
402	3	10	1850	218	1007677029	LUCKY LEOS CARWASH (Abandoned)	4920 109TH ST SW	LAKEWOOD	WA	98499	- 122.50254	47.15853	264	CSCSL NFA
403	3	10	2650	DY 654	1000660673	TEXACO STAR MART 632320042	10117 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48341	47.16507	311	CSCSL NFA
404	3	10	3000	CV 504	S104971967	US GEOLOGICAL SURVEY WA WATER	8914 LAKEVIEW AVE SW	LAKEWOOD	WA	98499	- 122.49105	47.17614	277	CSCSL NFA
405	3	10	3500	BX 365	1000409265	NORTHERN BATTERY CO	12012 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50590	47.14844	272	CERC-NFRAP
406	3	10	5400	EH 705	1000252102	INTERSTATE DISTRIBUTOR CO / REGIONAL TRANSPORT	8311 DURANGO ST SW	LAKEWOOD	WA	98499	- 122.48680	47.18120	274	CSCSL NFA
407	3	10	6150	GT1057	1007080120	MERCHANT METALS	2102 S 109TH ST	TACOMA	WA	98444	- 122.46721	47.15835	316	CSCSL NFA
408	3	10	6200	GR1006	1007153474	TUCCI & SONS INC MCCHORD	11102 S STEELE ST (MCCHORD PLA	TACOMA	WA	98444	- 122.46870	47.15690	304	CSCSL NFA
409	3	10	6700	GG 954	S101189843	USAF MAFB MTCA 23 NFAS	62 CES CEV	MCCHORD AFB	WA		- 122.47830	47.14492	290	CSCSL NFA
410	3	10	6800	CZ 522	U003353558	MMA studio	12828 PACIFIC HWY SW	LAKEWOOD	WA	98499-1031	- 122.51821	47.14125	278	CERC-NFRAP
411	4	1	800	CP 476	1009635476	City of Lakewood Lot	12602 PACIFIC HWY SOUTH	LAKEWOOD	WA	98499	- 122.51492	47.14320	278	SPILLS
412	4	1	850	G 44	S109824253	FIRESTONE COMPLETE AUTO CARE	6120 MAIN ST SW	LAKEWOOD	WA	98499	- 122.51907	47.16173	263	SPILLS
413	4	1	850	AF 152	S106562538	5115 SW FILBERT LN	5115 SW FILBERT LN	LAKEWOOD PIERCE	WA		- 122.50438	47.16473	264	SPILLS
414	4	1	950	G 39	1000878394	QUALEX INC TARGET 0349	10509 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	- 122.52050	47.16140	264	ICR
415	4	1	1450	G 52	1005445049	LAKEWOOD TOWNE CENTER	MAIN ST & 59TH AVE	LAKEWOOD	WA	98499	- 122.51891	47.16130	264	CSCSL
416	4	1	1850	AE 149	1007070948	CLOVER PARK SCHOOL DISTRICT HANGAR BLDG	9219 LAKEWOOD DR SW	LAKEWOOD	WA	98499	- 122.50575	47.17100	263	CSCSL

417	4	1	1900		455	S105395143	PACIFIC NW ENERGY COMPANY	8713 116TH ST. SW	LAKEWOOD PIERCE	WA		- 122.55318	47.15204	244	SPILLS
418	4	1	2050		DS 623	1012132524	OMARS TIRE SHOP	10402 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48396	47.16256	305	SPILLS
419	4	1	2300		Z 137	S109589815	LAKEWOOD POLICE DEPT	9401 LAKEWOOD DR DW	LAKEWOOD	WA	98499	- 122.50577	47.16960	263	SPILLS
420	4	1	2550		529	S106846448	Vacant Lot	12412 BRIDGEPORT WAY	LAKEWOOD	WA		- 122.50445	47.14487	281	SPILLS
421	4	1	2700		DV 651	S109884586	J C CONSTRUCTION	S 32ND & S TACOMA WAY	TACOMA	WA		- 122.48344	47.16517	311	SPILLS
422	4	1	2700		DV 652	S105686236	Café Banana	10109 SOUTH TACOMA WAY	LAKEWOOD	WA		- 122.48344	47.16517	311	SPILLS
423	4	1	3000		BJ 300	S108672102	BOYLE'S REPAIR	10203 LAKEVIEW AVENUE	LAKEWOOD PIERCE	WA		- 122.49445	47.16447	283	SPILLS
424	4	1	3100		GF 985	S111028072	LICENSE #052YCX-WHITE VAN	2419 S 96TH ST.	TACOMA	WA		- 122.46822	47.17024	312	SPILLS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
425	4	1	3100		CB 418	S107565967	Sound Transit	11536 & 11538 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.49778	47.15322	279	CSCSL
426	4	1	3150		CB 423	1007677813	LAKEWOOD FORD	11517 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.49769	47.15315	279	CSCSL
427	4	1	3200		DN 595	S108894225	Residence	12507 ADDISON ST SW #A	LAKEWOOD	WA		- 122.50183	47.14408	283	SPILLS
428	4	1	3250		782	S105387662	METRO WAREHOUSES INC.	3305 108TH ST SOUTH	LAKEWOOD PIERCE	WA		- 122.47882	47.15956	295	SPILLS
429	4	1	3250		916	S105555075	PIERCE COUNTY ROADS OPERATION	10723 100 STREET SOUTHWEST	LAKEWOOD PIERCE	WA		- 122.58013	47.16691	308	SPILLS
430	4	1	3400		CB 412	S107565968	LAKEVIEW AUTO WRECKING	11528 PACIFIC HWY SW	LAKEWOOD	WA		- 122.49902	47.15254	277	CSCSL
431	4	1	3400		648	S107487481	Residence	11001 MAUREY LANE SW	LAKEWOOD PIERCE	WA		- 122.56495	47.15730	300	SPILLS
432	4	1	3400		HD1071	S109010621	CAR WASH	2206 96TH STREET SOUTH	TACOMA	WA		- 122.46607	47.17019	315	SPILLS
433	4	1	4260		CM 468	S109892523	TACOMA PUD	I-5 & BRIDGEPORT WAY	LAKEWOOD	WA		- 122.50440	47.14704	278	SPILLS
434	4	1	4400		HQ1139	S108277163	BOBS MOBILE HOME PARK	7109 146TH ST SW SPACE 12	LAKEWOOD	WA	98439	- 122.53128	47.12487	275	CSCSL
435	4	1	4500		HQ1141	S107485995	Residence	7123 146TH STREET SW - TACOMA	LAKEWOOD	WA		- 122.53161	47.12485	275	SPILLS
436	4	1	4595		CM 496	1007080767	WA DOT BRIDGEPORT WAY INTERCHANGE	12320 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50451	47.14575	279	CSCSL
437	4	1	4600		CM 497	1007063838	ICA INC	12320 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50451	47.14575	279	FINDS
438	4	1	4950		GK1003	S107474482	Sales Road Storage	2317 102ND STREET SOUTH #15, PARKLAND, W	PARKLAND	WA		- 122.46714	47.16502	302	SPILLS
439	4	1	5000		GX1031	S105394485	Intersection	102ND ST. & STEELE ST. S	PARKLAND	WA		- 122.46677	47.16502	302	SPILLS
440	4	1	5550		DS 610	1000659085	Union 76	10302 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48420	47.16380	312	CSCSL
441	4	1	5550		GH1009	S108672123	Tacoma Speedometer	104TH AND STEELE ST	TACOMA	WA		- 122.46715	47.16336	315	SPILLS
442	4	1	6075		HR1142	1007064120	LAKEWOOD FUEL OIL CO UST 8226	2102 S 109 ST	TACOMA	WA	98444	- 122.46495	47.15890	318	LUST

443	4	1	6200	GZ1039	S108672133	TEXACO	10505 STEELE ST.	TACOMA	WA		- 122.46700	47.16170	318	SPILLS
444	4	1	6500	DP 656	S107155949	Barber and Beauty School	3711 STEILACOOM BLVD. SW; CORNER OF S. T	LAKEWOOD PIERCE	WA		- 122.48585	47.17655	281	SPILLS
445	4	1	6650	ED 721	1014477815	HERITAGE BANK	8801 SOUTH TACOMA WAY	LAKEWOOD	WA	98499	- 122.48372	47.17753	281	US Brownfields
446	4	1	8900	78	S108010321	Residence	5608 SEELEY LAKE DR SW	LAKEWOOD PIERCE	WA		- 122.51211	47.16885	269	SPILLS
447	4	2	820	CK 460	1000442872	PLAZA CLEANERS LAKEWOOD	12509 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51353	47.14384	280	DRYCLEANERS
448	4	3	8000	PC LU3		Pierce County land-use category	Residential (HRD, MHR, HSF, MSF, and SF)				- 122.46122	47.15164		Septic Systems
449	4	4	1350	AC 134	1004794765	Lowes	5115 100TH ST SW	LAKEWOOD	WA	98498	- 122.50529	47.16660	267	UST
450	4	4	2000	DU 627	S108024589	TRI STAR GAS STATION (Vacant)	10515 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.48406	47.16192	303	Financial assurance
451	4	4	3140	EU 779	1007076445	LAKEVIEW PIT SOUTH	3402 CHAPEL ST	TACOMA	WA	98444	- 122.48023	47.15706	284	UST
452	4	4	4300	ED 682	1007071811	SHELL GAS STATION	3615 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.48465	47.17666	283	UST
453	4	4	4700	ED 690	S109824376	ENTERPRISE RENT A CAR LAKEWOOD	9816 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48388	47.17574	291	UIC
454	4	4	4820	ED 710	S110124182	ECONOLUB N TUNE & BRAKES LAKEWOOD	8724 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48420	47.17770	281	UST
455	4	4	6250	EP 745	S108653645	KS FOOD MART	8533 S TACOMA WY	TACOMA	WA	98444	- 122.48373	47.18001	282	Financial assurance
456	4	4	6350	EP 736	U003604919	KOREA TOWN PLAZA	8629 S TACOMA WAY	TACOMA	WA	98499-4542	- 122.48372	47.17912	282	UST
457	4	4	6600	DP 658	1007074370	LUCKY FOOD MART/SHELL GAS	3701 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.48573	47.17656	281	Financial assurance
458	4	4	6700	V 116	1007073607	DEM LEASING INC	8802 BRIDGEPORT	LAKEWOOD	WA	98499	- 122.51809	47.17776	263	UST
459	4	4	6750	822	1007071330	WARNER PUMP STATION 43	8402 34TH AVE S	LAKEWOOD	WA	98499	- 122.48096	47.18113	287	UST
460	4	4	8300	I 48	1007072270	PUGET SOUND BANK LAKEWOOD MALL I (ABANDONED)	10103 PLAZA DR	LAKEWOOD	WA	98499	- 122.51572	47.16604	266	UST
461	4	5	800	CK 463	1005906257	RAINIER LIGHTING & ELECTRIC SUPPLY INC	12511 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51356	47.14383	280	ALLSITES
462	4	5	1550	AC 159	S109554149	LOWES OF LAKEWOOD WA 1081	5115 100TH ST SW	LAKEWOOD	WA	98499	- 122.50416	47.16672	272	HMIRS
463	4	5	3050	FE 815	1004794059	ROLFS IMPORT AUTO SERVICE	3122 96TH ST S	LAKEWOOD	WA	98409	- 122.47652	47.17025	310	ALLSITES
464	4	5	3100	EU 768	1000838935	MM TRUCK MAINTENANCE	3421 A CHAPEL ST S	TACOMA	WA	98444	- 122.48025	47.15733	284	RCRA-NonGen
465	4	5	3125	GF 980	1010338013	TOMS RACING PARTS	2427 96TH ST S	TACOMA	WA	98499	- 122.46830	47.17024	312	ALLSITES
466	4	5	3700	DJ 586	1001969453	IMPORT AUTO CENTER INC	3865 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.48819	47.17652	279	RCRA-NonGen
467	4	5	3750	DJ 589	1000293561	KELLY TELEVISION CO	3870 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.48800	47.17650	279	RCRA-NonGen
468	4	5	3900	CF 435	1000199876	CENTURY 21 FAC STORA	12331 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51131	47.14520	270	ALLSITES
469	4	5	4000	DP 604	1004793264	LES SCHWAB TIRE CENTER	3809 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.48710	47.17653	280	RCRA-CESQG
470	4	5	4650	FN 866	1001600499	TPST SOIL RECYCLERS OF WASHINGTON INC	2880 104TH ST CT S	LAKEWOOD	WA	98444	- 122.47415	47.16334	314	RCRA-NonGen

471	4	5	4810		692	1000199881	GOLDEN LION MOTEL DRU	9021 S TACOMA WAY RM 6	LAKESWOOD	WA	98499	- 122.48369	47.17546	292	RCRA-NonGen
472	4	5	8050		J 50	1010788425	RESIDENCE	5915 LAKE GROVE SW	LAKESWOOD	WA	98499	- 122.51607	47.16846	268	Manifest
473	4	5	9150		P 77	1007079840	RITE AID 5277	5700 100TH ST SW	LAKESWOOD	WA	98499	- 122.51176	47.16664	263	Manifest
474	4	5	9900		T 104	2009918955	RESIDENCE	5409 100TH ST SW	LAKESWOOD	WA		- 122.50891	47.16674	263	ERNS
475	4	5	10100		R 85	S108233847	TARGET STORE 0349	5618 LAKEWOOD TOWN CENTER BLVD	LAKESWOOD	WA	98499	- 122.51019	47.16501	263	Manifest
476	4	6	800		CK 461	S110039574	AUTOMOTIVE TRANSPORT SERVICE	12511 PACIFIC HWY SW	LAKESWOOD	WA	98499	- 122.51356	47.14383	280	ALLSITES
477	4	6	2250		82	1007070672	AT&T LAKEWOOD 2	10510 DAVISSON RD SW	LAKESWOOD	WA	98499	- 122.51340	47.16067	263	FINDS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
478	4	6	2400		GX1104	1007076148	SALES ROAD PUMP STATION 40	2102 102ND ST S	TACOMA	WA	98444	- 122.46517	47.16503	302	FINDS
479	4	6	3000		BJ 302	1012132520	TRIPPERS TRAILER SERVICE & REPAIR INC	10201 LAKEVIEW AVE SW	LAKESWOOD	WA	98499	- 122.49443	47.16447	283	FINDS
480	4	6	3100		BJ 298	1007064578	GRIFFIN GALBRAITH FUEL CO	10202 LAKEVIEW BLVD SW	TACOMA	WA	98499	- 122.49447	47.16450	283	FINDS
481	4	6	3120		EU 776	1007079431	MK BATTERY LAKEWOOD	3413 CHAPEL ST S	LAKESWOOD	WA	98499	- 122.48025	47.15707	284	FINDS
482	4	6	3150		BZ 415	1012222242	CAM ENTERPRISES	11605 PACIFIC HWY SW	LAKESWOOD	WA	98499	- 122.49933	47.15218	276	FINDS
483	4	6	3200		EU 778	S110038114	MERCEDES AUTO INC	11115 34TH AVE S	LAKESWOOD	WA	98499	- 122.48060	47.15634	284	FINDS
484	4	6	3300		EU 762	1007068553	I5 AT SR 512 CORPORATE PARK	11000 34TH AVE S	LAKESWOOD	WA	98444	- 122.48060	47.15700	284	FINDS
485	4	6	3850		756	1011932898	PRINT NW LAKEWOOD	9914 32ND AVE S	LAKESWOOD	WA	98499	- 122.47860	47.16596	312	FINDS
486	4	6	4000		FG 842	1011932230	SULLIVAN PAINTING SERVICE	3016 106TH ST S	LAKESWOOD	WA	98499	- 122.47591	47.16113	314	FINDS
487	4	6	4600		735	1007076203	TACOMA COUNTRY & GOLF CLUB	COUNTRY CLUB DR SW	LAKESWOOD	WA	98498	- 122.53480	47.13614	275	FINDS
488	4	6	4800		ED 694	S110039245	QUALITY BRAKE & MUFFLER	9009 S TACOMA WAY	LAKESWOOD	WA	98499	- 122.48369	47.17556	292	FINDS
489	4	6	4900		ED 696	S110039586	LEES AUTO MART LAKEWOOD	9001 S TACOMA WAY	LAKESWOOD	WA	98499	- 122.48369	47.17563	292	FINDS
490	4	6	5200		730	1008250294	LAKE LOUISE ELEMENTARY SCHOOL	11014 HOLDEN RD SW	LAKESWOOD	WA	98498	- 122.56851	47.15714	288	FINDS
491	4	6	5700		HZ1187	1007070233	EXXON 77175	2219 S 112TH	TACOMA	WA	98444	- 122.46454	47.15576	293	FINDS
492	4	6	5700		HZ1189	1007067073	ALLIED BUILDING PRODUCTS CORP TACOMA	2015 112TH ST S	TACOMA	WA	98444	- 122.46418	47.15576	293	FINDS
493	4	6	6600		ED 720	1011932573	NEW MODEL PRINTITNG	8811 S TACOMA WY	LAKESWOOD	WA	98499	- 122.48360	47.17730	282	FINDS
494	4	6	6750		ES 780	1007067727	REID S AUTOMOTIVE INC	3512 S 84TH ST	LAKESWOOD	WA	98409	- 122.48293	47.18063	284	FINDS
495	4	6	7600		L 58	S110039243	LAKESWOOD CITY MUNI SW	6000 MAIN ST SW	LAKESWOOD	WA	98499	- 122.51710	47.16193	260	FINDS
496	4	6	8100		J 53	1012298934	VILLA TRANSMISSION & AUTO REPAIR	9810 59TH AVE SW	LAKESWOOD	WA	98499	- 122.51554	47.16836	269	FINDS

497	4	6	8100	EQ 738	1007073477	KEITH SUTHERLAND	8905 HIGHLAND AVE SW	TACOMA	WA	98498	- 122.55571	47.14320	267	FINDS
498	4	6	8250	I 46	1012299179	JIFFY LUBE LAKEWOOD	5915 100TH ST SW	LAKEWOOD	WA	98499	- 122.51579	47.16682	269	FINDS
499	4	6	9950	LD1550	1012292403	AL ROBY PAINTING & CONSTRUCTION	1635 WHEELER ST S	TACOMA	WA	98444	- 122.45650	47.14708	303	FINDS
500	4	6	11225	1557	1008260925	WASHINGTON HIGH SCHOOL	12420 AINSWORTH AVE S	TACOMA	WA	98444	- 122.45788	47.14434	306	FINDS
501	4	7	1150	1321	S106783370	Pop's Cabins	14705 UNION AVENUE SW	LAKEWOOD	WA		- 122.54968	47.12404	283	HIST CDL
502	4	7	1400	AI 181	S110038278	OAK GROVE VILLAGE APARTMENTS	STEILACOOM BLVD & LAKEWOOD DR SW	LAKEWOOD	WA	98499	- 122.50782	47.17657	277	ALLSITES
503	4	7	1850	Z 127	1007075551	MCLANE NORTHWEST CANDY ANNEX	9501 LAKEWOOD DR SW STE A	LAKEWOOD	WA	98499	- 122.50624	47.16890	264	ALLSITES
504	4	7	2150	II1249	S110036461	INTERSTATE DISTRIBUTION CO	11707 21ST AVE CT S	TACOMA	WA	98444	- 122.46480	47.15070	293	ALLSITES
505	4	7	3900	BZ 372	1001807015	BEST JAPANESE AUTO REPAIR	11626 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.50086	47.15148	276	ALLSITES
506	4	7	4060	CF 451	S109824400	MIRANDA AUTO SALES INC	12411 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51226	47.14459	279	ALLSITES
507	4	7	4750	ED 708	S109824424	TACOMA RV CENTER INC	8909 S TACOMA WAY	LAKEWOOD	WA	98499	- 122.48372	47.17660	285	ALLSITES
508	4	7	4950	FZ 918	1007072352	EVERGREEN MODULAR HOMES INC	10720 26TH AVE S	TACOMA	WA	98444	- 122.47230	47.15650	293	ALLSITES
509	4	7	8500	I 43	S109556351	JIFFY LUBE 2049	5912 100TH ST SW	LAKEWOOD	WA	98499	- 122.51625	47.16669	268	ALLSITES
510	4	7	9250	P 75	1004613654	Northwest Bank	5702 100TH ST SW	LAKEWOOD	WA	98499	- 122.51186	47.16664	264	PADS
511	4	7	16000	PC LU2		Pierce County land-use category	Parks and Recreation (PR)				- 122.44938	47.13676		Pesticide Application
512	4	10	600	CK 465	1003880447	PONDER'S RECYCLING	12621 PACIFIC HWY S	LAKEWOOD	WA	98499	- 122.51364	47.14380	280	CERC-NFRAP
513	4	10	750	CK 459	1003880330	BILLIKENS TV CENTER	12515 PACIFIC HWY SW	LAKEWOOD	WA	98401	- 122.51361	47.14382	280	CERC-NFRAP
514	4	10	750	G 34	S104971964	FIRESTONE 31H8	10501 GRAVELLY LAKE DR	LAKEWOOD	WA	98499	- 122.52050	47.16175	264	CSCSL NFA
515	4	10	1050	CK 457	1007677532	HICKEY 12411 & 12507 PACIFIC HWY SW	12411 & 12507 PACIFIC HWY SW	LAKEWOOD	WA	98499	- 122.51279	47.14410	282	CSCSL NFA
516	4	10	2850	CM 493	1000838120	EXXON STATION 7142	12315 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499	- 122.50447	47.14581	279	CSCSL NFA
517	4	10	4775	HI1095	1004793909	STEILACOOM PUBLIC WORKS	1030 ROE ST	STEILACOOM	WA	98388	- 122.58511	47.16705	305	CSCSL NFA
518	4	10	6400	ES 789	S110123502	UNIVERSITY PLACE AUTO	3512 84TH ST S STE A	LAKEWOOD	WA	98499	- 122.48254	47.18116	283	CSCSL NFA
519	5	1	625	EZ 799	S109010864	Residence	9215 HIGHLAND AVE SW	LAKEWOOD	WA		- 122.55981	47.14321	276	SPILLS
520	5	1	1350	150	S105465499	LAKEWOOD INDUSTRIAL PARK	9112 LAKEWOOD DRIVE SOUTHEAST	LAKEWOOD	WA		- 122.50777	47.17399	267	SPILLS
521	5	1	1400	AB 146	U003353946	MCCONAGHY CONSTRUCTION	8903 GRAVELLY LAKE DR SW	LAKEWOOD	WA	98499-3149	- 122.51025	47.17598	274	LUST
522	5	1	1450	CW 513	S107156028	MATRESS RANCH	7513 LAKEWOOD DR.	LAKEWOOD	WA		- 122.50872	47.18929	248	SPILLS
523	5	1	1850	AI 168	1000838971	TIME OIL CO TACOMA	5404 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.50916	47.17656	277	LUST
524	5	1	1900	IX1334	S108429520	APARTMENTS	14512-14518 W THORNE LANE SW	LAKEWOOD	WA		- 122.55672	47.12599	280	SPILLS

525	5	1	2050		BH 322	S103504289	ARCO #4266	7718 BRIDGEPORT	LAKESWOOD	WA	98467	- 122.51842	47.18729	231	ICR
526	5	1	2300		AB 131	U004106728	SWAN PROPERTIES CORP	8920 GRAVELLY LAKE DR SW	LAKESWOOD	WA	98499-3110	- 122.51096	47.17574	273	CSCSL
527	5	1	2375		HD1090	S107484980	TERRA HIGHLANDS APTS.	2211 SOUTH 96TH STREET - GARAGE #25.	TACOMA	WA		- 122.46582	47.17022	316	SPILLS
528	5	1	2400		CH 456	1007072115	MUTUAL MATERIALS LAKESWOOD BLOCK PLT	5915 75TH ST W	LAKESWOOD	WA	98467	- 122.51526	47.18942	244	CSCSL
529	5	1	2475		IV1275	1000660670	SHELL STATION 121603	8433 S HOSMER	TACOMA	WA	98444	- 122.46321	47.18045	312	LUST
530	5	1	2525		IL1230	S105889845		8702 SOUTH HOSMER	TACOMA	WA		- 122.46319	47.17750	303	SPILLS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
531	5	1	2875		1048	1000360945	AMERICAN LAKE GARDENS/MCCHORD AFB	555 BARNES BLVD.	JBLM	WA	98438	- 122.52579	47.12635	277	CERCLIS
532	5	1	3050		BH 313	1000659666	SOND CREDIT UNION	7717 BRIDGEPORT WAY SW	LAKESWOOD	WA	98467	- 122.51839	47.18715	230	CSCSL
533	5	1	3050		471	S107155071	PIERCE COUNTY UTILITIES	6846 75TH STREET SW LAKESWOOD	LAKESWOOD	WA		- 122.52745	47.19065	185	SPILLS
534	5	1	3150		GS1016	1000378988	ABITIBI CONSOLIDATED SALES CORP (ABANDONED)	4302 CHAMBERS CREEK RD	STEILACOOM	WA	98388	- 122.57670	47.18543	6	CSCSL
535	5	1	3300		DB 566	S105393568	RESIDENCE	8301 ONYX DRIVE SW, TACOMA	LAKESWOOD	WA		- 122.54834	47.18812	244	SPILLS
536	5	1	3320		LJ1592	U003355696	CHEVRON	15408 UNION AVE SW	LAKESWOOD	WA	98498	- 122.55697	47.11978	275	LUST
537	5	1	3350		1152	S104873225	7 ELEVEN #2303 18585	9417 S. STEELE	TACOMA	WA	98444	- 122.46427	47.17154	302	ICR
538	5	1	3350		HN1120	S106239308	ALPINE ESTATES MOBILE HOME PARK	6600 146TH STREET SOUTHWEST	LAKESWOOD	WA		- 122.52534	47.12489	277	SPILLS
539	5	1	3400		342	S105465134	RESIDENCE	6224 76TH STREET COURT WEST	LAKESWOOD	WA		- 122.52113	47.18814	224	SPILLS
540	5	1	3425		591	S108674493	TACOMA POWER	8211 CORRAL PLACE SW LAKESWOOD	LAKESWOOD	WA		- 122.54719	47.18950	244	SPILLS
541	5	1	3500		LJ1619	U003354291	USED AUTO	8202 BERKLEY AVE SW	LAKESWOOD	WA	98498-2005	- 122.55781	47.11926	275	LUST
542	5	1	3525		1478	S108277648	RESIDENCE	15406 ROSE ROAD SOUTHWEST	LAKESWOOD	WA		- 122.56309	47.12416	264	SPILLS
543	5	1	3625		IN1238	S108894748	METRO TRUCKING	8620 S. HOSMER. NORTH I-5 TO 84TH ST EX	TACOMA	WA		- 122.46322	47.17864	303	SPILLS
544	5	1	3700		CH 445	1007080797	LANDSCAPING BY PAT BORING	7517 GRANGE ST W	LAKESWOOD	WA	98467	- 122.51635	47.18923	244	CSCSL
545	5	1	3725		1296	S109888136	CITY OF TACOMA / TACOMA POWER	1769 SOUTH 94TH STREET	TACOMA	WA		- 122.46313	47.17018	302	SPILLS
546	5	1	3775		1400	S108674538	RESIDENT BEHIND CALLER'S PROPERTY	8631 S ALASKA	TACOMA	WA		- 122.45798	47.17865	323	SPILLS
547	5	1	3800		HW1179	S106705503	KIDS CAMPUS	1908 S 96TH ST S	TACOMA	WA		- 122.46319	47.17018	302	SPILLS
548	5	1	3850		1609	S106562350	VACANT LOT	15530 BOUNDARY	LAKESWOOD	WA		- 122.56292	47.12122	268	SPILLS
549	5	1	3900		CO 473	S108653544	TACOMA DRY CLEANERS INC	7502 CUSTER RD W	LAKESWOOD	WA	98499	- 122.51302	47.18931	249	CSCSL
550	5	1	4150		226	S109613177	PIERCE CO	7051 81ST ST	LAKESWOOD	WA		- 122.53027	47.18402	188	SPILLS

551	5	1	4300	1688	S109140721	FORT LEWIS	41ST AND DIVISION ST	FORT LEWIS	WA		- 122.55992	47.11807	273	SPILLS
552	5	1	4475	KK1456	S107476165	UNKNOWN	8815 S AINSWORTH AVE	TACOMA	WA		- 122.45531	47.17730	351	SPILLS
553	5	1	4575	IY1284	S105387086	RESIDENCE	1751 SOUTH 96TH, TACOMA	TACOMA	WA		- 122.45980	47.17019	317	SPILLS
554	5	1	4650	IY1297	S106445676	LAKEWHORE APTS	9615 18TH AVE S	TACOMA	WA		- 122.45934	47.17006	318	SPILLS
555	5	1	4775	IU1272	1000243881	US AF MCCHORD	MCCHORD AIR FORCE BASE	MCCHORD AFB	WA	98438	- 122.49471	47.12709	299	CERCLIS
556	5	1	4775	HX1219	S106238933	WOODBROOK TRAILER PARK	14818 WOODBROOK	LAKEWOOD	WA		- 122.52675	47.12293	285	SPILLS
557	5	1	4775	940	1007081295	USAF MAFB MTCA WP 44		MCCHORD AFB	WA		- 122.49151	47.13593	300	CSCSL
558	5	1	4825	EA 666	U003354822	STRAIGHT LINE AUTO SERVICE	9126 WASHINGTON BLVD SW	LAKEWOOD	WA	98498-2641	- 122.55860	47.14855	254	LUST
559	5	1	4900	EA 684	U003354212	LEVITTS AUTO REPAIR	9202 WASHINGTON BLVD SW	LAKEWOOD	WA	98498	- 122.55974	47.14856	251	LUST
560	5	1	5050	166	S106445362	RESIDENCE	8311 CUSTER ROAD SW	LAKEWOOD	WA		- 122.52622	47.18101	244	SPILLS
561	5	1	5400	1515	S105686268	RESIDENCE	92ND AND SHERIDAN	TACOMA	WA		- 122.45257	47.17380	322	SPILLS
562	5	1	5425	HD1101	S106706185	CAR WASH	96TH AND STEELE	PARKLAND	WA		- 122.46555	47.17020	316	SPILLS
563	5	1	5600	IC1229	S107473872	WAVERLY FARMS APTS.	1833 SOUTH 93RD	TACOMA	WA		- 122.46188	47.17301	302	SPILLS
564	5	1	5750	1638	1000444928	FORT LEWIS LOGISTICS CENTER	T19N R2E SECS 21,22,26,27	LAKEWOOD	WA	98433	- 122.53650	47.11420	284	CERCLIS
565	5	1	5750	796	S105390008	RESIDENCE	9412 KENWOOD AVE. SW	LAKEWOOD	WA		- 122.56188	47.14503	265	SPILLS
566	5	1	5750	1501	S106846606	RESIDENCE	9500 S SHERIDAN	TACOMA	WA		- 122.45259	47.17111	323	SPILLS
567	5	1	5975	HB1052	S107153446	LAKEWOOD CINEMA PLAZA	2510 84TH ST S	LAKEWOOD	WA		- 122.47032	47.18114	292	SPILLS
568	5	1	6050	HJ1124	S107475457	RESIDENCE	6922 146TH ST SW, LAKEWOOD (WOODBROOK CO	LAKEWOOD	WA		- 122.52887	47.12486	277	SPILLS
569	5	1	6250	1479	S107672844	RESIDENCE	98TH ST S AND SHERIDAN AVE S	PARKLAND	WA		- 122.45263	47.16841	323	SPILLS
570	5	1	6475	IC1196	S108894206	CITY OF TACOMA	9201 S HOSMER	TACOMA	WA		- 122.46303	47.17384	305	SPILLS
571	5	1	6525	1410	S105685614	RESIDENCE (HOARDER)	10224 SOUTH AINSWORTH	TACOMA	WA		- 122.45537	47.16443	318	SPILLS
572	5	1	6600	1438	S109253618	TACOMA POWER	1501 101ST STREET SOUTH	PARKLAND	WA		- 122.45403	47.16570	318	SPILLS
573	5	1	6750	JD1301	S108894905	TRAILER PARK	6616 150TH ST SW # 9 (TRAILER)	LAKEWOOD PIERCE	WA		- 122.52359	47.12130	282	SPILLS
574	5	1	6950	1205	1007081313	USAF MAFB WASHRACK		MCCHORD AFB	WA		- 122.48456	47.13315	314	CSCSL
575	5	1	7075	901	S109864962	RESIDENCE	9714 VETERANS DR	LAKEWOOD	WA		- 122.56587	47.14230	275	SPILLS
576	5	1	7275	JG1315	S104487684	TACOMA PLUMBING AND HEATING	1819 112TH ST. E.	TACOMA	WA	98444	- 122.46068	47.15567	293	ICR
577	5	1	7650	IN1254	S108674534	ALLEGED VIOLATOR	8601 SOUTH HOSMER	TACOMA	WA		- 122.46309	47.17927	303	SPILLS
578	5	1	7920	LR1661	S106705690	RESIDENCE	10103 10TH AVE S	PARKLAND	WA		- 122.44735	47.16574	325	SPILLS

579	5	1	8025		KE1425	S107673202	RESIDENCE	10721 AINSWORTH AVE S	TACOMA	WA		- 122.45550	47.15961	316	SPILLS
580	5	1	8100		LR1627	S106562508	RESIDENCE	1122 102ND ST	BUCKLEY	WA		- 122.44833	47.16477	323	SPILLS
581	5	1	8225		KE1427	S106705929	TACOMA WATER (CAPPED WELL)	108TH AND AINSWORTH AVE	PARKLAND	WA		- 122.45552	47.15917	316	SPILLS
582	5	1	8525		JR1381	S106445601	DUPLEX RESIENC	1706 112 STREET	PARKLAND	WA		- 122.45814	47.15563	310	SPILLS
583	5	1	8950		ML1712	S108672136	RESIDENCE	105TH & BARNES	PARKLAND	WA		- 122.44573	47.16211	344	SPILLS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
584	5	1	9250		ML1713	S108672134	RESIDENCE	10523 BARNES LN S	TACOMA	WA		- 122.44572	47.16191	343	SPILLS
585	5	1	9250		MX1780	S108672125	RESIDENCE	104TH ST & 8TH AVE S	PARKLAND	WA		- 122.44328	47.16288	345	SPILLS
586	5	1	9400		KJ1455	S110277021	RESIDENCE	112TH AND AINSWORTH	TACOMA	WA		- 122.45536	47.15561	318	SPILLS
587	5	1	9600		MX1819	S108674373	RESIDENCE	715 104TH STREET SOUTH, PARKLAND	PARKLAND	WA		- 122.44155	47.16286	344	SPILLS
588	5	1	9775		LC1543	S108893995	TRAILER PARK	1301 112TH ST #8	TACOMA	WA		- 122.45272	47.15559	324	SPILLS
589	5	1	9800		MB1677	S105888901	RESIDENCE	1036 110 STREET SOUTH	TACOMA	WA		- 122.44787	47.15744	325	SPILLS
590	5	1	9850		MW1779	S107487601	RESIDENCE	806 107TH STREET S	TACOMA	WA		- 122.44366	47.16004	324	SPILLS
591	5	1	9950		KJ1509	S107484241	CITY OF TACOMA	1414 SOUTH 112TH STREET - TACOMA	TACOMA	WA		- 122.45372	47.15560	322	SPILLS
592	5	1	9950		MW1799	S105393150	RESIDENCE	774 107TH STREET SOUTH.....PARKLAND	PARKLAND	WA		- 122.44280	47.16004	325	SPILLS
593	5	1	10100		MW1782	S107485088	RESIDENCE	808 - 108TH STREET SOUTH (NEAR SR 512)	PARKLAND	WA		- 122.44372	47.15919	326	SPILLS
594	5	1	10450		MF1709	U003354043	LETTIE B BARTLEY	1005 112TH ST S	TACOMA	WA	98444-4065	- 122.44713	47.15555	328	LUST
595	5	1	10600		LP1658	S106444940	RESIDENCE	1315 119TH STREET SOUTH	TACOMA	WA		- 122.45172	47.14918	327	SPILLS
596	5	1	10650		LP1624	S105390176	RESIDENCE	1412 120TH ST S	TACOMA	WA		- 122.45311	47.14845	324	SPILLS
597	5	1	10800		1822	S108009980	RESIDENCE	756 110 ST S	PARKLAND	WA		- 122.44235	47.15746	329	SPILLS
598	5	1	10950		LV1641	S106846008	RESIDENCE	11415 12TH AVE	PUYALLUP	WA		- 122.45011	47.15321	328	SPILLS
599	5	1	11200		MF1702	S107153178	RESIDENCE	11214 10 AVE S	PARKLAND	WA		- 122.44753	47.15500	328	SPILLS
600	5	1	11300		MF1697	S107153181	QUALITY CARE AUTO REPAIR	112TH ST S & 10TH AVE S	PARKLAND	WA		- 122.44750	47.15554	327	SPILLS
601	5	1	11500		1756	S109864637	RESIDENCE	1019 118TH ST S	PARKLAND	WA		- 122.44787	47.14984	333	SPILLS
602	5	1	13375		1818	S106705538	RESIDENCE	14324 20TH AVE CT S	SPANAWAY	WA		- 122.46450	47.12708	339	SPILLS
603	5	1	14425		MI1751	S105396463	RESIDENCE	10202 8TH AVENUE COURT SOUTH, PARKLAND,	PARKLAND	WA		- 122.44451	47.16466	332	SPILLS
604	5	1	16100		MO1748	S105554869	RESIDENCE	1004 116TH STREET EAST	TACOMA	WA		- 122.44766	47.15126	333	SPILLS

605	5	1	17000	1628	S107155282	RHINE INCORPORATED	1124 112TH ST SE	TACOMA	WA		- 122.44994	47.15556	325	SPILLS
606	5	1	27150	IL1228	S108674551	CROSSLAND ECONOMY STUDIOS MOTEL	8801 SOUTH HOSMER	TACOMA	WA		- 122.46300	47.17680	310	SPILLS
607	5	2	2550	KT1499	S106878988	BDU CLEANERS	15206 Union Ave SW #3	Lakewood	WA	98499	- 122.55486	47.12097	278	Inactive Drycleaners
608	5	2	4775	1376	1007081297	USAF MAFB MTCA WP 64	62 CES CEV	MCCHORD AFB	WA		- 122.49013	47.12621	303	INST CONTROL
609	5	2	5140	DC 531	1012222321	PIERCE COUNTY LAKEVIEW PIT STREET WASTE	12101 47TH AVE SW	LAKEWOOD	WA	98499	- 122.49908	47.14762	278	FINDS
610	5	2	5250	EK 746	1004793972	VETERAN CLEANERS	9127 VETRANS DR SW	TACOMA	WA	98498	- 122.55864	47.14483	270	Inactive Drycleaners
611	5	2	10300	R 105	1000474157	BJS CLEANERS	10108 BRIDGEPORT WAY SW	TACOMA	WA	98499	- 122.50887	47.16593	263	Inactive Drycleaners
612	5	3	4275	JQ1365	1012065317	9307 S ALASKA ST	9307 S ALASKA ST	TACOMA	WA		- 122.45781	47.17283	327	US CDL
613	5	4	3450	HH1094	S109396632	MCCHORD AFB, SITE SS 34N	MCCHORD AIR FORCE BASE	TACOMA	WA		- 122.48639	47.13556	283	UIC
614	5	4	3900	1630	S109396108	FORT LEWIS I-5	RAINIER DRIVE	FORT LEWIS	WA	0	- 122.55000	47.11667	280	UIC
615	5	4	4775	927	S109590052	AMERICAN LAKE GARDEN TRACT TREATMENT PLA	BUILDING # 887, LINCOLN BLVD	MCCHORD AFB	WA	0	- 122.51667	47.12917	280	UIC
616	5	4	10000	T 99	U003353012	HOBBY LOBBY/BIG LOTS	5401 100TH ST	LAKEWOOD	WA	98499-3818	- 122.50909	47.16685	263	UST
617	5	4	10450	1817	1007069873	A & A WOOD STOVES	752 S 108TH ST	TACOMA	WA	98444	- 122.44220	47.15917	328	UST
618	5	5	2325	1380	2007326445	RESIDENCE	15008 SILCOX DRIVE	LAKEWOOD	WA	98498	- 122.55878	47.12535	266	ERNS
619	5	5	3325	HH1102	1000354360	MCCHORD AIR FORCE BASE TEST BURN FACITLI	MCCHORD AIR FORCE BASE	TACOMA	WA	98438	- 122.48495	47.13614	285	RCRA-NonGen
620	5	5	6475	0	CUSA101374	FORT LEWIS MILITARY RESERVATION FORT LEWIS MILITARY RESERVATION			WA		- 122.52509	47.12710	276	DOD
621	5	5	6500	0	CUSA101374				WA		- 122.56800	47.15679	283	DOD
622	5	5	8000	1414	2008424210	675 LINCOLN AVENUE - #300	675 LINCOLN AVENUE - #300	TACOMA	WA		- 122.49649	47.12277	306	HMIRS
623	5	5	18900	JG1314	90186799	TACOMA PLUMBING & HEATING 1819 EAST 112T	TACOMA PLUMBING & HEATING 1819 EAST 112T	TACOMA	WA		- 122.46070	47.15570	293	ERNS
624	5	6	1425	1319	1008249838	TILlicUM ELEMENTARY SCHOOL	8514 MAPLE ST SW	LAKEWOOD	WA	98498	- 122.55280	47.12512	282	FINDS
625	5	6	1750	AB 140	1004794149	RAYS AUTO CENTER TACOMA	5445 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.51126	47.17657	275	FINDS
626	5	6	1750	CO 509	1007064126	CUSTER ROAD ASSOC	7409 CUSTER RD	LAKEWOOD	WA	98499	- 122.51166	47.19012	246	FINDS
627	5	6	1875	CG 441	1007078162	MUTUAL MATERIALS UST 502616	5915 75TH W	LAKEWOOD	WA	98499	- 122.51768	47.18939	239	FINDS
628	5	6	1925	FV 894	1005777401	PARK CHASE TOWNHOMES	8331 32ND AVE S	LAKEWOOD	WA	98499	- 122.47648	47.18148	293	FINDS
629	5	6	1975	CA 406	1012292549	ARASI AUTO SALES	7607 CUSTER RD W	LAKEWOOD	WA	98499	- 122.51500	47.18804	243	FINDS
630	5	6	2125	IR1245	1007079109	ASH STREET PUMP STATION 41	10014 18TH AVE S	TACOMA	WA	98444	- 122.46056	47.16669	302	FINDS
631	5	6	2700	AB 151	1008250295	LOCHBURN MIDDLE SCHOOL	5431 STEILACOOM BLVD SW	LAKEWOOD	WA	98499	- 122.51042	47.17658	276	FINDS
632	5	6	2700	CA 439	1012296444	9999 AUTO REPAIR & SALES INC	7524 CUSTER RD W	LAKEWOOD	WA	98499	- 122.51410	47.18868	244	FINDS

633	5	6	2825		917	1008249840	CARTER LAKE ELEMENTARY SCHOOL	3415 LINCOLN BLVD SW	TACOMA	WA	98439	- 122.52076	47.12916	288	FINDS
634	5	6	3100		DB 528	1008250297	OAKBROOK ELEMENTARY SCHOOL	7802 83RD AVE SW	LAKEWOOD	WA	98498	- 122.54777	47.18729	245	FINDS
635	5	6	3950		262	1008249842	DOWER ELEMENTARY SCHOOL	7817 JOHN DOWER RD W	LAKEWOOD	WA	98499	- 122.52374	47.18570	242	FINDS
636	5	6	4500		EK 740	1008918992	LAKE CITY TAVERN PROPERTY	9106 VETERANS DR SW	LAKEWOOD	WA	98498	- 122.55837	47.14491	270	FINDS

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
637	5	6	4600		1424	1011466620	HELEN B. STAFFORD ELEMENTARY	1615 SOUTH 92ND ST	TACOMA	WA	98444	- 122.45559	47.17381	321	FINDS
638	5	6	5125		IN1251	1007071315	UNOCAL 6384	8602 S HOSMER	TACOMA	WA	98444	- 122.46322	47.17917	303	FINDS
639	5	6	5150		EF 700	1010435344	TAHOMA HIGH SCHOOL 74TH ST	4634 S 74TH ST	TACOMA	WA	98409	- 122.49929	47.19047	259	FINDS
640	5	6	5700		HX1182	1007071605	WILLIAM J MURRAY	14720 WOODBROOK DR SW	LAKEWOOD	WA	98439	- 122.52717	47.12381	278	FINDS
641	5	6	5800		GD 937	1004794082	ARROWHEAD CLEANERS (CLOSED)	10650 MILITARY RD SW	LAKEWOOD	WA	98498	- 122.58068	47.16086	339	FINDS
642	5	6	7500		FM 864	1011461987	5-12 LEARNING COMMUNITY	3230 85TH ST S	LAKEWOOD	WA	98499	- 122.47828	47.18029	289	FINDS
643	5	6	8470		MI1704	1008259586	CHRISTENSEN ELEMENTARY	10232 BARNES LN S	TACOMA	WA	98444	- 122.44568	47.16428	345	FINDS
644	5	6	10325		LC1551	1008260924	JAMES SALES ELEMENTARY	11213 SHERIDAN AVE S	TACOMA	WA	98444	- 122.45271	47.15486	324	FINDS
645	5	6	11950		1761	1008264845	PERRY G KEITHLEY MIDDLE SCHOOL	12324 12TH AVE S	TACOMA	WA	98444	- 122.45032	47.14471	304	FINDS
646	5	7	700		CW 521	1001490523	SUNDANCE APTS.	7511 LAKEWOOD DR	LAKEWOOD	WA	98467	- 122.50909	47.18969	247	ALLSITES
647	5	7	800		DG 549	1000401605	MASTER MILLWORK INC TACOMA (DEMOLISHED)	7505 52ND AVE W	TACOMA	WA	98467	- 122.50549	47.18929	249	ALLSITES
648	5	7	900		BH 340	S110627252	CLASSY CHASSIS EXPRESS LUBE CTR	7701 CUSTER RD W	LAKEWOOD	WA	98499	- 122.51630	47.18730	240	ALLSITES
649	5	7	1000		CW 547	U003294873	MEADOW PARK CHEVRON	7410 LAKEWOOD DR W	LAKEWOOD	WA	98499	- 122.50881	47.19040	248	ALLSITES
650	5	7	1100		CW 552	1000218849	ANDERSON DENTAL LABORATORY INC LAKEWOOD	7403 LAKEWOOD DR W 11	LAKEWOOD	WA	98467	- 122.50878	47.19053	248	ALLSITES
651	5	7	1100		DG 601	1004793712	BOESENS COLLISION CENTER INC	5124 74TH AVE W	LAKEWOOD	WA	98499	- 122.50482	47.19050	250	ALLSITES
652	5	7	1300		1054	1001490446	DUNKIN & BUSH INC STEILACOOM	4302 CHAMBERS CREEK PAINT SHOP	STEILACOOM	WA	98388	- 122.57854	47.18402	34	ALLSITES
653	5	7	1625		EK 718	S110037553	VINCES AUTO REPAIR	9007 VETERANS DR SW	LAKEWOOD	WA	98498	- 122.55679	47.14502	267	ALLSITES
654	5	7	1800		IX1282	1009631359	PUGET SOUND ENERGY	14312 W THORNE LANE SW	LAKEWOOD	WA	98498	- 122.55657	47.12711	268	DOT OPS
655	5	7	1825		JW1388	U003355757	STRIP MALL	14902 UNION AVE SW	LAKEWOOD	WA	98498-2250	- 122.55176	47.12284	282	ALLSITES
656	5	7	2275		1265	1007081293	USAF MAFB MTCA LF 01 02	62 CES CEV	JBLM	WA		- 122.50262	47.12482	287	ALLSITES
657	5	7	2300		BH 328	1001491030	AUSTIN PAVOLKA	7711 CUSTER RD W	LAKEWOOD	WA	98467	- 122.51672	47.18710	239	ALLSITES
658	5	7	2300		CE 443	S109556555	HUDTCOFF JUNIOR HIGH	7702 PHILLIPS RD SW	LAKEWOOD	WA	98498	- 122.53895	47.18805	231	ALLSITES

659	5	7	2300	CG 458	S110626002	BRIDGEPORT PHARMACY SERVICES BRIDGEPORT MEDICAL BUILDING	7424 BRIDGEPORT WAY W STE 109	LAKEWOOD	WA	98499	- 122.51852	47.19004	233	ALLSITES
660	5	7	2500	KI1446	S106409471	RESIDENCE	15209 PORTLAND AVE SW	LAKEWOOD	WA	98498	- 122.55863	47.12343	271	HIST CDL
661	5	7	2650	BH 295	1007066793	SOUTHLAND CORP 232418563	7727 CUSTER RD	LAKEWOOD	WA	98467	- 122.51745	47.18673	232	ALLSITES
662	5	7	2775	KT1541	S106783037	RESIDENCE	15007 W THORNE LN SW	LAKEWOOD	WA	98498	- 122.55665	47.12069	278	HIST CDL
663	5	7	2875	1081	1007062221	STEILACOOM TOWN WELL 4	2850 CHAMBERS BAY DR	STEILACOOM	WA	98388	- 122.58015	47.18235	164	ALLSITES
664	5	7	2950	CG 434	U003353608	WERNER SCHARMACH	7507 BRIDGEPORTWAY W	TACOMA	WA	98467-2423	- 122.51857	47.18934	234	ALLSITES
665	5	7	2950	CG 438	U004069126	BOBS COLLISION REPAIR	7501 HUDSON ST W	LAKEWOOD	WA	98499	- 122.51762	47.18935	239	ALLSITES
666	5	7	3600	T 113	S110036297	ENVIRONMENTAL DISTRIBUTION SYSTEMS	10001 LAKEWOOD DR SW	LAKEWOOD	WA	98499	- 122.50781	47.16565	263	ALLSITES
667	5	7	4100	DE 542	S109555993	RESIDENCE	8906 WILDWOOD AVE SW	LAKEWOOD	WA	98498	- 122.55570	47.15030	251	ALLSITES
668	5	7	4325	HJ1099	U003355808	LEAVTTTS AUTOMOTIVE (CLOSED)	14401 WOODBROOK DR SW	LAKEWOOD	WA	98439-1310	- 122.52784	47.12566	275	ALLSITES
669	5	7	4400	CE 428	U003352247	SOUTH TACOMA HATCHERY	7723 PHILLIPS RD SW	LAKEWOOD	WA	98498-6362	- 122.53909	47.18776	229	ALLSITES
670	5	7	4550	EM 727	U003352919	RESIDENCE	12218 VERNON AVE S W	LAKEWOOD	WA	98498-1231	- 122.55970	47.14659	261	ALLSITES
671	5	7	4600	349	1010311616	7598 WEST 66TH AVENUE	7598 WEST 66TH AVENUE	LAKEWOOD	WA		- 122.52508	47.18869	223	US HIST CDL
672	5	7	4775	877	1008383536	AT&T MCCHORD WAK046 MCABWAQ4540	MCCHORD AFB	MCCHORD AFB	WA	98439	- 122.52100	47.13080	300	ALLSITES
673	5	7	4775	HB1103	1001490375	LAKEWOOD CINEMA	2410 S 84TH ST	LAKEWOOD	WA	98409	- 122.46910	47.18110	293	ALLSITES
674	5	7	4775	1390	U004118025	US AF MCCHORD A ST	555 A ST	MCCHORD AFB	WA	98438-5436	- 122.49388	47.12430	305	ALLSITES
675	5	7	5600	FJ 851	U003354983	CITY PARK/BOAT LAUNCH	9306 VETERANS DR SW	LAKEWOOD	WA	98498-1146	- 122.56139	47.14230	275	ALLSITES
676	5	7	5700	1805	U003355385	ORGANIZATIONAL MAINT SHOP 1 UST 7557	CAMP MURRAY	JBLM	WA	98430-0001	- 122.56628	47.11698	266	ALLSITES
677	5	7	5925	JJ1329	S107032406	RESIDENCE	1711 102ND ST. S.	TACOMA	WA	98444	- 122.45832	47.16497	315	HIST CDL
678	5	7	6750	EW 785	S109557268	MANN JUNIOR HIGH	11509 HOLDEN RD SW	LAKEWOOD	WA	98498	- 122.56844	47.15273	272	ALLSITES
679	5	7	7175	1477	S110486290	RICKS TRANSMISSION HQ	10203 SHERIDAN AVE S	TACOMA	WA	98444	- 122.45270	47.16475	319	ALLSITES
680	5	7	7750	1363	1007070691	AINSWORTH PUMP STATION 42	1700 108TH ST S	TACOMA	WA	98444	- 122.45810	47.15919	299	ALLSITES
681	5	7	8200	MW1807	1011917275	NELSONS 3D COMPLETE AUTOMOTIVE REPAIR	709 106TH ST CT S	TACOMA	WA	98444	- 122.44233	47.16089	330	ALLSITES
682	5	7	8220	KE1421	U003353336	COLUMBIA SHEET METAL INC OF WA	1525 S 108TH ST	TACOMA	WA	98444-2613	- 122.45570	47.15917	315	ALLSITES
683	5	7	8700	JR1372	1009628823	1728 S 112TH ST	1728 S 112TH ST	PARKLAND	WA		- 122.45870	47.15564	304	US HIST CDL
684	5	7	9000	1604	1007075191	WESTERN FURNACE UST 3162	1109 108TH S	TACOMA	WA	98444	- 122.44985	47.15918	323	ALLSITES
685	5	7	10325	MP1746	S106783357	RESIDENCE	916 POLK ST S.,	TACOMA	WA		- 122.44580	47.15671	328	HIST CDL
686	5	7	11250	1699	S106783187	RESIDENCE	1022 113TH ST. S.	TACOMA	WA	98444	- 122.44789	47.15411	329	HIST CDL

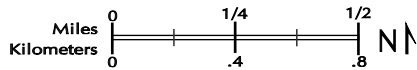
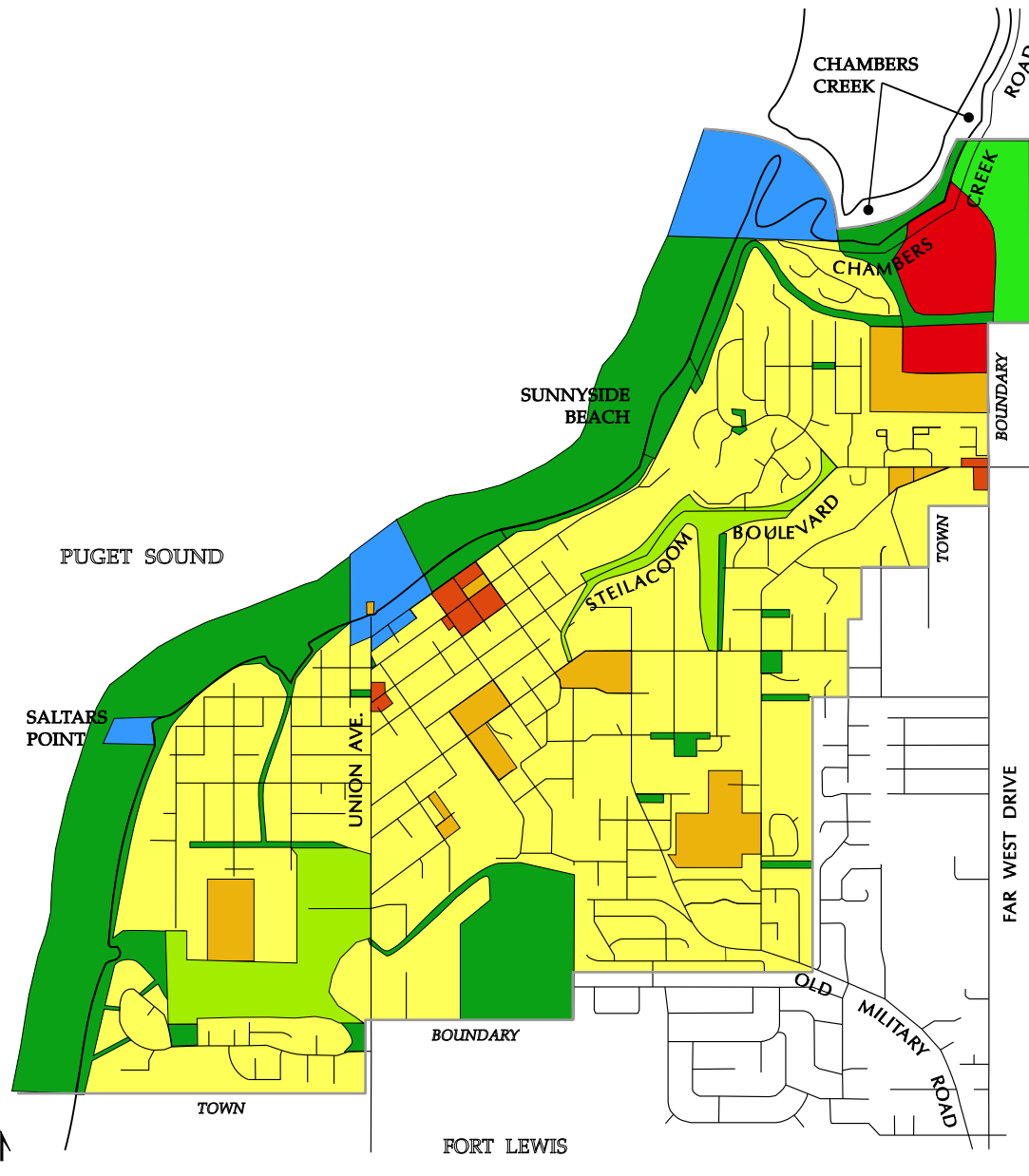
687	5	7	11625		MO1738	S106083424	RESIDENCE	1004 116TH ST S	TACOMA	WA	98444	-122.44773	47.15125	333	HIST CDL
688	5	7	12450		1821	U003353197	PACIFIC LUTHERAN UNIVERSITY PHYS PLANT	PHYSICAL PLANT	TACOMA	WA	98447-0001	-122.44732	47.14532	303	ALLSITES
689	5	7	18975		JR1377	S110038847	MIDLAND SELF STORAGE	1712 112TH ST E	TACOMA	WA	98444	-122.45835	47.15562	308	ALLSITES

Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
690	5	7	27150		IL1227	S106783365		CROSSLAND MTL #314, 8801 S. HOSMER	TACOMA	WA		-122.46300	47.17680	310	HIST CDL
691	5	9	4775		1178	S102456362	US AIR FORCE MCCHORD AIR FORCE BASE	BRIDGEPORT WY & I-5	MCCHORD AFB	WA	98438	-122.49453	47.12966	299	AIRS
692	5	10	2525		IV1277	1000659303	SHELL STATION	8433 HOSMER	TACOMA	WA	98444	-122.46321	47.18060	310	CSCSL NFA
693	5	10	3000		KI1474	S104971940	DUPLEX RESIDENCE	8810 FOREST RD	LAKEWOOD	WA	98498	-122.55988	47.12294	267	CSCSL NFA
694	5	10	3150		950	1000811039	MCCHORD CUSTOM CLEANERS	12923 BRIDGEPORT WAY	LAKEWOOD	WA	98438	-122.49552	47.13374	303	CSCSL NFA
695	5	10	4050		CF 449	1003880444	PONDERS COLLISION CTR/COLLISION CENTER AUTO REP	12424 PACIFIC AVE SW	LAKEWOOD	WA	98499	-122.51252	47.14457	279	CERC-NFRAP
696	5	10	5225		HD1113	S104918122	7-ELEVEN INC #18585	9517 S STEELE	TACOMA	WA	98444	-122.46506	47.17081	304	CSCSL NFA
697	5	10	5775		EZ 847	S104320439	LAKEWOOD CITY NORTH AMERICAN LAKE PARK	9222 VETERANS DR SW	LAKEWOOD	WA	98499	-122.56111	47.14231	276	CSCSL NFA
698	5	10	9600		T 92	U003352716	TVETENS LAKEWOOD INC	10002 BRIDGEPORT WAY SW	LAKEWOOD	WA	98499-2319	-122.50938	47.16627	263	CSCSL NFA
699	5	10	9800		T 103	U003355603	BLACK STAR COFFEE	5411 100TH ST SW	LAKEWOOD	WA	98499-3818	-122.50894	47.16674	263	CSCSL NFA

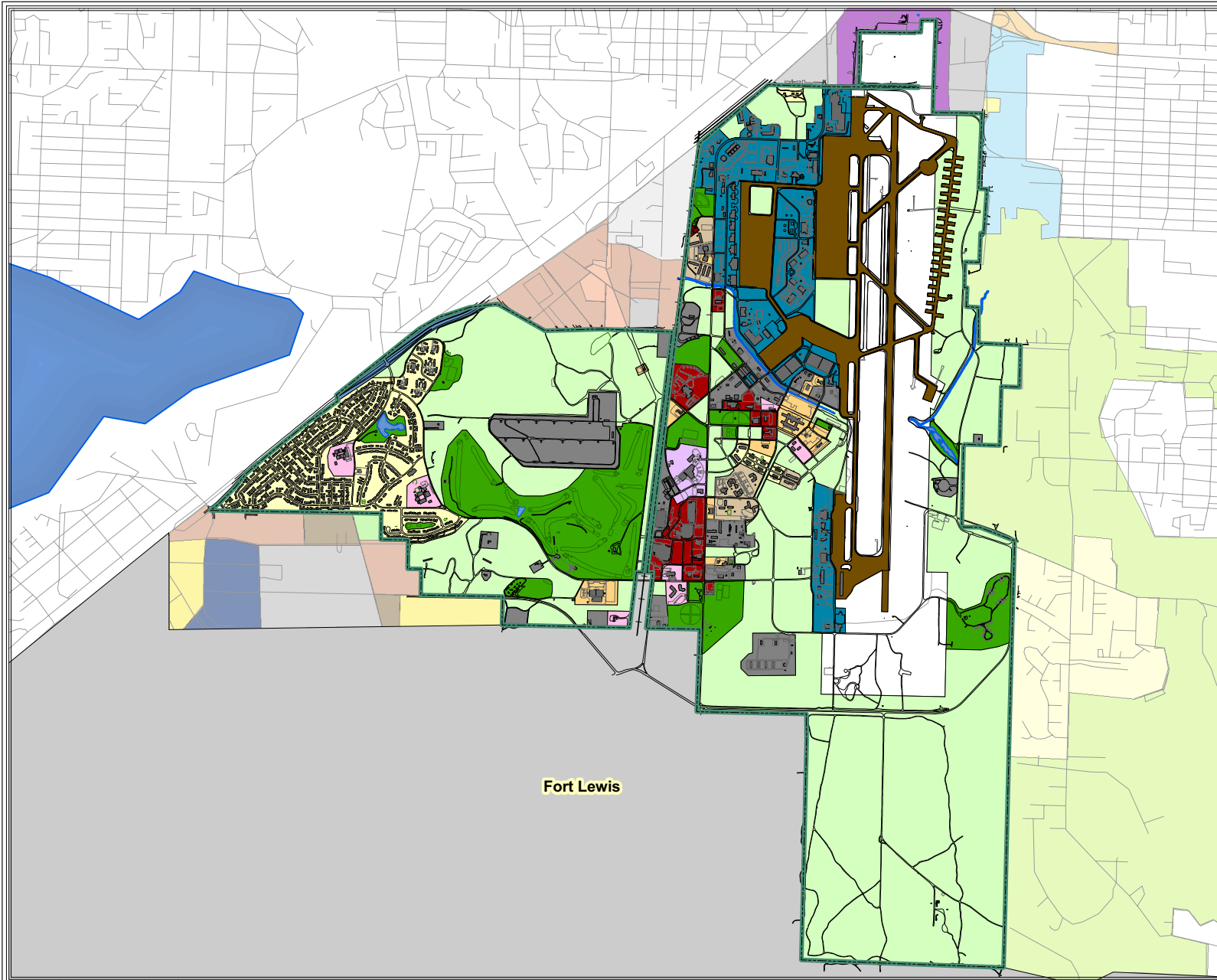
Hazard Ranking	Zone	category rank	feet to well	Aquifer	DATAKEY	REFNO	FACILITY	STREET	CITY	STATE	ZIP	LON	LAT	ELEV	DBACRON
700	5	11					OLYMPIC MOVING AND STORAGE	7010 150 TH ST	LAKEWOOD	WA					
701	5	11					BARRETT'S AUTO REPAIR	12408 PACIFIC HWY	LAKEWOOD	WA	98499				
702	5	11					KENWORTH NORTHWEST	12507 PACIFIC HWY	LAKEWOOD	WA	98499				
703	5	11					PLAZA CLEANERS (CLOSED)	12314 PACIFIC HWY	LAKEWOOD	WA	98499				
704	5	11					SHELL/NISQUALLY MARKETS	11741 PACIFIC HWY	LAKEWOOD	WA	98499				
705	5	11					CITY OF LAKEWOOD MAINT YARD	9420 FRONT ST	LAKEWOOD	WA	98498				
706	5	11					OSCAR HOKOLD DEVELOPMENT	2514 92 ND ST	LAKEWOOD	WA	98499				
707	5	11					REDDY ICE WAREHOUSE	9625 32 ND AVE	LAKEWOOD	WA	98499				
708	5	11					CLOVER PARK SD AUX SERVICE CENTER	9219 LAKEWOOD DR.	LAKEWOOD	WA	98498				
709	5	11					SOUND TRANSIT MAINT YARD	3904 STEILACOOM BLVD	LAKEWOOD	WA	98498				
701	5	11					BARRETT'S AUTO REPAIR	12408 PACIFIC HWY	LAKEWOOD	WA	98499				
702	5	11					KENWORTH NORTHWEST	12507 PACIFIC HWY	LAKEWOOD	WA	98499				
703	5	11					PLAZA CLEANERS (CLOSED)	12314 PACIFIC HWY	LAKEWOOD	WA	98499				
704	5	11					SHELL/NISQUALLY MARKETS	11741 PACIFIC HWY	LAKEWOOD	WA	98499				
705	5	11					CITY OF LAKEWOOD MAINT YARD	9420 FRONT ST	LAKEWOOD	WA	98498				
706	5	11					OSCAR HOKOLD DEVELOPMENT	2514 92 ND ST	LAKEWOOD	WA	98499				
707	5	11					REDDY ICE WAREHOUSE	9625 32 ND AVE	LAKEWOOD	WA	98499				
708	5	11					CLOVER PARK SD AUX SERVICE CENTER	9219 LAKEWOOD DR.	LAKEWOOD	WA	98498				
709	5	11					SOUND TRANSIT MAINT YARD	3904 STEILACOOM BLVD	LAKEWOOD	WA	98498				
710	5	11					EDWARDS MEMORIAL CREMATORIA	11020 S. TACOMA WAY	LAKEWOOD	WA	98498				
711	5	11					BROTHERS AUTO REPAIR	8825 MEADOW ROAD	LAKEWOOD	WA	98498				
712	5	11					PARKER PAINT	5211 100 th St. SW	LAKEWOOD	WA	98498				
713	5	11					RODDA PAINT	2510 84 TH ST	LAKEWOOD	WA	98498				
714	5	11					LAKEWOOD SOUND TRANSIT STATION	11424 PACIFIC HWY	LAKEWOOD	WA	98498				
715	5	11					MULTI-USE WAREHOUSE	8016 DURANGO	LAKEWOOD	WA	98499				
716	5	11					NEW INDUSTRIAL PARK WAREHOUSES	4625 100 TH ST	LAKEWOOD	WA	98498				
717	5	11					SHELL GAS STATION/MINI MART	6107 STEILACOOM BLVD	LAKEWOOD	WA	98498				

718	5	11				MULTICARE CLINIC	5609 100 TH ST	LAKEWOOD	WA	98496				
719	5	11				PACIFIC MACHINE INC.	8601 38 TH AVE	LAKEWOOD	WA	98499				
720	5	11				RAPID PREP INC.	9720 40 TH AVE	LAKEWOOD	WA	98498				
721	5	11				WEST PIERCE FIRE MAINT BLDG.	9410 39 AVE CT SW	LAKEWOOD	WA	98498				
722	5	11				MOUNTAIN VIEW FUNERAL HOME	4100 STEILACOOM BLVD	LAKEWOOD	WA	98498				
	5	11												
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APPENDIX C



- Housing**
- Public Facilities**
- Commercial/housing**
- Industrial**
- Commercial/recreation**
- Housing/open space**
- Industrial/open space**
- Open space/recreation**



- Legend**
- Installation Boundary
 - Airfield
 - Aircraft Pavements
 - Aircraft Operations and Maintenance
 - Industrial
 - Administrative
 - Community (Commercial)
 - Community (Service)
 - Medical
 - Housing (Accompanied)
 - Housing (Unaccompanied)
 - Outdoor Recreation
 - Open Space
 - Water
 - Highway Right-of-Way
- Off-Base Zoning**
- Ft Lewis
 - Military Lands (Fort Lewis)
 - Air Corridor
 - Industrial Business Park
 - Industrial
 - Commercial
 - Public Institutional
 - Employment Services
 - Residential/Office Civic
 - Residential Resource
 - Residential
 - Single Family
 - High Density Single Family
 - Multi-Family
 - Mixed Residential

Fort Lewis

Technical Memorandum

This technical memorandum describes the calibration efforts performed by Murraysmith on the Lakewood Water District's (District) hydraulic model. This initial calibration specifically focused on the following updates:

1. Correct pipe sizes, ages and materials based on the updated GIS map of the District's 6 pressure zones
2. Correct pipe connections in the 404 and 455 pressure zones
3. Adjust pipe roughness based on pipe material, age, and flow tests

Background

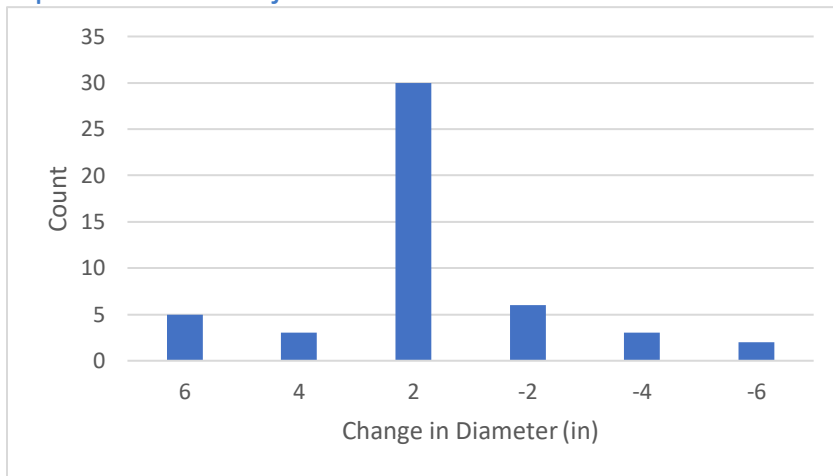
Lakewood Water District developed an InfoWater hydraulic model from the District's Geographical Information System (GIS) database in 2011. The model was used to analyze Lakewood's water system for the *Comprehensive Water System Plan* in 2013, as well as to inform day to day and future operations decisions. Additional calibration efforts were performed by Murraysmith on the hydraulic model between April and September 2018 in preparation for the *Comprehensive Water System Plan* update in 2019. The district plans to utilize the model in the system analysis portion of the Plan.

Calibration

Pipe Adjustments

The District provided Murraysmith with updated GIS map files that include recent system updates not already expressed in the model. The diameter of 49 model pipes* were adjusted to match the District's GIS. 78% of the adjusted pipes were increased in size and 22% were decreased.

Figure 1
Pipe Diameter Adjustments

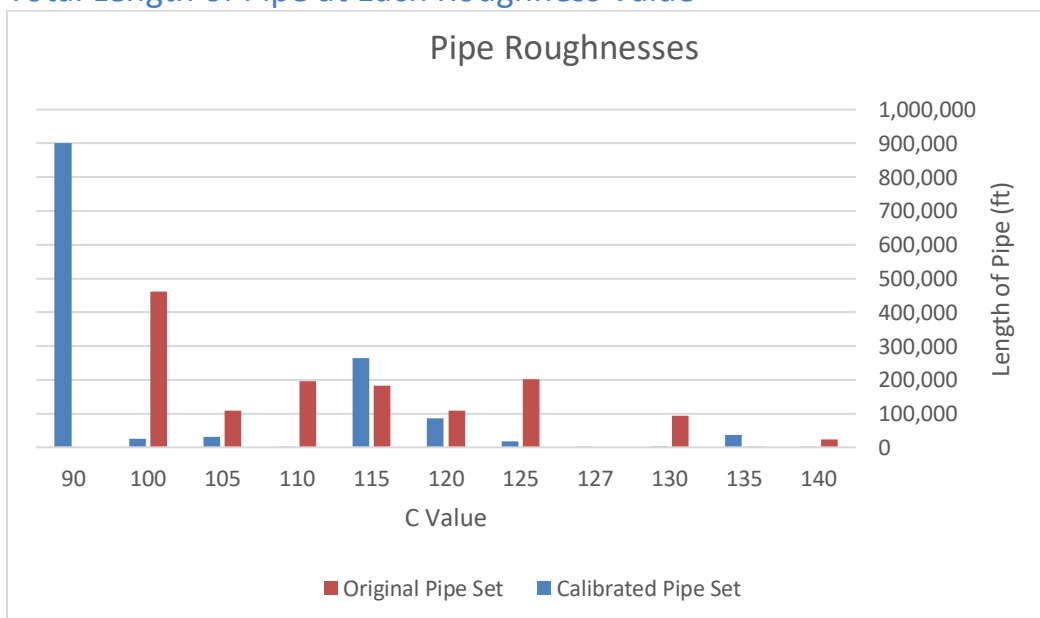


Positive values indicate an increase in pipe diameter between the original model and the calibrated model.

*The length of model pipes do not necessarily reflect the length or number of as-built pipes

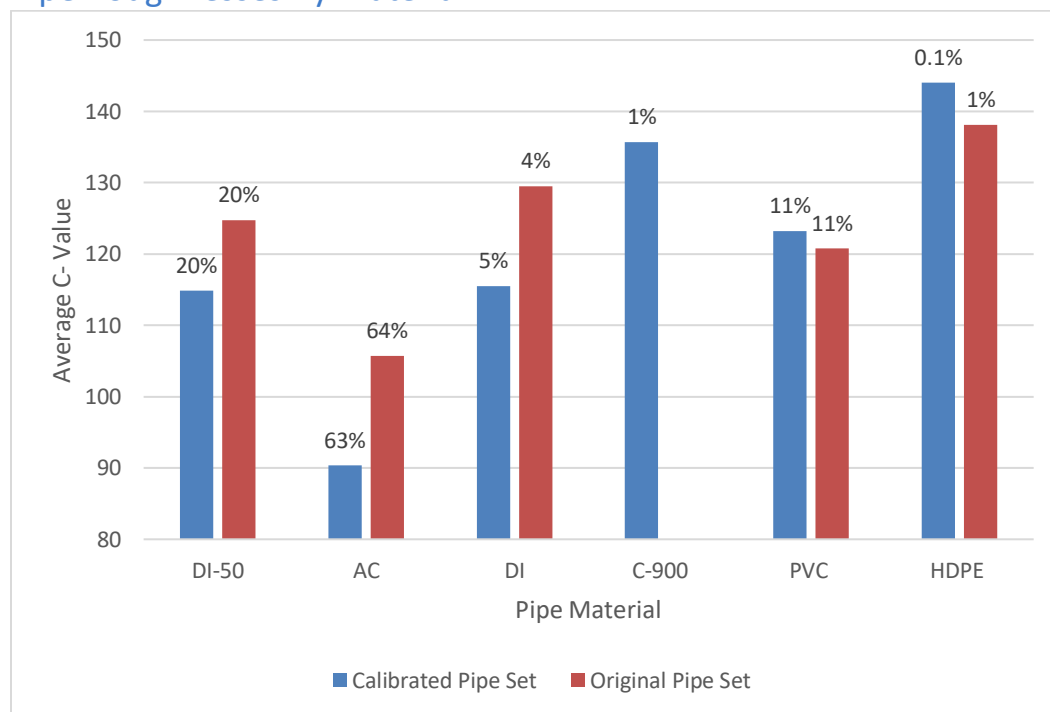
Pipe roughness were adjusted based on age and material using similar systems in the area as reference. Roughness's are reflected as Manning's roughness coefficients (C) to the model. These adjustments were made based on the assumption that pipes become rougher as they age, thus older pipes were assigned lower C values than newer pipes of the same material.

Figure 2
Total Length of Pipe at Each Roughness Value



All pipe materials expressed

Figure 3
Pipe Roughnesses By Material



Data labels indicate the percentage of each pipe material in the model based on pipe count.

Flow Tests

Flow tests were performed in the field at 23 locations between April and July 2018. 22 of the tests were fire flow simulations with flows ranging from 500-1360 gpm. Tests were performed within 4 of the 6 pressure zones within the Lakewood Water District. The pressure was measured before (static) and after (residual) the flow hydrant was opened at an adjacent hydrant. In 9 of the 23 tests the flow at the hydrant was estimated, and in the other 14 locations it was measured in the field. Fire Flow tests 9,10 and 13 were discarded due to a lack of accurate data. SCADA data provided by the District was used to create demand, tank, pump and valve sets as inputs to the model. Pipe roughnesses were adjusted within reason based on the flow tests. Complete results from the fire flow tests are shown in **Table 1.1** of **Appendix 1**.

Tests 23-26 were performed at the Wholesale Booster Pump Station (WBPS) on August 7, 2018. SCADA data was provided by the District for the duration of the flow test (10:00 - 13:30). 10:15 was selected as the static condition and 11:45, 12:15 and 12:45 were selected as the residual conditions. The three residual conditions reflect different controls (ie pump and well flow) as well as different demands at the WBPS. These flow tests specifically tested the models reaction to different flow patterns in the west side of the 404 and 455 zones. Complete results from the WBPS flow tests are presented in **Table 1.2** of **Appendix 1**.

The static pressure calibration results from all tests were analyzed based on the guidelines presented by the Engineering Computer Applications Committee (ECAC) in 1999. These guidelines recommend that the static pressure calculated by the model is within 2 psi of the pressure measured in the field. **87%** of the 23 static pressure tests revealed model pressures within 2 psi of the value recorded in the field.

The dynamic pressure calibration results from all tests were analyzed based on the guidelines presented by Walski et al. in *Advanced Water Distribution Modeling and Management*. These guidelines recommend that headloss values (ft) calculated by the model be within 10ft of the headloss recorded in the field. **35%** of the 23 tests revealed model values within 5ft, and **52%** within 10ft of the headloss recorded in the field.

The accuracy of the field measurements during the flow tests, and the location accuracy of the hydrants within the model may influence the level of calibration achieved during this phase of work. The large variation in elevation within the Lakewood Water District makes the model sensitive to small geographical errors. Future calibrations should include field flow and location measurements at all the hydrants as well as a higher quantity of tests to increase model accuracy.

Appendix 1

Table 1.1
Flow Test Results: Fire Flow

Model Calibration Results: Fire Flow Tests 2018															
Test #	Pressure Zone	Flow Hydrant	Pressure Hydrant	Flow (gpm)	Date	Test Duration	Field Measurements			Model Results			Analysis		
							Static P (psi)	Residual P (psi)	Field P Loss (psi)	Model Static P (psi)	Model Residual P (psi)	Model P Loss (psi)	Δ P Error (psi)	Δ Headloss Error (ft)	Static P Error (psi)
1	404	16H4	17HV14	650	4/9	0:15	55	42	13	55.56	49.9	5.66	7.34	16.95	0.56
2	404	34H19	28Hv15	839	4/9	0:23	64	60	4	64	61.5	2.5	1.5	3.46	0
3	455	20hv2	20hv1	548	4/17	0:03	76	48	28	77.76	50.51	27.25	0.75	1.73	1.76
4	455	19hv16	19h15	702	4/17	0:04	80	58	22	79.79	72.94	6.85	15.15	34.99	0.21
5	404	86hv11	86hv1	650	4/18	0:05	70	42	28	70.19	65	5.19	22.81	52.69	0.19
6	404	13hv12	28hv7	712	4/18	0:03	68	50	18	67.52	63.64	3.88	14.12	32.61	0.48
7	404	76hv37	77hv29	787	4/19	0:04	72	52	20	71.39	68.63	2.76	17.24	39.82	0.61
8	404	79HV19	81hv2	760	5/15	0:03	66	52	14	68	66	2	12	27.72	2
11	513	48HV19	48HV18	651	6/13	0:10	88	50	38	82.59	54.23	28.36	9.64	22.26	5.41
12	460	53h10	53h9	500	6/13	0:10	52	42	10	51.79	33.6	18.19	-8.19	18.91	0.21
14	404	39HV22	39HV23	604	6/19	0:05	45	30	15	45.52	38.47	7.05	7.95	18.36	0.52
15	455	22HV7	22HV13	548	6/18	0:05	80	55	25	78.36	72.93	5.43	19.57	45.20	1.64
16	404	16HV39	16HV16	548	6/19	0:07	58	54	4	64	62.15	1.85	2.15	4.96	6
17	404	80HV08	80HV02	548	6/19	0:05	64	60	4	65.33	64.54	0.79	3.21	7.41	1.33
18	404	51HV08	51HV07	548	6/19	0:05	52	44	8	52.89	48.4	4.49	3.51	8.10	0.89
19	455	20h28	75h10	787	7/9	0:02	62	50	12	61.26	50.65	10.61	1.39	3.21	0.74
20	404	37h30	37h36	839	7/9	0:01	64	58	6	64.5	60.01	4.49	1.51	3.48	0.5
21	404	39h41	39h43	628	7/10	0:01	45	38	7	46.17	42.8	3.37	3.63	8.38	1.17
22	460	53H10	53H9	1360	6/15	0:15	65	29	36	52.42	20.69	31.73	4.27	9.86	12.58

Table 1.2
Flow Test Results: Wholesale Test

Model Calibration Results: Wholesale Test 8/7/18															
Test #	Pressure Zone	Flow Hydrant	Pressure Hydrant	Flow (gpm)	Time	Test Duration	Field Measurements			Model Results			Analysis		
							Static P (psi)	Residual P (psi)	Field P Loss (psi)	Model Static P (psi)	Model Residual P (psi)	Model P Loss (psi)	Δ P Error (psi)	Δ Headloss Error (ft)	Static P Error (psi)
23	404	WSBPS	Myrtle St.	1712	10:15 AM	0:30	45.55			47					1.45
24	404	WSBPS	Myrtle St.	3361	11:45 AM	0:25	45.55	38.85	6.70	47.00	36.26	10.74	-4.04	-9.33	1.45
25	404	WSBPS	Myrtle St.	3389	12:15 AM	0:25	45.55	36.87	8.68	47.00	36.46	10.54	-1.86	-4.30	1.45
26	404	WSBPS	Myrtle St.	1523	12:45 AM	0:30	45.55	52.13	-6.58	47.00	51.73	-4.73	-1.85	-4.28	1.45



LAKEWOOD WATER DISTRICT
Determination of Non-significance—Comprehensive Water System Plan
WAC 197-11-970

Description of Proposal: The proposal is to adopt the District's Water Comprehensive Plan that outlines a series of capital improvements and District operations necessary to implement adopted Growth Management Plans and Policies and comply with Washington Department of Health requirements.

Proponent: Lakewood Water District

Location of Proposal: The proposal addresses water system operations and improvements for the Lakewood Water District current and planned service areas, which include members of the Water Cooperative of Pierce County and are shown in Figure 2-2 of the Plan document. These areas generally are the City of Lakewood and Central Pierce County, including the water service areas of Lakewood Water District, Spanaway Water Company, Summit Water and Supply Company, Rainier View Water Company, Fruitland Mutual Water Company, Mountain View – Edgewood Water Company, Parkland Light & Water Company, City of Puyallup, Valley Water District, Firgrove Mutual, Inc., Graham Hill Mutual Water Company and other municipal water systems identified in the Pierce County Coordinated Water System Plan.

Lead Agency: Lakewood Water District

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after a review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

This DNS is issued under WAC 197-11-340(2) and relevant Lakewood Water District resolutions. There is a 14-day comment period for this DNS. Written comments may be submitted to the address listed below within 14 days of the date of this Determination.

This Determination is part of a Phased Review under the provisions of SEPA (WAC 197-11-060(5)). Subsequent project-specific environmental review will be conducted as individual capital improvements contemplated in the Water Plan are pursued.

Randall M. Black, General Manager
Lakewood Water District
11900 Gravelly Lake Drive SW
Lakewood WA 98499-0729
253/588-4423

A handwritten signature in black ink, appearing to read "Randall M. Black", is written over a horizontal line.

Randall M. Black, Responsible Official

A handwritten date "2/10/2020" is written in black ink over a horizontal line.

Date

LAKESWOOD WATER DISTRICT WATER SHORTAGE RESPONSE PLAN

Adopted: April xx, 2017

1.0 Introduction

This Plan was developed by Lakewood Water District, (District) staff and approved by the Board of Commissioners on the date noted above. The Plan will remain in effect until modified or rescinded by the Commissioners.

The goal of the Water Shortage Response Plan, (WSRP) is to maintain essential public health and safety services and minimize adverse impacts affecting the lifestyles of the District's customers. The WSRP outlines the District's short-term water shortage response activities and in conjunction with the District's Emergency Response Plan, positions the District to minimize the impacts of events that can be weather-related water shortages, natural or human-caused disasters, or other water system operating emergencies.

Lakewood Water District's water system relies on 31 wells at a variety of depths for water to provide a maximum production capacity of 40 million gallons a day (MGD). Elevated and ground level tanks provide a total storage capacity of 25,950,000 gallons. The District services a population of approximately 65,000 to 70,000 people. A regional declaration of a drought emergency for the Puyallup/Chambers Creek basins by the Governor will automatically trigger a drought response.

Drought responses for water systems with a groundwater source consider aquifer level patterns. Drought conditions resulting in less than average fall/winter precipitation can decrease recharge to local aquifers and because of the lag time between drought conditions and recharge and groundwater withdrawals, impacts from this scenario may not be immediately evident. Impacts may become evident in shallow aquifers 6 months to 1 year or more following below average rainfall and would likely be evident following a 1 to 2-year period of below-average precipitation. In deeper aquifers, it may take years before impacts of below-normal precipitation are observed. Unusually warm and dry weather sustained over the summer months also holds the potential to impact water supplies if the usual period of peak demand extends in duration.

Natural disasters such as earthquakes, flooding, snow and windstorms that result in power failures can result in water shortage situations lasting a longer period of time than a routine water main break. The

same is true for human caused emergencies such as hazardous material spill, or an act of vandalism. Such emergencies can result in a critical water component to be out of service for an extended period of time resulting in a curtailment of water usage. The District's Emergency Response Plan describes these scenarios in more detail.

Over the years, the District has installed two major technological advancements enhancing its ability to manage production, establish both local and remote command and control for production and storage facilities, increase data acquisition, and increase tracking of customer usage behavior. The District added the Well Saver Control program to its SCADA command and control designed to protect against over pumping the aquifers by limiting the drawdown and production rates in each of its wells. Each well has a pre-set parameter for Minimum/Maximum production rates (in Gallons Per Minute) as well as Minimum/Maximum drawdown levels. Under normal seasonal conditions, most wells can operate at maximum production capacity with drawdown levels above the Well Saver parameters. However, when seasonal conditions change and aquifer recharge from area precipitation is diminished, the Well Saver Program limits production by activating Flow Control valves or manipulating the input signal to a Variable Frequency Drive.

The second major technological advancement is the installation of the AMI system on all the District's customer meters. The AMI system provides real time flow demand information for all its meters enabling the District to track customer usage and demand trends.

The District also participated in the 2015 Cascade Water Alliance grant to study the effects of long term drought as well as climate change on Western Washington water purveyors (see Appendix H). The conclusions of the study indicate the District should experience limited impacts to its production capacity in the first two years of a prolonged drought condition. The District will experience some impacts in the upper aquifers in years three and four, and significant impacts in years five and six. Without taking conservation methods, the impacts to production from all aquifers can become critical in year seven and thereafter.

The District's drought response plan is divided into several stages. Each stage has its own level of activity. The actions taken in each stage are outlined first, and then criteria for triggering the raising and lowering of each stage are described.

Equation for Stage Triggers Water Shortage Response Plan triggers involve a comparison of current water demand to potential production. Triggers are marked when current demand reaches certain percentages of potential production. In that case, the WSRP Team would evaluate whether or not to implement the corresponding stage of the Plan. Meeting or exceeding the trigger is not the sole variable to be considered and alone may not necessitate implementation of the corresponding plan stage.

Current Demand (CD): The values are viewed daily on the District SCADA System by the Pumping and Treatment Department Head. These values consider water pumped from wells and used from storage the previous day.

Triggers:

Stage 1: Advisory Every summer

Stage 2: Internal Action Stage

-STEP 1 CD = 80% of P3 (Present Possible Production) for 1 day

-STEP 2 CD = 90% of P3 for 1 day

Stage 3: Mandatory Stage

-CD = 95% of P3 for 3 consecutive days; or CD = 97% of P3 for 1 day

Stage 4: Emergency Stage

-CD = 100% of P3 for 1 day

Definitions for the trigger equation variables follow:

Useable Source: A source of potable water supply that can be relied upon to pump water into the system at a moment's notice. Tanks can be drawn down only a certain amount without affecting area pressures and fire flow capacity. Pumping time is limited by the amount of drawdown within the tanks, thus all well pumps within the water system do not pump for 24 hours. For the purpose of this plan, a pumping time of 22 hours for each useable source will be utilized. (Note: Sources can become unusable due to mechanical/electrical failure, the well drawdown level being too low to effectively operate the pump, or if water quality concerns render the water unusable.)

Present Possible Production (P3): The maximum well pumping time of 22 hours per day which is based on the available standby and operational reservoir storage capacity of the water system, expressed in MGD units. The P3 will be reevaluated by the Pumping and Treatment Department Head annually prior to June 1st, and the adopted P3 value shall be inserted as Appendix G of this plan.

2.0 General Progression of Drought Response

Water Shortage Response Plan Stages

The plan involves four stages of phased response, to be implemented as conditions warrant, in an effort to manage water demand when supplies become limited. Stages will be implemented progressively, if timing and conditions allow, providing internal staff, cooperating agencies and the public with reasonable warning when the implementation of the next stage of response becomes necessary. However, conditions may warrant immediate implementation of an advanced stage without first moving through initial stages. The four stages include a variety of communications, internal operations, and

supply-side actions and demand management strategies as appropriate. Supply-side actions are actions that are taken internally to increase or better leverage water supply, e.g. adjusting tank elevations, or well call order to better leverage supply, or activating the intertie with the Parkland Light and Water system, or activating emergency interties with agencies such as Tacoma Water. Demand management strategies are actions that encourage or require water customers to use less water. The stages are characterized as follows:

- **Stage 1: Advisory Stage** – Internal evaluation of conditions and coordination are initiated to determine the likelihood of shortage and facilitate next steps. The public is reminded that the WSRP is in place and seasonal or other conditions may warrant its implementation. The public is encouraged to use water wisely.

- **Stage 2: Internal Action Stage** – If supply conditions worsen, the plan moves to the internal action stage. During this stage, the District will implement demand and supply-side actions aimed at reducing demand.

- **Stage 3: Mandatory Stage** – If the internal action stage does not result in needed demand reduction or if conditions worsen, the mandatory stage is implemented. During this stage, the District will implement more aggressive supply-side actions and will limit or prohibit certain uses of water by customers. This stage may involve an enforcement component with fines for non-compliance.

- **Stage 4: Emergency Stage**– This stage is implemented when supply conditions worsen, and/or previous demand-reduction actions are not sufficient. Emergency curtailment addresses the most severe need for demand reduction and includes emergency restrictions.

The early stages of the drought response are expected to be used during the late winter to early-summer period as drought conditions may emerge. The later stages are likely to be used during the summer through mid-fall period and possibly into early winter. Conservation goals are specified for each of Stages 2 through 4. Drought stages will not be lowered until demand is reduced to achieve these goals or until source water levels begin to rise consistently.

As the drought stage increases, the amount of demand reduction increases. The conservation goals are based on Washington Department of Health guidelines (DOH, 2005). The levels of demand reduction are based on these goals. Monitoring of demand (source meter production, tank elevation trending levels, and customer meter data) will determine when and how long the goals are met.

Drought conditions starting in early spring and persisting into the fall would be severe. Using an extended version of the 2015 drought as an example of an extreme drought, lowering of the drought response stage would not occur until source water levels rise to acceptable levels. Short-term emergency curtailment plans are not included in the drought response plan.

3.0 Stages of Drought Response

Stage 1—Advisory Stage

The key elements of Stage 1 are forecasts to alert District commissioners and personnel to the risk of drought conditions and to prepare for a possible drought response.

Stage 1: Advisory Stage Objectives

- Evaluate water supply and demand conditions to determine if further implementation of the WSRP is warranted.

- Initiate internal coordination to evaluate conditions and facilitate further implementation.

- Prepare District staff for a potential water shortage, thereby allowing adequate time for planning and coordination.

- Remind the public to use water wisely. Remind them also that a WSRP exists and can be implemented if it becomes necessary.

Stage 1 triggers seasonally during peak demand periods.

Advisory Stage Actions Coordination

- The Pumping and Water Treatment Department Head will compile data on a revised Daily Water Production Report and route the report via email to members of the District Management Staff to keep them informed of current demand and supply conditions.

- The Pumping and Water Treatment Department Head or other staff will inform the District Management Staff if a trigger has been met or exceeded.

- If a trigger has been met, the District's General Manager will assemble a meeting of District Staff to develop a recommendation on whether to implement the WSRP and decide if further implementation of the WSRP is needed and actively encourage conservation. The message should include a reminder that the District has adopted a WSRP that can be implemented if necessary.

- The Pumping and Treatment Department Head will develop a fact sheet outlining the WSRP and provide it to District customer service staff and the public via the District's webpage, as requested, to allow for uniform, consistent dissemination of information to the public.

- The Pumping and Water Treatment Department Head will include information regarding relative efficiencies of various irrigation systems and equipment in water conservation messages. The public will be reminded that use of less efficient equipment may be restricted or prohibited in the case of a water shortage.

- Ask the public to follow these specific watering guidelines:

-Apply no more than one inch of water to landscaping each week.

-Limit all landscape watering (turf and/or ornamental) to no more than three days per week. Residents with odd numbered addresses should water only on Monday, Wednesday and/or Saturday. Residents with even numbered addresses should water only on Tuesday, Thursday and/or Sunday.

Public Outreach

-The Pumping and Treatment Department Head will develop and distribute a press release reminding the public that summer weather leads to increases in water demands.

Stage 2—Internal Action Stage

The key elements of Stage 2 are communication of public information and cooperation from customers. The goal of this stage is to notify customers to anticipate an increase in drought response later in the dry season and to begin taking voluntary conservation. The District's General Manager will advise the Board of Commissioners as to the necessity of implementing Stage 2 and shall take all necessary actions with the Board's approval.

Objectives

- Reduce water use to accommodate supply limitations through internal actions.
- Forestall or minimize the need for more stringent demand or supply management actions.
- Minimize the disruption/inconvenience to customers while meeting demand reduction goals.
- Maintain the highest water quality standards throughout the shortage.

Triggers STEP 1: 80% of P3 for 1-day STEP 2: 90% of P3 for 1 day.

Internal Action Stage- Action Step 1- Coordination.

-Establish regular meetings for the District Management Staff and systematic communications with the District's Board of Commissioners.

- District Management Staff will establish regular communications with City of Lakewood staff to keep them up to date on conditions, goals, and District actions.

-District Management Staff will consider current and projected supply conditions and seasonal demand and set demand reduction goals that may be revised as necessary.

-District Management Staff will coordinate use of emergency interties with neighboring water suppliers to increase emergency supply availability and communicate with neighboring water suppliers (City of Tacoma and Parkland Light and Water), state resource agencies, Pierce County, and other interested parties to gauge regional status of supply, as necessary.

-Contact West Pierce Fire and Rescue to inform them of the situation and request implementation of actions listed in Appendix C.

-Implement staffing reassignments as needed and that may be needed for the Mandatory stage, including staff to enforce mandatory restrictions. See Appendix E for suggested staffing assignments. Initiate planning and preparation for the Mandatory stage.

Public Outreach

The District Management will begin additional, targeted outreach to commercial customers to remind them to adhere to the watering schedule listed above and/or prepare and implement a curtailment plan that reduces their water use by at least 10%.

- Ask commercial customers to plan ahead for possible implementation of the Mandatory stage. During that stage, they would be required reduce irrigation water use by 25%.

Internal Operating Actions

-The District Staff will begin close monitoring of the City's top 10 commercial irrigation consumers for compliance with the odd-even watering schedule.

-Increase water quality monitoring actions as necessary.

-Reduce all operating system water uses (flushing, truck washing, etc.) to essential levels.

-Reduce irrigation at City-owned and managed landscapes. Reduce or eliminate seasonal plantings. See Appendix D for more details regarding management of City parks and landscapes during the Voluntary stage.

Internal Action Stage Actions Internal Action Step 2 Coordination

-District Management Staff and Pumping Department Field Staff will meet to discuss potential supply-side actions based on water supply and demand.

Internal Operating Actions

-Operations staff will implement recommended changes based on the District Management Staff and Pumping Department Field Staff meeting.

Stage 3: Mandatory Stage

Objectives

-Achieve targeted demand reduction goals by restricting defined water uses.

-Ensure that adequate water supply will be available during the duration of the water shortage to protect public health and safety including fire flow capacity.

-Minimize the disruption to customers' lives and businesses while meeting target demand reduction goals.

-Promote equity among all customers, both Wholesale and Retail, by establishing clear restrictions that affect all customers.

-Ensure water quality remains at the highest level possible.

Triggers 95% of P3 for 3 consecutive days; or 97% of P3 for 1 day

Mandatory Stage Actions

Coordination

- The District's General Manager, with approval from the District's Board of Commissioners, will recommend the move to the Mandatory Stage, and adopt mandatory restrictions. The District Management Staff will recommend the nature, scope and timing of restrictions.

-Implement water use restrictions, as developed by the WSRT. The following list serves as the baseline for water use restrictions. The exact restrictions used will depend on the situation and may change as the severity of the situation changes. However, this list should be used as the starting point, with additional, more stringent restrictions put in place as necessary:

-Limit outdoor watering to 2 days per week, based on customer address:

-Odd address: can water WEDNESDAY and SATURDAY only.

-Even address: can water THURSDAY and SUNDAY only.

-No watering on MONDAY, TUESDAY or FRIDAY.

-Monitor customer usage with the AMI system

-Prohibit all watering during the warmest hours of the day, between 9 am and 7 pm.

-Prohibit use of outdoor ornamental fountains using potable water.

-Prohibit car washing except at commercial car wash facilities that recycle water.

-Prohibit washing of sidewalks, streets, decks or driveways. Only waterless means of cleaning these areas are allowed during this stage.

-Limit pressure washing of buildings to situations that require it as part of a scheduled building rehabilitation project (e.g. painting).

-Prohibit water waste, including untended hoses without shutoff nozzles, obvious leaks, and water running to waste, such as sprinkler/irrigation water hitting paved areas.

-Exemptions from restrictions might include:

-Ball fields and playfields may be watered at the minimum rate necessary for safety purposes and dust control.

-Landscapes installed within the previous 12 months are exempt from watering bans if such bans would result in significant property damage. –

-Customers with special medical needs, such as home dialysis, will be exempted from any emergency restrictions, provided these customers are included on the District's dialysis notification list or they notify the District of such a need. Their exemption will not apply to outdoor water use.

-Implement the process for receiving, recording and responding to reported violations of restrictions. Enforcement procedures will be implemented to assess fines where mandatory restrictions are not followed (see Appendix B). The District Management Staff will review and process all requests for exemptions from mandatory requirements. See Appendix F for recommended process.

-Increase enforcement actions in accordance with the applicable ordinance approved by District Commissioners.

-Notify the Police Department regarding enforcement of curtailment actions and coordinate with them regarding the need for additional enforcement assistance.

-Work with the West Pierce Fire and Rescue to ensure that their operations and maintenance activities are consistent with actions listed in Appendix C for the Mandatory Stage.

-Restrict hydrant usage to essential purposes, including recall of hydrant meters previously issued. Require use of best management practices to reduce water use, meet operational needs, and provide for dust control.

-Work with the City of Lakewood's Community Planning and Development Department to defer landscape installation requirements until the shortage is over.

-Evaluate resources and plans for moving into the Emergency Curtailment stage. As appropriate, begin preparations.

Public Outreach

-The public will be notified immediately using one or more of the methods listed below. The District Manager will decide which method(s) will be most appropriate and effective based upon the specific situation:

- Automated phone calls using the District's choice of automated phone call services.

-Direct phone calls to the District's highest water users.

-Hand deliver pamphlets to households.

-Direct mailing to households.

-Use of District's website and social media platforms.

-When feasible, include some or all of the following information when communicating the restrictions to the public:

-Scope and nature of mandatory restrictions.

-Reasons for imposing restrictions.

- Demand reduction goals and ways to achieve those goals.
- Pending additional restrictions if goals not met.
- Enforcement mechanisms and fines.
- Projections for how long restrictions will be in place.
- Provide area landscape management and property management companies directly with water use restriction information.
- Contact irrigation customers using potable water and inform them that the District may shut off their irrigation meters in the event of an extreme water shortage situation.
- Post updated status reports on the District's web site.
- Establish a "Customer Hotline" or similar for residents to report violations of restrictions

Internal Operations Actions

- District-owned property irrigation will be restricted as proposed in Appendix D and will meet or exceed irrigation reduction goals being asked of the public.
- Enhance water quality monitoring actions as necessary.
- Fleet vehicles will be washed only at commercial facilities that recycle water and only when deemed necessary for public health and safety reasons. Notify District staff that this restriction is in place.

Stage 4: Emergency Stage

Objectives

- Ensure that throughout the water shortage, an adequate water supply exists to protect public health and safety including fire flow capacity.
- Sharply reduce water demand.
- Restrict certain defined water uses in order to meet demand reduction goals.
- Ensure water quality remains at the highest level possible.

Triggers:

In this stage, triggers indicate that a critical water situation exists and that without additional significant curtailment actions, a shortage of water for public health and safety would be imminent.

100% of P3 for 1 day

Emergency Stage Actions

Coordination

-The District Management Staff along with The Board of Commissioners will define the water shortage as an emergency and work through the District's General Manager to implement procedures to formally declare a Water Shortage Emergency.

-The District Management Staff will recommend to the District's General Manager a list of water use restrictions, prohibitions and exemptions for consideration. Restrictions and prohibitions may include any of the following:

Emergency – Step 1

-Residential customers are allowed to water only 1 day per week: 1 day per week

-Addresses ending in 0, 2 can water: SUNDAY

-Addresses ending in 1 or 3 can water: MONDAY

-Addresses ending in 4 or 6 can water: TUESDAY

-Addresses ending in 5 or 7 can water: WEDNESDAY

-Addresses ending in 8 can water: THURSDAY

-Addresses ending in 9 can water: SATURDAY

-Commercial/large irrigators are allowed to water only one day per week or implement a plan that would reduce irrigation water use by at least 50%.

-Exemption for new landscapes would remain in effect.

-Prohibit use of any ornamental fountains using potable water for operation.

-Prohibit car washing except at commercial car wash facilities that recycle water.

-Rescind all hydrant meters.

-Prohibit washing of sidewalks, streets, decks and driveways.

-Prohibit use of potable water for pressure washing of buildings.

-Prohibit filling or adding potable water to swimming pools at public and private facilities.

-Prohibit the use of water in training exercises and flushing activities by the Fire Department until the emergency is over.

Emergency – Step 2

-Prohibit all lawn/turf irrigation.

-Prohibit all irrigation of gardens and ornamental landscapes.

-Prohibit irrigation of new landscapes as well (exemption for landscapes <12 months of age no longer in effect).

-Prohibit use of any ornamental fountains using potable water for operation.

-Prohibit car washing except at commercial car wash facilities that recycle water.

-Rescind all hydrant meters.

-Prohibit washing of sidewalks, streets, decks and driveways.

-Prohibit use of potable water for pressure washing of buildings.

-Prohibit filling or adding potable water to swimming pools at public and private facilities.

-Prohibit the use of water in training exercises and flushing activities by the Fire Department until the emergency is over.

-Implement a short term emergency billing rate schedule designed to financially impact users who fail to follow emergency water use guidelines.

-Exemptions may include:

-If dust control is required to comply with air quality standards and dust control and other hydrant uses are determined to be necessary to meet essential health and safety requirements, water may be applied to construction or other areas at the minimum rate necessary to achieve the desired result, provided that all appropriate best management practices are being employed.

-Customers with special medical needs, such as home dialysis, will be exempted from any emergency restrictions, provided these customers are included on the District's dialysis notification list or they notify the District of such a need. Their exemption will not apply to outdoor water use.

-Increase enforcement actions in accordance with the applicable ordinance approved by The Board of Commissioners.

-Provide training for staff and deploy additional "Water Watcher" patrols. Reach out to City of Lakewood CERT (Citizens Emergency Response Team) members to become active members of the "Water Watcher" patrols.

-Notify the Police Department regarding enforcement of curtailment actions and coordinate with them regarding the need for additional enforcement assistance.

-The District Management Staff will increase the frequency of reports to the District Manager and Board of Commissioners. Reports will provide detail on the implementation of the Emergency Curtailment Stage and customer response data.

Public Outreach

-The public will be notified immediately using one or more of the methods listed below. The District Management Staff will decide which method(s) will be most appropriate and effective based upon the specific situation:

- Automated phone calls using the District's choice of automated phone call services.
- Directed phone calls to the District's highest water users.
- Hand deliver pamphlets to households.
- Direct mailing to households.
- Use of District's website and social media platforms.

-When feasible, include some or all of the following information when communicating the restrictions to the public:

- Scope and nature of mandatory restrictions.
- Reasons for imposing restrictions.
- Demand reduction goals and ways to achieve those goals.
- Pending additional restrictions if goals not met.
- Enforcement mechanisms and fines.
- Projections for how long restrictions will be in place.

-Clearly identify and communicate exemptions from water use curtailment, such as for medical facilities and other public health situations.

-Inform customers about possible pressure reductions and problems this may cause.

-Provide area landscape firms with water use curtailment information to facilitate their compliance and ability to explain the need for compliance to their customers.

-Provide contractors and landscape firms with information on locations to obtain reclaimed water for street cleaning, construction projects, landscape irrigation, dust control, etc. if available.

-Post updated status reports on the District's website.

Appendix A:

Lakewood Water District Shortage Response Contact List

A working list of contacts for easy reference should be developed and regularly updated by District Management Staff. In the event of a water shortage caused by a drought, the following will be contacted directly. They will be apprised of the situation, and their support and cooperation in reducing demand will be requested.

Other Public Agencies

- City of Lakewood
- City of Steilacoom
- Western State Hospital
- Wholesale Customers
- Clover Park School District
- Clover Park Technical College
- Pierce County
- Pierce County Health Department
- State Department of Ecology
- State Department of Health

High Water Use Customers

- List Updated Annually

Landscape Interests

- City of Lakewood
- Lakewold Gardens
- Oakbrook Golf Course
- Tacoma Country Club
- Fort Steilacoom Golf Course
- Local landscape contractors
- Local nurseries

-Washington Association of Landscape Professionals

-Washington State Nursery and Landscape Professionals

Business Groups

-Lakewood Chamber of Commerce

-Lakewood Rotary Club

-Lakewood Towne Center

Appendix B:

Mandatory Restrictions – Enforcement Procedural Checklist

_____ Violations of the water use restrictions constitute civil violations, as explained in Resolution xxx. Upon determination by the General Manager that a violation has occurred, a written notice, allowing for voluntary correction, as described in Resolution xxx will be issued. All subsequent offenses will be charged using the same schedule provided in Resolution xxx, as follows:

- 1st day of each violation: \$100 fine
- 2nd day of each violation: \$200 fine
- 3rd day of each violation: \$300 fine
- 4th day of each violation: \$400 fine
- Each additional day of violation beyond four days: \$500/day

_____ Assign and train staff with customer service and communication experience to “Water Watch”, providing an explanation to the customer regarding the violation, suggestions for correcting the problem, and a reminder that further offenses result in fines.

_____ Print self-duplicating “Notice of Violation” forms: one copy for location where violation occurred, one to report violation to Utility Billing to enter into HTE, one to send out with the bill, and one for internal records. Print violations and fines on the Notice of Violation.

_____ Track violations in HMS. When violations with corresponding fines (1st, 2nd, 3rd, 4th and subsequent offenses) are entered, HMS will add the infraction fine directly to the water bill.

_____ Establish “due process” to consistently collect and document evidence of violations. Violations must be documented by a Water Watcher in the following way:

1. Record date, time, location, type of violation on a Notice of Violation form.
2. Take a photograph of the offense.
3. Note corroboration from any witnesses to the violation.
4. If the violation is not witnessed first-hand by a Water Watcher and a photograph is not obtained, the suspected violator can be issued only a warning.

_____ Establish a “hotline” for customers to report violations. To help avoid frivolous complaints, recorded message should note that only complaints with name and address of complainant will be pursued.

Appendix C:

West Pierce Fire and Rescue Shortage Response

The Fire Department uses water in a variety of ways. These uses include:

- Fire hydrant pressure testing.
- Vehicle washing.
- Training (wet training).
- Irrigation.

The following explains how these water uses might be affected during the four stages of drought response.

Advisory Stage

At this stage, we would be communicating a possible water supply shortage to our customers. It may make sense to schedule any line flushing or wet training for earlier in the season in case restrictions are in place.

Internal Action Stage

In this stage, the District would be asking its staff to reduce their water use by a certain amount (generally about 10 percent). The Fire Department may change their water use at this stage in the following ways:

- Vehicle washing: Currently, several of the vehicles washed or at least rinsed daily. Washing is more frequent during the wet season, when vehicles are muddy. During this stage, vehicles would only be washed if they have mud on them but could continue to be rinsed each evening.
- Fire hydrant testing: Testing could still occur at this stage.
- Training: Scheduled training could still occur at this stage. However, the need for the training should be weighed carefully against the water use.
- Irrigation: Irrigation of landscape should be slightly reduced at this stage.

Mandatory Stage

At this stage, we would acknowledge a serious water supply shortage. Water use restriction would be enforced with fines. The Fire Department may alter their water use in the following way at this stage:

-Vehicle washing: As in the Internal Action Stage, vehicles would only be washed or rinsed if there is mud on them.

-Fire hydrant testing: Testing should be postponed during this stage.

-Training: Scheduled training should not occur at this stage. If this stage continues for more than one-month, limited training exercises would resume.

-Irrigation: Irrigation of landscape should be reduced further at this stage.

Emergency Stage

At this stage, the utility would be faced with a critical water supply shortage. The goal would be to provide enough water to provide for our customers' health and safety during the duration of the emergency. No outdoor irrigation would be allowed for any of our customers. At this stage, the Fire Department would need to change their water uses in the following ways:

-Vehicle washing: Vehicles would only be washed if there is mud on them. No rinsing could occur. Vehicles that can fit in commercial washes must be washed only at facilities that recycle water.

-Fire hydrant testing: Testing may not occur during this stage.

-Training: Scheduled training may not occur at this stage.

-Irrigation: Irrigation of landscape may not occur at this stage.

Appendix D:

City of Lakewood Parks Department Alternative Irrigation Plan

This plan will provide for reductions in irrigation water usage that meet thresholds provided for each of the stages of the Water Shortage Response Plan. The plan reduces water use at City owned parks, streetscapes and other facilities by shifting irrigation schedules and prioritizing City facilities based on the age of landscaping, watering needs and public use.

In Stage 2, the Internal Action Stage, water use consumed through non-exempt meters will be reduced by 10%.

Stage 3, the Mandatory Stage, provides for water use reduction of 25%.

In Stage 4, the Emergency Stage – Step 1, provides for water use reduction of 50%, which would also be required for playfields. During the Emergency Stage – Step 2, all outdoor watering at City-owned facilities would cease, to comply with the severity of the situation and related restrictions

Appendix E:

Water Watcher Staffing Assignments

-All District staff will watch for violations when in the field as they go about their usual business.

-During the Advisory and Internal Action Stages, meter repair technicians would watch for noncompliance with the odd-even watering schedule and hang “friendly reminder” door hangers where appropriate.

-During the Mandatory and Emergency Stages, Water Watchers would respond to calls (information about suspected violations will be left by the public on a “hotline”) about violations. Staff available for duty may include: Water Quality Technician, Cross Control Connection Specialist, District Construction Crews, District Inspectors, CERT teams and Senior Patrols.

-Water Watchers would investigate complaints, interact with customers for 1st offenses (friendly encounters) and gather evidence for all offenses.

-Police Officers would deliver civil violation notices for subsequent offenses involving fines. It is expected that there will be very few civil violations. Police officers could complete this task as time allows, since the evidence will have been gathered previously by the Water Watchers and the fines will be included on the water bills.

Appendix F:

Procedure for Exemptions

-Customers may request exemption for the following water uses:

- irrigating new landscapes installed within the past 12 months.

- irrigating ball fields used regularly by community sports teams.

- water use for dust suppression to meet air quality standards.

-Customers will submit exemption request to District Manager,

-If approved, Utility Billing will flag customer account in billing system

-Customer will be provided a sign for posting to indicate exemption has been granted

Appendix G:

Present Possible Production (P3) Last updated: February 12, 2018,

For the annual period beginning June 1, 2018 unless modified by the District Management Staff at a sooner date, the P3 value, and corresponding triggers are identified as:

P3: 40 million gallons per day (MGD)

Stage 1 Trigger: Every summer

Stage 2 Trigger: STEP 1: 32 MGD or greater for 1 day

STEP 2: 36 MGD or greater for 1 day

Stage 3 Trigger: 38 MGD or greater for 3 days, or

38.8 MGD or greater for 1 day

Stage 4 Trigger: 40 MGD for 1 day

Appendix H:

2015 Cascade Water Grant Study of Effects of Prolonged Drought

CASCADE WATER DROUGHT STUDY

“BREAKING” THE LWD SYSTEM

In order to clearly define the conditions that would lead to a “California” style drought disaster in the western region of Washington State, the participants in the Cascade Water Alliance grant study were tasked to create a scenario designed to result in significant negative connotations for their individual systems. The Management staff of Lakewood Water District has defined “breaking the system” as a point in a prolonged drought where the District has suspended supplying water to its wholesale customers and needs to institute mandatory demand curtailment policies within its service boundary area. Understand, the nature of the exercise is to create a worst case scenario. There are many extenuating circumstances that could significantly change the outcome in real world conditions with both positive and negative ramifications to the District’s ability to provide water with or without mandatory curtailment.

In order to create the scenario, Tacoma area precipitation data from 12/71 to present (see Fig 1) and thirty (30) years of well elevation and production data were used. System capacity was determined by taking the average difference in maximum and minimum gpm flows and maximum and minimum drawdown levels for every well in each of the three primary aquifers...A, C, and E. The G aquifer was not modeled since there is currently only one well whose production contributes less than 0.4% of the total system capacity. The max and min levels were determined using the District’s Well Saver Control parameter settings. Once the individual well has reached the minimum drawdown level the program shuts the well down and prohibits use until aquifer levels rise sufficiently to permit re-start.

The scenario assumes that the majority of aquifer regeneration results from area precipitation amounts and not mountain snowpack levels. The scenario is based on an eleven (11) year reduced precipitation cycle. Year 0 is a period with normal precipitation (37.98” forty-three year average), normal demand (9.3 – 9.7 MGD), and normal aquifer level/pumping conditions. Year 1 of the scenario precipitation level is 23.46” which corresponds to the year 2000 which is the lowest rainfall year in the data set. Precipitation data for years 2-10 is based on the average rate of decline seen from 1991 to 1993 (Fig 1). Remember, worst case scenario!

In Figures 2, 3, and 4, Column 1 is obviously the year. Column 2 represents capacity levels under normal (average precipitation, average well levels, and average demand/production) conditions. Column 3 represents percentage of capacity loss. The average rate of drawdown decline for the wells in the particular aquifer based on the difference between 2000 well level data and 2007 (normal precipitation year) well level data. Column 4 represents the average percentage of drawdown before the aquifer fails to produce sufficient water for continued usage. For example, the average drawdown in the A aquifer before failure is 28%, therefore, anything under 72% of total

capacity becomes critical. Likewise, the C aquifer can only sustain a 16% decline and the E aquifer a 17% decline. Column 5 represents the precipitation amount based on rate of decline as seen in the data set. Lastly, Column 6 represents the percentage of contribution the individual aquifer makes to the Peak Demand Day using 2000 and 2007 comparison production data.

Figure 5 represents a comparison between declining system capacity and demand forecast. Once again, Column 1 is the year while Columns 2, 3, and 4 are the percentages that each aquifer system contributes to the Average Demand Day (using 2007 data). Column 5 is the combined contribution to ADD. Column 6 (dark blue line) is the percentage of 9.3 MGD (ADD) compared to the District's total Qa water right with an annual increase of 1.65% as noted in the District's Comp Plan. Column 7 (green line) forecast is based on the 1987 highest production year plus the 1.65% increase.

Results: Figures 2 and 3 clearly show that for Aquifers C and A drought years 5 through 7 are critical years. C aquifer loses capacity in year 6 and A aquifer loses capacity in year 7. Although E aquifer does not lose capacity until year 9 (Fig. 4), the scenario does not take into account the effect that increased dependency on ground water sources by surrounding purveyors will have on E aquifer sources. It is a fair assumption that Tacoma will rely heavily on their E and C aquifer well fields after year 2 if the decline in precipitation translates into a decline in snowpack and higher mean annual temperatures. Also, JBLM will need to rely more on its ground water sources as the Sequimichew artesian flow rate diminishes. Therefore, E aquifer failure may be closer to years 7 and 8. Figure 5 clearly demonstrates that under extreme conditions, there is a point where the District's ability to meet flow demands could be severely compromised. The data would suggest that somewhere in the 5 to 7 year period (hopefully closer to 5) critical decisions will need to be made to avoid the "break the system" scenario. An increased emphasis on additional G aquifer wells in the District's long term planning may be the solution to both drought and potential effects of climate change.

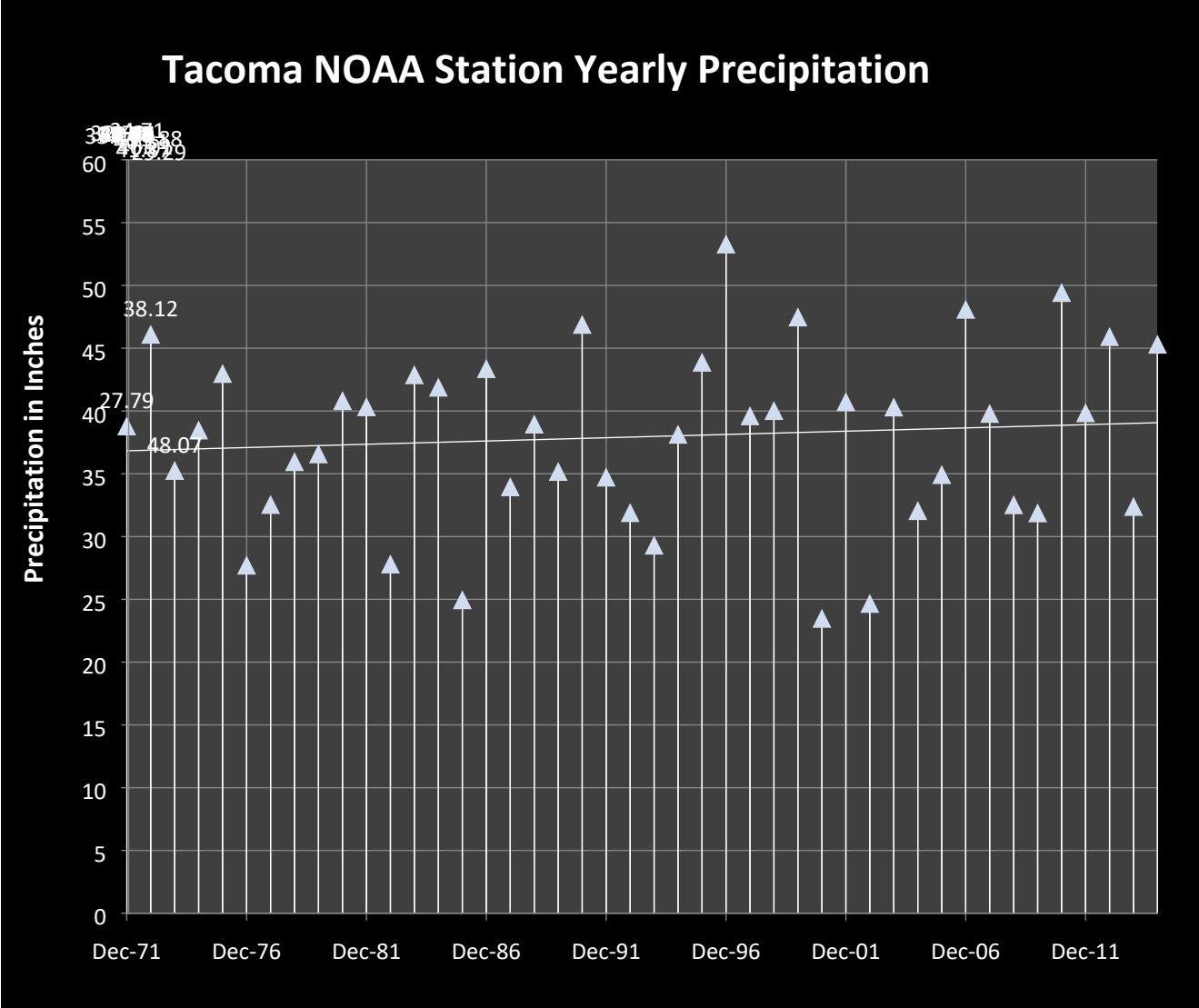


Fig. 1

Year	% A Aquifer Normal Precip	% Capacity Loss	% Loss A Aquifer Fail	Precip in Inches	% of PDD			
0	100	100	72	37.98	28.06			
1	100	93	72	23.46	26.1			
2	100	88.52	72	21.63	25.71			
3	100	86.4	72	19.94	25.32			
4	100	82.94	72	18.38	24.44			
5	100	79.62	72	16.95	23.58			
6	100	75.64	72	15.62	22.28			
7	100	71.84	72	14.40	5.00			
8	100	68.26	72	13.28	4.93			
9	100	64.85	72	12.24	4.85			
10	100	61.61	72	11.29	4.78			

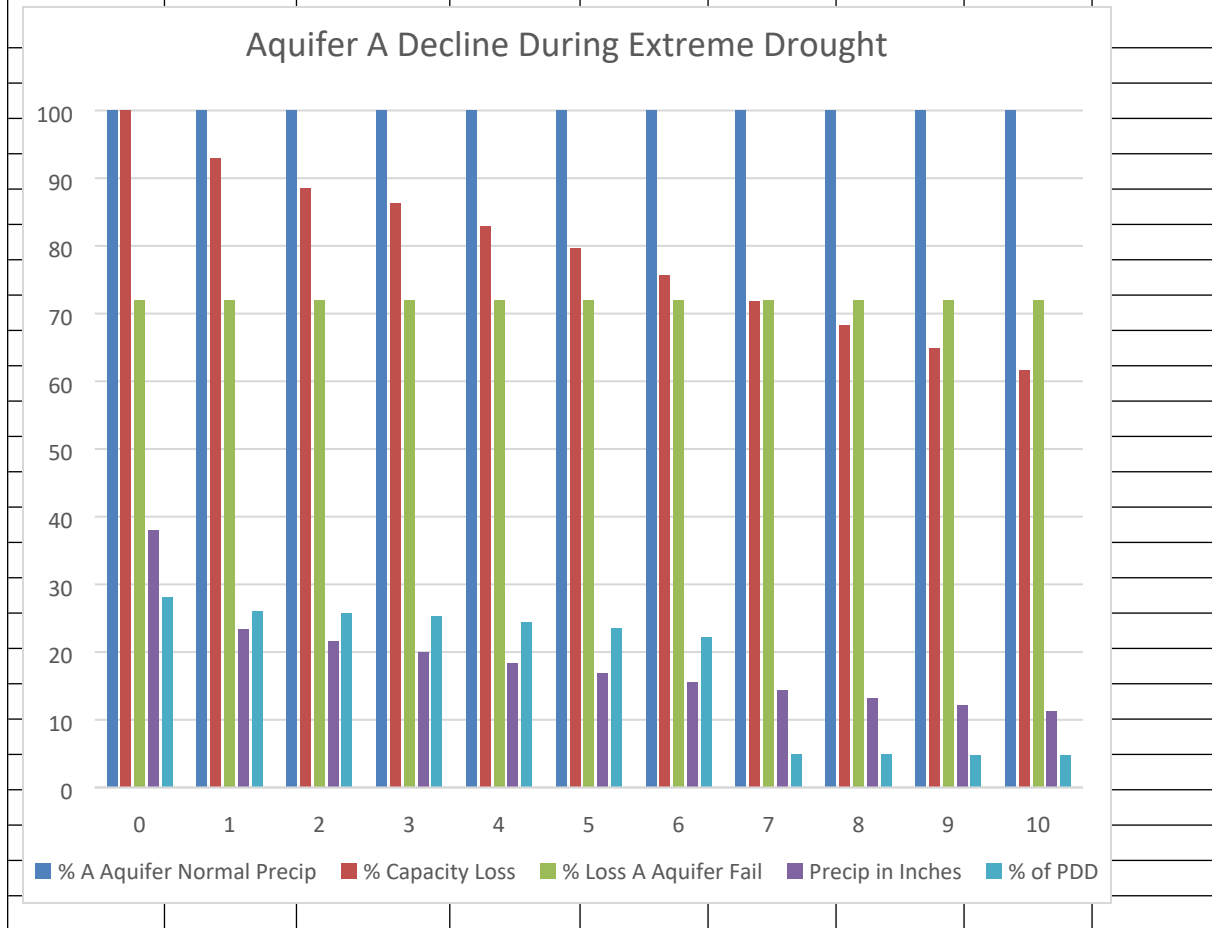


Fig. 2

Year	% C Aquifer Normal Precip	% Capacity Loss	% Loss C Aquifer Fail	Precip in Inches	% of PDD
0	100	100	84	37.98	13.5
1	100	91	84	23.46	12.3
2	100	89.32	84	21.63	12.07
3	100	87.66	84	19.94	11.85
4	100	86.04	84	18.38	11.63
5	100	84.45	84	16.95	11.41
6	100	82.89	84	15.62	7.36
7	100	81.35	84	14.40	4.75
8	100	79.85	84	13.28	3.06
9	100	78.37	84	12.24	1.98
10	100	76.92	84	11.29	1.27

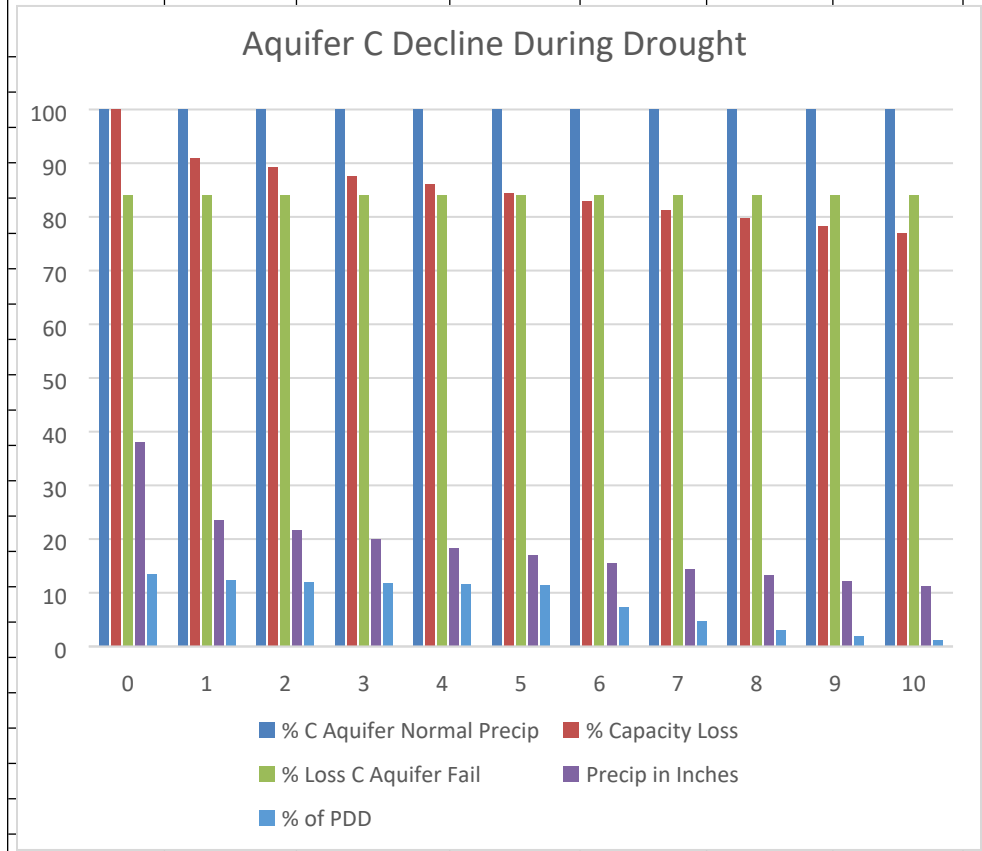


Fig. 3

Year	% E Aquifer Normal Precip	% Capacity Loss	% Loss E Aquifer Fail	Precip in Inches	% of PDD			
0	100	100	83	37.98	57.75			
1	100	97.67	83	23.46	56.4			
2	100	96.73	83	21.63	55.86			
3	100	95.80	83	19.94	55.32			
4	100	94.37	83	18.38	54.79			
5	100	92.01	83	16.95	53.97			
6	100	89.25	83	15.62	52.89			
7	100	86.57	83	14.40	51.57			
8	100	83.54	83	13.28	50.02			
9	100	80.62	83	12.24	48.52			
10	100	77.79	83	11.29	47.06			

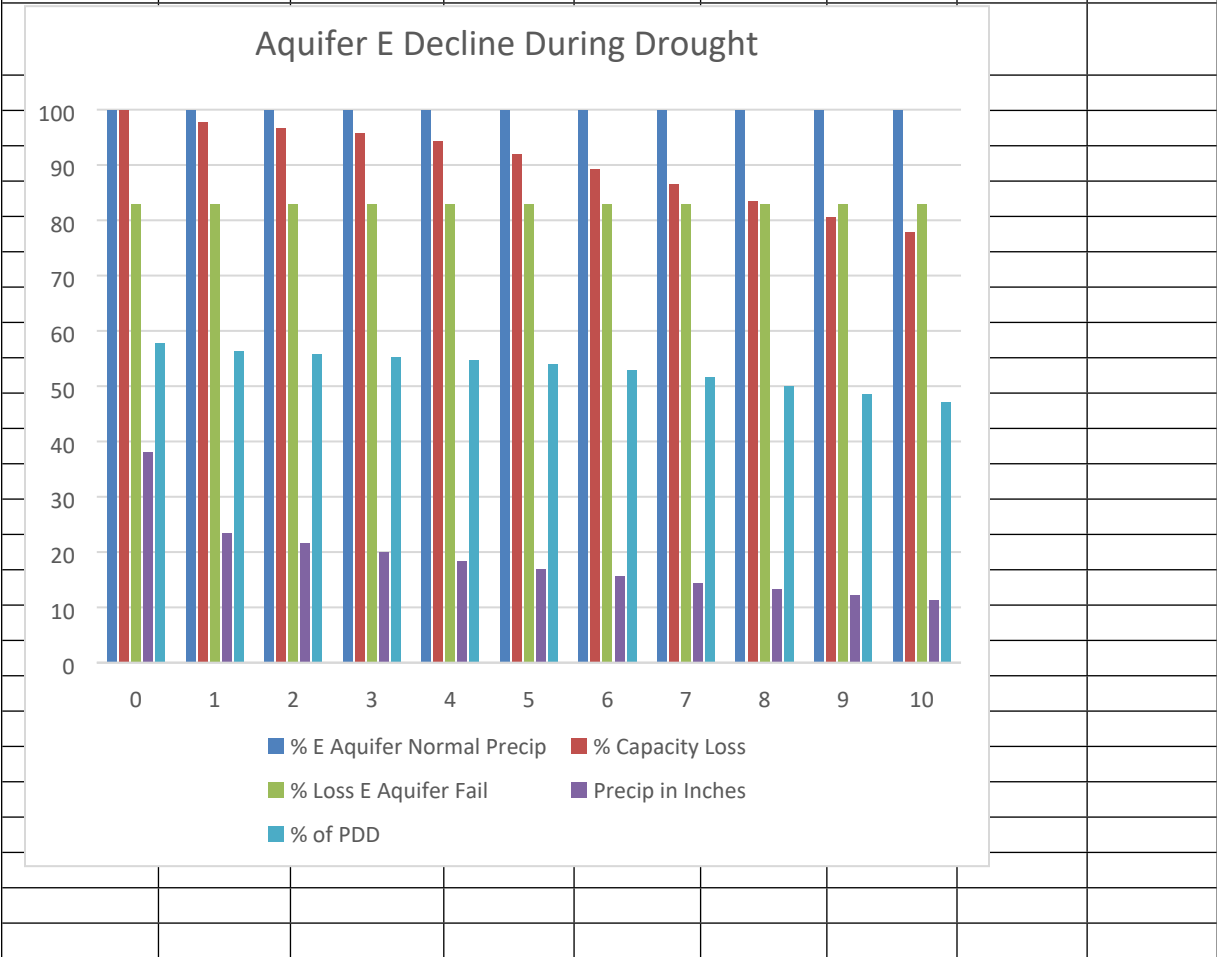


Fig. 4

Year	% A Aquifer ADD	% C Aquifer ADD	% E Aquifer of ADD	% Combined of ADD	% ADD of Total QA	% ADD+of Total QA
0	28.06	13.50	57.75	99.31	50.30	61.00
1	26.10	12.30	56.40	94.80	51.13	62.01
2	25.71	12.07	55.86	93.64	51.97	63.03
3	25.32	11.85	55.32	92.49	52.83	64.07
4	24.44	11.63	54.79	90.86	53.70	65.13
5	23.58	11.41	53.97	88.97	54.59	66.20
6	22.28	7.36	52.89	82.54	55.49	67.29
7	5.00	4.75	51.57	61.32	56.41	68.40
8	4.93	3.06	50.02	58.01	57.34	69.53
9	4.85	1.98	48.52	55.35	58.28	70.68
10	4.78	1.27	47.06	53.12	59.24	71.85

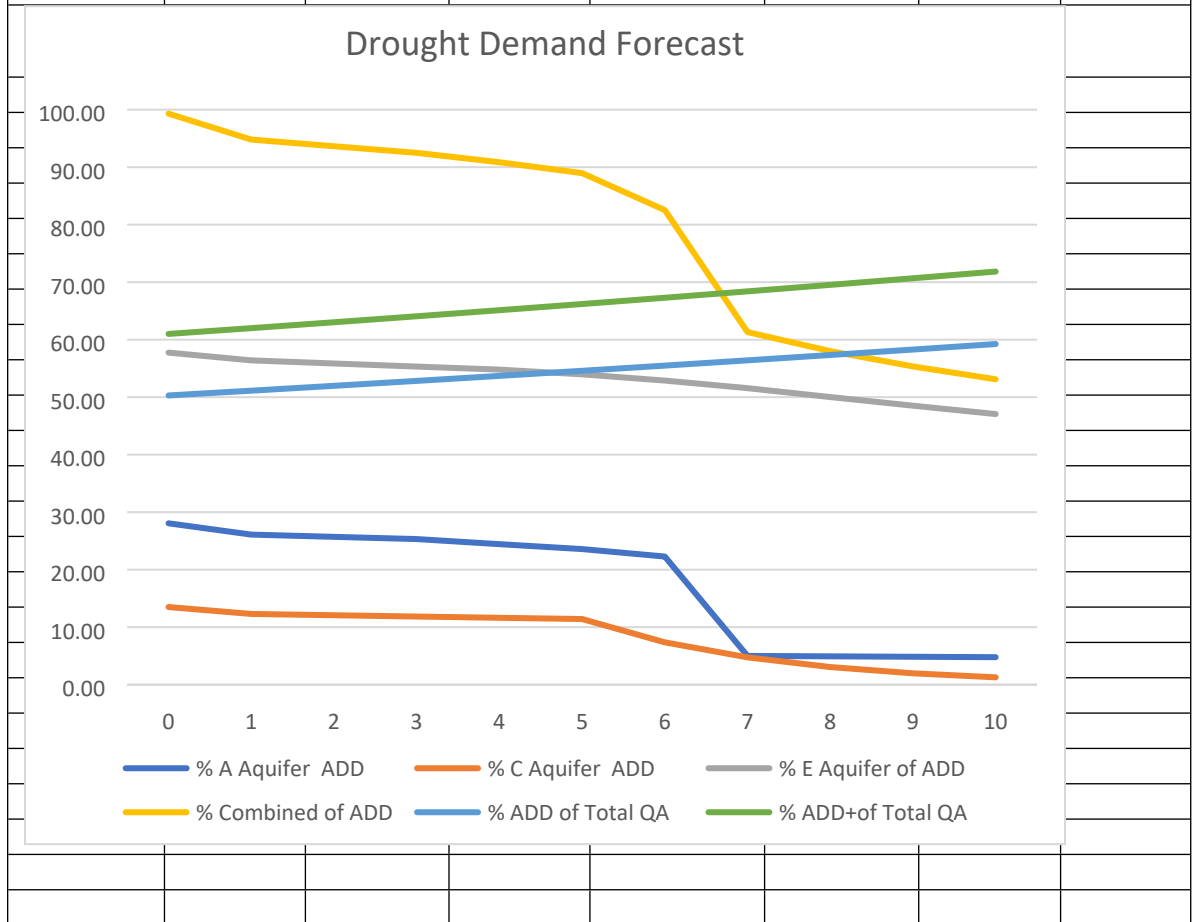


Fig. 5

Pertinent resolutions to the Comprehensive Plan

With the Board of Commissioners being the legislative body governing the District we have included what we feel are the most pertinent resolutions affecting the District operations from a high level. These include the latest rate increase resolution, decommissioning of wells additions of water rights purchases Wholesale pricing annexing of areas and asset life assessment resolution and the like. Currently that district has 1450 resolutions on the books. We have digitized the older resolutions for inclusion in to the Appendices.

RESOLUTIONS

10	Adoption of comprehensive plan of water supply	June 1945
11	To acquire the 12 inch water main serving the Naval Advance Base Depot	September 1945
12	Providing funds for water facilities	September 1945
13	Providing for the sale of water- rates and prices	September 1945
15	Sale of water revenue bonds	November 1945
16	Providing for the delivery of water revenue bonds	December 1945
17	Furnishing water to Naval Advance Base Depot	March 1946
18	Establishing funds and creating accounts	April 1946
19	Acceptance of franchises	April 1946
20	Contract for Chicago Avenue water main extension	April 1946
#	Write-up of assets	November 1946
21	Rates of salary established for Agnes Hall, Wanda Hunt & Walter Ross	January 1948
22	Accepting addition to the district	January 1948
35	Transferring funds from customers advance payment fund to the general & construction fund	June 1948
36	Transfer of funds- Glenwood Ave. from Beverlyl Dr.	June 1948
37	Transfer of funds- Avenue Du Bois	September 1948
38	Transfer of funds – Highland Avenue	September 1948
39	Transfer of funds- Lake City Blvd.	September 1948
40	Announcing general election to elect a commissioner	December 1948
41	Amending certain sections of resolution 13	February 1949
42	Transfer of funds- Linwood Lane	January 1949
43	Transfer of funds- Cable property main extension	January 1949
45	New warrant issued to Standard Oil Co. to replace one lost	March 1949
46	New warrant issued to Standard Oil Co. to replace one lost	April 1949
A-1	Transfer of funds - Nyanza Park	May 1949
A-2	Transfer of funds - Nyanza Park No. 2	May 1949
A-3	Transfer of funds - Winrich - 87 th Street	May 1949
A-4	Transfer of funds – Lake Grove & 99th	December 1949
A-5	Transfer of funds – Fern Street	December 1949
A-6	Transfer of funds – Lindwood Meadows	December 1949
A-7	Transfer of funds – Oak Park	December 1949
A-8	Transfer of funds – M & M Addition – third	December 1949
A-9	Authorizing district to borrow funds to extend, enlarge, and otherwise improve supply & distribution of water	February 1950
A-10	Transfer of funds – Meadow Rd. & 88 th St.	March 1950
A-11	Transfer of funds – M & M second addition	March 1950
A-12	Transfer of funds – Alfaretta main extension	May 1950
A-13	Transfer of funds – Alfaretta main extension	May 1950
A-14	Transfer of funds – Whitman Ave. extension	May 1950
A-15	Resignation of A. H. Link	May 1950

A-15a	Amending resolution 13, creating a charge for removal of meter at customer's request	May 1950
A-16	Transfer of funds – Lake City Blvd. – Lawndale extension	July 1950
A-17	Transfer of funds – Oak Park extension	July 1950
A-18	Transfer of funds – Nyanza Grove	July 1950
A-19	Resolution amending section 2 of resolution 41- establishing a minimum charge for fraction of a month	
A-20	Transfer of funds – 84 th & South Tacoma Way	October 1950
A-21	Authorizing manager to sign County construction permits	November 1950
A-22	Conveyance of property to County at Gravelly Lake Dr. & Washington Blvd.	November 1950
A-23	Authorization of \$5,000 bond to be filed with Pierce County	November 1950
A-24	Transfer of funds – 87 th St. – Custer to Woodbourne	November 1950
A-25	Transfer of funds – Wootan Bros. – Oak Lane extension	November 1950
A-26	Transfer of funds – Lake Steilacoom Ave., west of Dekoven Dr.	November 1950
A-27	Transfer of funds – Woodbine Lane	November 1950
A-28	Transfer of funds – Cronin's first	November 1950
A-29	Transfer of funds – John Dower Rd. – project "A"	November 1950
A-30	Transfer of funds – John Dower Rd. – project "B"	November 1950
A-31	Transfer of funds – M & M third addition, Huson St. & Lake St.	November 1950
A-32	Transfer of funds – Interlaaken Park	December 1950
A-33	Quit claim deed to George & Laurie Rakness	December 1950
A-34	Increase Manager's salary (minutes only)	
A-35	Transfer of funds – Highland Ave. extension	February 1951
A-36	Transfer of funds – 122 nd St. extension	February 1951
A-37	Transfer of funds – 95 th St. – Fir Glen Park	February 1951
A-38	Transfer of funds – Park Hill – first addition	February 1951
A-39	Transfer of funds – Pagel's first addition	March 1951
A-40	Transfer of funds – Lawndale Ave. extension	March 1951
A-41	Transfer of funds – 87 th – Woodbourne- Edgewater	March 1951
A-42	Authorizing commissioners to borrow money	March 1951
A-43	Acceptance of franchise State Historical Rd. #1	
A-44	Transfer of funds – Washington & Berkley, Tillicum	April 1951
A-45	Transfer of funds – Winona Ave.	April 1951
A-46	Transfer of funds – Tract "B" – Park Hill – first addition	May 1951
A-47	Transfer of funds – Nyanza Park Dr. extension	June 1951
A-48	Transfer of funds – Bristol Dr.	June 1951
A-49	Amending resolution 13 – fire protection, service, rates & charges	June 1951
A-50	Main extension for M. E. Pitman, Jr.	July 1951
A-51	Transfer of funds – Oakwood Manor	July 1951
A-52	Transfer of funds – Fane Bell addition	September 1951

A-53	Transfer of funds – Sacramento St. from Maple to Meadow Rd.	September 1951
A-54	Comprehensive plan	September 1951
A-55	Election call for comprehensive plan	October 1951
A-56	Transfer of funds – Lawndale Ave. extension	October 1951
A-57	Issuance of \$600,000 revenue bond	December 1951
A-58	Transfer of funds – Whitman Ave. extension	December 1951
A-59	Transfer of funds – unit 2, tract B, Park Hill extension	December 1951
A-60	Salary increases – December 1951 (in minutes only)	
A-61	Sale of \$600,000 revenue bonds to Pacific N.W. Co.	January 1952
A-62	Payment of note - \$20,000 – National Bank of Washington	January 1952
A-63	Transfer of funds – Cronin’s 2 nd addition extension	March 1952
A-64	Transfer of funds – Fir Glen Park extension	March 1952
A-65	Acceptance of F. D. Metzger’s resignation	
A -66	Roland J. Day’s appointment	
A-67	Transfer of funds – Mountbrook Manor extension	April 1952
A-68	Contract award for 88 th & Pine tank	
A-69	Transfer of funds – bond to general fund	
A-70	Contract award for Washington Blvd. – Vernon Ave. extension	
A-71	Contract award for Clovercrest Estates	
A-72	Water service outside District (re: Hiner’s service)	
A-73	Ralph W. Coblenz employed as manager	
A-74	Contract award for Steilacoom Blvd. extension	
A-75	Transfer of funds – Sylvan Park – 88 th St.	June 1952
A-76	Contract award – Pinehurst addition	
A-77	Authorization to sign checks- National Bank of Washington	July 1952
A-78	Authorization to sign checks – Puget Sound National Bank	July 1952
A-79	Amending resolution 13 – re: service pipes & special rates on 12” main supplying Naval Base	July 1952
A-80	Agreement releases	July 1952
A-81	Transfer of funds – Clovercrest Estates	August 1952
A-82	Transfer of funds – Pinehurst extension	August 1952
A-83	Salary increases – August 1952	August 1952
A-84	Manager of Lakewood Water District designated with authorities vested	September 1952
A-85	Transfer of funds – Clovercrest Estates, schedule “A”	September 1952
A-86	Transfer of funds – Lake Avenue West extension	October 1952
A-87	Transfer of funds – Alderwood Court extension	October 1952
A-88	Void	October 1952
A-89	Transfer of funds- Linwood Heights, 2 nd addition	October 1952
A-90	Front footage – south side of Lake St., Cronin’s 1 st , 2 nd & 3 rd addition	December 1952

A-91	Front footage – Ave DuBoise	December 1952
A-92	Front footage – Highway 99 – “A”	December 1952
B-1	Front footage – west side of Highway 99 and on Bridgeport Way, between Highway 99 and 111 th St.	January 1953
B-2	Front footage – 92 nd St. from Lorraine Ave., west to a point 200 feet west of the west boundary of Lawrence St.	January 1953
B-3	Transfer funds from general and construction fund to sinking and redemption fund	January 1953
B-4	Front footage - Steilacoom Ave., West of Vernon Ave.	March 1953
B-5	Cronin’s 3 rd – transfer of funds	April 1953
B-6	Amending resolution 13	April 1953
B-7	Front footage – Durango & 84 th Street	May 1953
B-8	Front footage – Bridgeport Way from Steilacoom Blvd. to south line of Plat of Lochburn	June 1953
B-9	Fairway-at-Lakewood – transfer of funds	June 1953
B-10	Resignation from board – McCann	June 1953
B-11	Authorization for releases by McCann	June 1953
B-12	Front footage – Alameda Ave & Moreland Ave	June 1953
B-13	Day’s appointment as secretary & treasury	June 1953
B-14	Authorization for bank signatures	June 1953
B-15	Authorization for bank signatures	June 1953
B-16	American Biscuit Co. – transfer of funds	July 1953
B-17	Front footage – 88 th St., east of Durango	July 1953
B-18	Extending length of time of contract on John Dower extension.	August 1953
B-19	Front footage - Pine Street & Walnut Street	August 1953
B-20	50 cent stand-by charge cancelled	August 1953
B-21	Social Security	October 1953
B-22	Waive interest on Avenue Du Bois extension	October 1953
B-23	Lakewood branch bank	October 1953
B-24	Rate schedule	October 1953
B- 25	Bank resolutions, authorizing signatures	November 1953
B-26	Bank resolutions, authorizing signatures	November 1953
B-27	Horace Wright – Clover Creek Dr. (extension of time on agreement)	November 1953
B-28	Transfer funds from general bond to sinking and redemption fund	November 1953
B-29	Authorizing the release of liens	January 1954
B-30	Freigang – transfer of funds	January 1954
B-31	Hillcrest – transfer of funds	January 1954
B-32	Freigang main extension	January 1954
B-33	Front footage - Thorne Lane	January 1954
B-34	Bank resolution	March 1954
B-35	Bank resolution	March 1954

B-36	Amending resolution B-29 – release of liens	March 1954
B-37	Front footage – Union Avenue	April 1954
B-38	John Dower Road extension	April 1954
B- 39	Front footage - 99 th & Belmont	June 1954
B-40	Front footage - Kline, Hayden & Pacific	June 1954
B-41	Front footage - Steilacoom Ave., east of Vernon	June 1954
B-42	Amending resolution B-32	June 1954
B-43	111 th St. front footage charges & special charges for Wambem & Davisson	August 1954
B-44	Revision of resolution B-19, Pine St. charges	August 1954
B-45	112 th St. main extension	September 1954
B-46	San Francisco main extension	September 1954
B-47	Lot 6, block 6, Lake City addition – on Forest Ave.	September 1954
B-48	Transfer funds – Southgate first addition	September 1954
B-49	Rates on Hemlock Hill - \$2.50 minimum rate	October 1954
B-50	Front footage - Kenwood Avenue west from Edgewood Avenue	October 1954
B-51	Front footage - Phillips Road	October 1954
B-52	Transfer from general fund to bond sinking and redemption fund	November 1954
B-53	Front footage - Hewitt-Steilacoom Road	November 1954
B-54	Front footage - Meadow Rd. & 88 th St. to Steilacoom Blvd.	December 1954
B-55	Front footage - 88 th St., west of Bridgeport to Vassault	December 1954
B-56	Front footage - North Lake Drive	January 1955
B-57	Lease to fire district	March 1955
B-58	Lease to Optimist Club	March 1955
B-59	Front footage - Huggins – Meyers Rd.	June 1955
B-60	Front footage - Edgewood Avenue	June 1955
B-61	Front footage - Adams Street	June 1955
B-62	Front footage - Laurel Avenue	June 1955
B-63	Deed to County – Hemlock Street	September 1955
B-64	Accept Southgate second addition – water mains	September 1955
B-65	Transfer of funds – Southgate second addition	September 1955
B-66	Front footage - Winona Avenue	September 1955
B-67	Front footage - north side of 86 th from Custer to Woodbourne	September 1955
B-68	Front footage - south side of 92 nd St., east from Lorraine	September 1955
B-69	Front footage - south side of North Way, west of Hipkins	October 1955
B-70	Front footage - south Warner from 88 th to 90 th	October 1955
B-71	Front footage - Kenwood, Nottingham, Newgrove, west of Edgewood	October 1955
B-72	Front footage - Barlow second addition, east side of Bridgeport	October 1955
B-73	Front footage - East side of Highway 99, fire station main	October 1955

B-74	One inch extension and shut off valve	November 1955
B-75	Acceptance of Barlow Lakes extension	November 1955
B-76	Transfer funds – Barlow Lakes	November 1955
B-77	Acceptance of highway crossing for fire station main	January 1956
B-78	Increase in connection charges	January 1956
B-79	Transfer to bond redemption fund	January 1956
B-80	Authorizing Kempe to sign releases	January 1956
B-81	Fire meter standby charges	January 1956
B-82	Front footage - Steilacoom Blvd. from Freigang main to Hewitt- Steilacoom Rd.	January 1956
B-83	Front footage - Alameda from Lawndale to Steilacoom Avenue	January 1956
B-84	Hemlock Hill water rates and charges	January 1956
B-85	Front footage - Washington Blvd. to Lake Louise	January 1956
B-86	Revising front footage charge for water mains	January 1956
B-87	Accept offer of Homes Inc.	March 1956
B-88	Accept Hemlock Hill tank bid	March 1956
B-89	Acceptance of bid for Southgate third addition	April 1956
B-90	Front footage - 90 th Street extension	April 1956
B-91	Patching repair charges and connection charges	April 1956
B-92	Figuring main construction costs	April 1956
B-93	Front footage - Paine Street	April 1956
B-94	Front footage - 93 rd Street	April 1956
B-95	Front footage - Forest Avenue	May 1956
B-96	Front footage - Steilacoom Avenue, west of Alameda	May 1956
B-97	Front footage - Kendrick Street	May 1956
B-98	Awarding contract – Hemlock Hill	May 1956
B-99	Accepting mains in Southgate third addition	June 1956
B-100	Transfer of funds – Southgate third addition	June 1956
B-101	Extension of Navy Base contract	June 1956
B-102	Examiner's report	June 1956
B-103	Front footage - Steilacoom Avenue, west of Edgewood	June 1956
B-104	Booster system on Nyanza Hill	July 1956
B-105	Annexation	July 1956
B-106	Acceptance of new tank foundations – Hemlock Hill	July 1956
B-107	Signatures not required on payroll	July 1956
B-108	Acceptance of American Pipe & Construction Co.	August 1956
B-109	Award Star Machinery Co. bid for submersible pump	August 1956
B-110	Front footage - Meadow Road	August 1956
B-111	Correcting charges made to certain builders	August 1956
B-112	Acceptance of annexation	September 1956
B-113	Basis for payment - amending resolutions B-91 & B-92	September 1956
B-114	Front footage - Cedar Street south from 92 nd	September 1956

B-115	Front footage - Vernon Ave., north from Washington Blvd. and on Moreland Ave. between Vernon & Alameda Ave.	September 1956
B-116	Front footage - Meadow Road, south from Custer Road	September 1956
B-117	Amending resolution B-112 – annexation	November 1956
B-118	Acceptance for operation of 100,000 gallon tank – Hemlock Hill	November 1956
B-119	Transfer of funds to bond redemption fund	November 1956
B-120	Front footage – Winona Ave. between Alameda and Vernon SW	November 1956
B-121	Front footage - Old Military Road in Forest Park addition	November 1956
B-122	Front footage- east side of Highway 99, north from Southgate fire station.	November 1956
B-123	Transfer of funds – Fire Glen Park	November 1956
B-124	Front footage – Old Pacific Highway, north from Pacific St.	January 1957
B-125	Front footage – Lawndale Ave. between Alameda and Vernon Ave.	March 1957
B-126	Front footage – north side of Moreland Ave., west from Military Road	March 1957
B-127	Transfer of commercial account National Bank of Washington - Villa Plaza	March 1957
B-128	Sale of property to state – Ponders well site	March 1957
B-129	Acceptance of foundation for 1,000,000 gallon reservoir	April 1957
B-130	Acceptance of 1,000,000 gallon reservoir	April 1957
B-131	Acceptance of Hipkins Road and Tillicum well pumps	April 1957
B-132	Accepting bid of Byron Jackson for 1,200 GPM pump on Washington Blvd.	May 1957
B-133	Front footage – Alameda north from Moreland; Forest Avenue to Lake City Blvd.	August 1957
B-134	Front footage – 111 th St. from Kline to Old Pacific Highway; north on Old Pacific to Lake St.	August 1957
B-135	Awarding of contract for control system to service controls company of Portland	June 1957
B-136	Front footage – Terry Road 218 feet north from Washington Blvd.	August 1957
B-137	Acceptance of 1,200 GPM pump for maintenance and operation	August 1957
B-138	Acceptance of automatic controls	October 1957
B-139	Front footage – extension of 92 nd St. west to 120 ft. of Warner	October 1957
B-140	Bond redemption and interest fund transfer for 1958	November 1957
B-141	Front footage – Bernese Road	November 1957
B-142	Resignation of Robert J. Lloyd as commissioner	November 1957
B-143	Front footage – west side of Cedrona St., north from 102 nd to 101 st St.	December 1957
B-144	Charles McCallum’s appointment as commissioner	November 1957
B-145	Bank resolutions, authorizing signatures	December 1957
B-146	Bank resolutions, authorizing signatures	December 1957

B-147	Front footage – Alameda Ave. north from Forest to Laurel Ave. east on Laurel to Lake City Blvd., south on Lake City to Forest	December 1957
B-148	Resolution for hearing on petition – east of district	February 1958
B-149	Resolution accepting annexation to the east	March 1958
B-150	Front footage – Spruce St., Washington Ave. & Grant Ave., Tillicum	April 1958
B-151	Front footage – east side of Belmont Drive	April 1958
B-152	Resolution amending emergency turn-off charges	April 1958
B-153	Front footage – Butte Drive and further extensions	May 1958
B-154	Resolution authorizing purchase of lot 17, Griggs Acres	May 1958
B-155	Resolution granting easement City of Tacoma – Lake Avenue tank site	June 1958
B-156	Resolution establishing sick leave regulations	July 1958
B-157	Resolution establishing vacation leave regulations	July 1958
B-158	Front footage – 111 th St. to Gravelly Lake Dr. to Oak St.	August 1958
B-159	Front footage – north side of south 88 th St.	October 1958
B-160	Front footage – Southway	October 1958
B-161	Front footage – south side of south 92 nd St.	October 1958
B-162	Front footage – Lucerne Rd.	October 1958
B-163	Front footage – south side of Laurel Ave. abutting On block 5 and properties abutting on the east side Of block 5 & 10, Lake City addition	December 1958
B-164	Bond redemption and interest fund transfer for 1959	November 1958
B-165	Front footage – Washington Blvd. west from Old Military Rd. to Nottingham Ave., north to Moreland	November 1958
B-166	Front footage – San Francisco Ave., True Lane, McChord Dr., Boston Ave. and Chicago Ave.	November 1958
B-167	Front footage – Union Ave. & Berkeley Ave.	December 1958
B-168	Front footage – north side of South 94 th St., west 244 ft. from the northeast corner of Cedar St.	December 1958
B-169	Fire meter rate revision	December 1958
B-170	Resignation of Roland J. Day	December 1958
B-171	Appointment of Harold W. Gloyde as commissioner	December 1958
B-172	Corporate resolution of authority- Puget Sound National Bank – Lakewood	January 1959
B-173	Corporate resolution of authority – National Bank of Washington – Villa Plaza	December 1958
B-174	Acceptance of company house	January 1959
B-175	Front footage – Wildwood Ave. between Lake City Blvd. & Alameda	March 1959
B-176	Front footage – Huggins-Meyers Rd. northeast of Laurel	March 1959
B-177	Front footage – 95 th St., from Meadow Rd. to Lexington Ave.	March 1959

B-178	Front footage – east side of Holden Rd., south of Old Military Rd.	March 1959
B-179	Front footage – Montgrove subdivision	April 1959
B-180	Front footage – Lake St., southeast of Pacific Highway	April 1959
B-181	Front footage – Bristol Ave., south of Lake Steilacoom Ave.	April 1959
B-182	Amending B-84 – Hemlock Hill spate system	June 1959
B-183	Front footage – Kendrick St., north of Lake St.	June 1959
B-184	Dedication deed to county – lot 17, Griggs Acres	June 1959
B-185	Changing board of commissioners meetings to twice each month	June 1959
B-186	Front footage – Steilacoom Ave. west of Edgewood & Holden Rd. to Washington Blvd.	July 1959
B-187	Front footage – south 88 th St. (north side) Sylvan Park 8 th addition	September 1959
B-188	Front footage – 112 th St., between Holden Rd. & Butte Drive	August 1959
B-189	Front footage – South 92 nd St. (south side) Sylvan Park 8 th addition	September 1959
B-190	Bond redemption and interest transfer for 1960	November 1959
B-191	Front footage – Bridgeport Way, Seattle to San Francisco Ave	January 1960
B-192	Setting hearing date for annexation	January 1960
B-193	Annexation of area to the north of the district	February 1960
B-194	Front footage – Bridgeport Way between San Francisco & Seattle	April 1960
B-195	Charges for extension from mains already established into new or established plat.	May 1960
B-196	Increase deposits on tenants from \$5.00 to \$10.00	May 1960
B-197	Front footage – Laurel Ave. between Piermont & Lake City Blvd.	May 1960
B-198	Front footage – Forest Ave. between Piermont & Lake City Blvd.	May 1960
B-199	Front footage – South 99 th St. between Warner & Lorraine Ave.	May 1960
B-200	Front footage – Grant Ave. between Berkeley St. & Boundary St.	May 1960
B-201	Front footage – Wildwood Ave. between blocks 20 & 25, Lake City additions	May 1960
B-202	Front footage – Oak St. between 111 th St. & 112 th St.	May 1960
B-203	Front footage – 112 th St. west from northeast corner of replat of block 3 of Clovercrest Estates	May 1960
B-204	Front footage – Vernon Ave. from More Moreland to Skylark addition	May 1960
B-205	Hearing on petition for annexation, setting date 7/14/60	June 1960
B-206	Acceptance of annexation	July 1960
B-207	Front footage – John Dower County Rd. from Custer Rd. To Hewitt-Steilacoom	August 1960
B-208	Front footage – north side of Hewitt- Steilacoom County	

	Rd. west of John Dower Country Rd. to Chambers Creek	August 1960
B-209	Bi-monthly billing	August 1960
B-210	Front footage – south side of South 82 nd St. and the west side of South Lawrence St.	September 1960
B-211	Front footage – 101 st St., from Hemlock to Farwest Dr.	October 1960
B-212	Payment of compensation to commissioners (\$10 & \$25)	
B-213	Front footage – South 94 th St. west to South Lawrence St.	
B- 214	Bond redemption and interest transfer for 1961	November 1960
B-215	Front footage – Farwest Dr. from 101 st St. to 112 th St.	February 1961
B-216	Front footage – Lake Louise Dr. from melody Lane to 104 th	March 1961
B-217	Change of water rates, effective with April 1961 billings	March 1961
B-218	Establishing conditions for certain types of water users on 2 ½ acres etc.	March 1961
B-219	Front footage – Laurel Ave. (south side) west of Vernon Ave. extension	June 1961
B-220	Front footage – Paine St., north to Robin Hood Estates	July 1961
B-221	Front footage – South 82 nd St. from Lawrence St. to South Tacoma Way	July 1961
B-222	Front footage – 112 th St., west from Holden Rd. to Old Military Rd.	July 1961
B-223	Front footage – Occident St., from Lake to State Streets	October 1961
B-224	Front footage – Butte Dr. from northeast corner Franwood 3 rd and 660' north of 112 th St.	November 1961
B-225	Front footage – Old Military Rd. to 150' southeast of 112 th St.	November 1961
B-226	Bond S. & R. fund	December 1961
B-227	Authorizing membership in Washington State Association of Water District	January 1962
B-228	Front footage – Old Military Rd., newly from 112 th & any further extension	February 1962
B-229	Front footage – 101 st St., east from easement in Glenmar to Norwood Dr.	April 1962
B-230	Front footage – Freiday St. – 108 th to 11 th St.	April 1962
B-231	Front footage – south side South 92 nd from Sylvan 8 th to 25 th Ave. So.	April 1962
B-232	Eight cent mile for manager and superintendent's car	April 1962
B- 233	Madrona Hills booster pump	April 1962
B-234	Front footage – Dekoven Dr. from 96 th St. to 98 th St.	July 1962
B-235	Front footage – Butte Dr. between 1112 th & 104 th	July 1962
B-236	Front footage – Farwest Dr., between 101 st & 96 th	July 1962
B-237	Front footage – Custer Rd., Bridgeport Way, Deschutes (76 th St.) & Grange St. to Custer Rd.	August 1962
B-238	Front footage – Lake Grove Ave. southwest from Waverly Dr.	August 1962
B-239	Front footage – Custer Rd. between 77 th & 76 th	September 1962
B-240	Front footage – 96 th St. (Mt. Tacoma Dr.) Farwest Dr.	

	to Division Lane	September 1962
B-241	Front footage – Division Lane from 96 th St. to Marietta St.	September 1962
B-242	Front footage – Marietta St. east from Division Lane to east line of View Rd. & on View Rd. north to well sites	September 1962
B-243	Front footage – Marietta St. west 420 ft.	October 1962
B-244	Transfer of funds from the general & construction fund to the bond sinking and redemption fund	November 1962
B-245	Increase in service connection charges	December 1962
B-246	Authorizing payment of 1963 dues in Washington State Association of Water Districts	January 1963
B-247	Front footage – South 94 th , from Lawrence to Warner St.	October 1963
B-248	Front footage - Lawndale Ave., west of Edgewood & Nottingham St., from Lawndale to Kenwood Ave.	March 1963
B- 249	Front footage – 109 th St., between Glenrose Dr. & Halycon Rd. and on Halycon Rd. between 109 th & 108 th	April 1963
B-250	Front footage – Bridgeport Way from San Francisco to McChord Dr.	July 1963
B-251	Front footage – McChord Dr., from Bridgeport Way to True Lane	August 1963
B-252	Front footage – Ingleside Dr., and Glenwood Ave.	August 1963
B-253	Front footage – South Tacoma Way from 92 nd to Sales Rd.	September 1963
B-254	Front footage – Terry Rd., and any extension thereof	September 1963
B-255	State employees retirement system	October 1963
B-256	Pierce County Industrial Bureau insurance plan	October 1963
B-257	Front footage – Warner St., between South 92 nd & 94 th	October 1963
B-258	Transfer of funds from the general & construction fund to the bond sinking and redemption fund	November 1963
B-259	Transfer of \$50,000 from the general & construction fund to special deposit fund	October 1963
B-260	Investment in time certificates of deposit (5) banks	October 1963
B-261	Purchase of short term U.S. Government Securities, \$50,000	October 1963
B-262	Front footage – 110 th St. west to Halcyon Rd.	December 1963
B-263	Front footage – Pearl St. (59 th Ave.) & 88 th St. to Bridgeport Way	February 1964
B-264	Front footage – Carlyle Rd. (47 th Ave.) & McChord Dr. from Bridgeport Way to Carlyle Rd.	February 1964
B- 265	Purchase of short term Government Securities \$50,000	March 1964
B-266	Front footage – 112 th St. between Piermont & Deepwood Dr.	March 1964
B-267	Front footage – Phillips Rd. to “Oakbrook”	March 1964
B-268	Purchase of \$50,000 Government Securities	April 1964
B-269	Front footage – 112 th St. & Lakeview County Rd.	May 1964
B-270	Front footage – Maple St., southeasterly from Washington Ave.	May 1964
B-271	Front footage – 58 th Ave. in Racquet Club Est.	June 1964

B-272	Purchase of Government Securities - \$50,000	June 1964
B-273	Front footage – Bridgeport Way from 76 th St. to 64 th St. extension & 64 th St. extension	September 1964
B-274	Purchase of Government securities - \$50,000	September 1964
B-275	Front footage – 63 rd Ave. west from 64 th St. extension to Bridgeport Way	September 1964
B-276	Purchase of \$50,000 in Government Securities	October 1964
B-277	Front footage – Phillips Rd., north from Agate Dr.	October 1964
B-278	Warner St., from South 84 th to South 86 th St.	November 1964
B-279	Transfer of funds from general & construction fund to bond sinking & redemption fund	November 1964
B-280	Purchase of \$50,000 in Government Securities	November 1964
B-281	Purchase of \$50,000 in government securities	December 1964
B-282	Richard W. McCann to continue as manager for 12 months	December 1964
B-283	Purchase of \$100,000 in government securities maturing prior to 3/1/66	February 1965
B-284	Quit claim easement to Garold G. Gray	February 1965
B-285	Front footage – 109 th St. from Occident to Addison & Addison to 111 th	April 1965
B-286	Front footage – Winona Ave., Edgewood to Nottingham & Nottingham to Steilacoom Ave.	April 1965
B-287	Purchase of \$100,000 in government securities maturing prior to 11/1/65	April 1965
B-288	Front footage – 96 th St. (Mt. Tacoma Dr.) from Division Lane to 108 th Ave. & south to southwest corner of Royal Acres	April 1965
B-289	Front footage – 112 th St., Old Military Rd. to boundary of Westland	May 1965
B-290	Purchase of \$50,000 in Government Securities maturing prior to 12/1/65	May 1965
B-291	Front footage – 98 th St., south side for a distance of 430', north & south sides lying 913' east of Farwest to west boundary of hospital	June 1965
B-292	Authorizing Richard W. McCann & C. G. Kempe to sign as auditing officers	June 1965
B-293	Purchase of \$50,000 government Securities maturing prior to 1/1/66	June 1965
B-294	Front footage – Angle lane, from Norwood Dr. to Hipkins Rd.	September 1965
B-295	Purchase of \$100,000 Government Securities maturing prior to 11/1/66	September 1965
B-296	Transfer of funds to pay LWD water revenue bonds 1952 Series A	November 1965
B-297	Front footage – Hipkins Rd., south from “Oakbrook” to Steilacoom Blvd.	November 1965
B-298	Front footage – View Rd., Old Steilacoom Tacoma Rd. & Steilacoom Blvd. to western boundary of Western State Hospital	November 1965

B-299	Purchase of \$50,000 in government securities maturing prior to 12/1/66	November 1965
B-300	Purchasing of \$50,000 in government securities maturing prior to 1/1/67	December 1965
B-301	Purchase \$100,000 in government securities maturing prior to 1/1/67	December 1965
B-302	Amending resolution B-80 to exclude Richard W. McCann as one authorized to make releases	January 1966
B-303	Corporate resolution of authority – Puget Sound National Bank	January 1966
B-304	Corporate resolution of authority – Puget Sound National Bank	January 1966
B-305	Front footage - Woodbourne St., west side, north of 86 th St.	February 1966
B-306	Front footage – Kenrick St., south from 111 th to County Rd.	February 1966
B-307	Purchase of \$100,000 in Government Securities maturing prior to 4/1/67	February 1966
B-308	Dedication deed to Pierce County – Washington Blvd.	March 1966
B-309	Establishing rate for Oakbrook Golf Course	May 1966
B-310	Front footage – View Rd. north from Old Military Rd. to tie-in with Lakes High School	August 1966
B-311	Front footage – Phillips Rd. – northeasterly 1200 ft. from Jade Dr.	August 1966
B-312	Retaining Sleavin & Kors to prepare application for public works planning	August 1966
B-313	Front footage – 103 rd Ave. from Steilacoom Blvd. to south boundary of Krista Ct.	September 1966
B-314	Purchase of \$100,000 government securities maturing prior to 10/1/67	September 1966
B-315	Purchase of \$100,000 government securities maturing prior to 5/1/67	September 1966
B-316	Purchase \$50,000 government securities maturing prior to 7/1/67	September 1966
B-317	Resolution rescinding resolution B-233 (Madrona Hills booster pump)	October 1966
B-318	Authorizing filing of application with United States for planning of public work	October 1966
B-319	Transfer of funds	November 1966
B-320	Purchase of \$100,000 government securities maturing prior to 12/1/67	November 1966
B-321	Front footage – Old Military Rd. from 112 th to 114 th	December 1966
B-322	Front footage – 96 th St. west 950 ft from Highway 99	December 1966
B-323	Front footage – 100 th St. 970 ft westerly from Highway 99	January 1967
B-324	Purchase \$50,000 government securities maturing prior to 2/1/68	January 1967
B-325	Purchase of \$100,000 in government securities prior to 2/1/68	February 1967
B-326	Appointing attorneys and prescribing their compensation	March 1967

B-327	Acceptance of agreement for Public Works plan preparation	March 1967
B-328	Purchase of \$100,000 in government securities maturing prior to 5/1/68	March 1967
B-329	Front footage – Luzader Lane, north from 86 th St.	April 1967
B-330	Authorizing execution of agreement between LWD and Cornell, Howland, Hayes and Merryfield	May 1967
B-331	Resolution of authority, National Bank of Washington (adding Wayne E. Dunbar)	May 1967
B-332	Resolution of authority, Puget Sound National Bank (adding Wayne E. Dunbar)	May 1967
B-333	Authorizing Wayne E. Dunbar to sign releases	May 1967
B-334	Authorizing Wayne E. Dunbar to sign as auditing officer	May 1967
B-335	Authorizing & directing sale of former office building	June 1967
B-336	Front footage – 116 th St. & Alameda to Vernon Ave.	May 1967
B-337	Authorizing agreement between George Pongracz-Bartha & LWD	June 1967
B-338	Accepting new office building	July 1967
B-339	Purchase of \$100,000 in government securities maturing prior to 7/1/68	August 1967
B-340	Front footage – Bridgeport Way north from Clover Creek bridge to 123 rd St. & on 123 rd St.	August 1967
B-341	Resolution retaining Sleavin-Kors for survey work in connection with the HUD	August 1967
B-342	Purchase of \$100,000 of government securities maturing prior to 9/30/68	September 1967
B-343	Amending resolution B-182 – deleting \$50 hi-level charge on Hemlock Hill	September 1967
B-344	Authorizing purchase of \$50,000 in government securities maturing prior to 10/31/68	October 1967
B-345	Bond fund transfer	November 1967
B-346	Authorizing payments to CH2M and George Pongracz-Bartha from HUD funds	November 1967
B-347	Front footage – 123 rd St. east from existing main for 400 ft	December 1967
B-348	Purchase of \$100,000 in government securities maturing prior to 12/31/68	February 1968
B-349	Establishing “Comprehensive Plan” fund with county for HUD payments	January 1968
B-350	Accepting utility building for operation and maintenance	February 1968
B-351	Authorizing payments from HUD account	February 1968
B-352	Purchase of \$100,000 in government securities maturing prior to 3/1/69	February 1968
B-353	Changing board of commissioners meeting to 3 rd Monday, commencing with 3/18/68	February 1968
B-354	Authorizing conveyance of old building site to county	February 1968
B-355	Purchase of \$100,000 in government securities maturing prior to 4/1/69	March 1968
B-356	Authorizing execution of quit claim deed on portion of Old Max Frolic property (Highway 99)	March 1968

B-357	Front footage – Boundary St., from Grant Ave. to Woodlawn Ave.	March 1968
B-358	Acceptance of bid of Joe P. Kinney Paint and Sandblasting Co.	April 1968
B-359	Acceptance of 500,000 gallon tank at Oakbrook #2 for operation and maintenance	May 1968
B-360	Acceptance of bid of Pittsburgh- Des Moines Steel Co. for construction of Farwest Dr. & 100 th St. 500,000 gallon steel tank	May 1968
B-361	Front footage – Wildwood Ave. from Vernon Ave. to Alameda	June 1968
B-362	Purchase of \$100,000 in government securities maturing prior to 7/1/69	June 1968
B-363	Acceptance of cleaning & painting of various tanks	June 1968
B-364	Resolution setting new water service connection charges	June 1968
B-365	Resolution authorizing agreement retaining Marshall & Meyer, Inc.	July 1968
B-366	Resolution- 47 th Ave. north from 127 th St.	July 1968
B-367	Resolution approving planning documents submitted by CH2M	July 1968
B-368	Resolution adopting comprehensive plan for collection & disposal of sewage	August 1968
B-369	Front footage – Forest Rd west from Tower Rd.	August 1968
B-370	Purchase of \$100,000 in government securities maturing prior to 10/01/13	September 1968
B-371	Memoriam to Charles McCallum	September 1968
B-372	Appointment of W. W. Philip as commissioner	October 1968
B- 373	Resolution of Authority – Puget Sound National Bank	October 1968
B-374	Resolution of Authority – National Bank of Washington	October 1968
B-375	Purchase of \$100,000 in government securities	October 1968
B-376	Final payment from HUD loan	October 1968
B-377	Repealing refunds of contributions towards certain mains	November 1968
B-378	Bond fund transfer	November 1968
B-379	Front footage – Bridgeport Way from 83 rd to Custer Rd.	December 1968
B-380	Front footage – South 94 th St. (Fox County Rd.) from South Tacoma Way to Antonia	December 1968
B-381	Front footage – Custer Rd. from 76 th to 75 th and on 75 th to Dean St.	January 1969
B-382	Purchase of \$100,000 in government securities maturing prior to 3/1/70	February 1969
B-383	Purchase of \$100,000 in government securities maturing prior to 4/1/70	March 1969
B-384	Acceptance of 500,000 gallon elevated tank – Farwest Dr.	April 1969
B-385	Providing for exchange of property with Lakewood Elks	April 1969
B-386	New summer water rates for June through	May 1969
B-387	Front footage – 59 th Ave. west from Custer Rd. to 79 th St. W.	May 1969
B-388	Front footage – Thorne Lane North- from Portland Ave.	

	800 ft. east	June 1969
B-389	Abandonment of wells M-1 and M-2	June 1969
B-390	Front footage – South Pine St., 83 rd north to 80 th	July 1969
B-391	Front footage –Steilacoom Blvd., Old Steilacoom Tacoma Rd. to 108 th Ave.	July 1969
B-392	Front footage – Lake Louise Dr. from Clara Blvd. to 101 st	August 1969
B-393	Purchase of \$100,000 in government securities maturing prior to 8/31/70	August 1969
B-394	Purchase \$100,000 in government securities maturing prior to 10/1/69	September 1969
B-395	Purchase of \$100,000 in government securities maturing prior to 11/1/69	October 1969
B-396	Bond fund transfer	November 1969
B-397	Front footage – 83 rd Ave. north from 112 th St.	December 1969
B-398	Front footage – Pacific Highway, Sely 250 ft. from Humble Oil easement	December 1969
B-399	Membership in Washington State Association of Water Districts	December 1969
B-400	Front footage – Elwood Dr. for a distance of 650 ft. south from Onyx Dr.	January 1970
B-401	Front footage – 75 th St. west from Dean St. to 54 th Ave; north on 54 th Ave. to 74 th St. for a distance of 800 ft., south on 52 nd Ave. 690 ft.	January 1970
B-402	Approval and ratification for county to proceed with sewers	February 1970
B-403	Authorizing filing of application for HUD grant under PL 89-117	March 1970
B-404	Stating policy of LWD in acquisition of real property	March 1970
B-405	Front footage – Custer Rd. north for 400 ft. from 75 th St.	March 1970
B-406	Front footage – Custer Rd., northeasterly from Bridgeport Way to 60 th Ave. W.	June 1970
B-407	Front footage – 112 th St., west from Deepwood to Senwood	July 1970
B-408	Front footage – 75 th St. west, for a distance of 300 southeasterly	July 1970
B-409	Acceptance of 500,000 gallon tank at 104 th & Bridgeport Way	August 1970
B-410	Purchase of \$100,000 in government securities maturing prior to 11/1/71	October 1970
B-411	Purchase of \$100,000 in government securities maturing prior to 11/1/71	October 1970
B-412	Purchase of \$100,000 in government securities maturing prior to 11/1/71	October 1970
B-413	Front footage – Cody St., from 75 th St. to 76 th St.	October 1970
B-414	Purchase of \$50,000 in government securities maturing prior to 12/1/71	November 1970
B-415	Transfer of funds	December 1970
B-416	Front footage – Avenue DuBois, east from existing main	December 1970

B-417	Increase in Attorneys' fees to \$35.00 per hour	January 1971
B-418	Purchase of \$50,000 in government securities maturing prior to 6/1/72	May 1971
B-419	Front footage – South Warner St., 86 th St.	May 1971
B-420	Front footage – Nyanza Hill booster pump \$50.00 connection charge repealed	May 1971
B-421	Setting mandatory retirement age to 65 years	June 1971
B-422	Amending sick leave resolution B-156	August 1971
B-423	Investment \$100,000 maturing 6/30/72	September 1971
B-424	Investment \$100,000 maturing 7/30/72	September 1971
B-425	Investment \$50,000 maturing 8/30/72	September 1971
B-426	Front footage – 79 th St., Burgess St. & Cody St.	September 1971
B-427	Front footage – Farwest Dr., 96 th St. to Steilacoom Blvd.	September 1971
B-428	Investment \$100,000 maturing 9/30/72	October 1971
B-429	Investment \$50,000 maturing 10/31/72	October 1971
B-430	Front footage – 75 th St. from John Dower Rd. to Bridgeport Way	November 1971
B-431	Investment \$50,000 maturing 11/31/72	December 1971
B-432	Changing due date on statements to 30 days after billing date	January 1972
B-433	Investment \$50,000 maturing 12/21/72	February 1972
B-434	Front footage – 107 th Ave., from 104 th St. to 102 nd St.	March 1972
B-435	Front footage – Burgess St., from Custer Rd. to 78 th St.	
B-436	Investment \$50,000 maturing 1/31/73	May 1972
B-437	Front footage – 54 th Ave., from 74 th St. to Steilacoom Blvd.	June 1972
B-438	Resignation of Oliver Malm	June 1972
B-439	Appointment of Alvin G. Stearns	June 1972
B-440	Corporate resolution of authority – Puget Sound National Bank	June 1972
B-441	Corporate resolution of authority – Pacific National Bank of Washington	June 1972
B-442	Investment \$100,000 maturing 2/28/73	July 1972
B-443	Investment \$100,000 maturing 3/31/73	August 1972
B-444	Investment \$100,000 maturing 4/30/73	August 1972
B-445	Front footage - Pacific Highway northeast of Bridgeport	August 1972
B-446	Investment \$100,000 maturing 5/30/73	September 1972
B-447	Purchase of \$50,000 government securities maturing 6/30/73	October 1972
B-448	Front footage – 54 th Ave. from Steilacoom Blvd. to 101 st St.	November 1972
B-449	Front footage – Pacific Highway southeasterly side from Bridgeport Way	November 1972
B-450	Investment \$100,000 due 7/30/73	November 1972
B-451	Investment \$50,000 due 8/31/73	December 1972
B-452	Increase attorney's fee to \$40 per hour	January 1973

B-453	Investment \$50,000 maturing 9/30/73	January 1973
B-454	Front footage – Marietta St. east from View Rd.	January 1973
B-455	Investment \$100,000 maturing 10/31/73	February 1973
B-456	Investment \$50,000 maturing 11/30/73	March 1973
B-457	Investment \$100,000 maturing 12/31/73	March 1973
B-458	Front footage – North Lake Dr., west of Edgewood	April 1973
B-459	Investment \$100,000 maturing 1/31/74	April 1973
B-460	Authorizing payment of Department of Highways claim of \$9,369.73	April 1973
B-461	Front footage – South Tacoma Way, from 9900 block	May 1973
B-462	Investment \$100,000 maturing 2/28/74	May 1973
B-463	Investment \$50,000 maturing 3/31/74	
B-464	Front footage – Wildwood Ave., from 83 rd to Lake City Blvd.	June 1973
B-465	Investment \$100,000 maturing 4/30/74	July 1973
B-466	Investment \$50,000 maturing 5/31/74	August 1973
B-467	Investment \$100,000 maturing 6/30/74	September 1973
B-468	Front footage – Washington Ave. – Berkeley to boundary	October 1973
B-469	Investment \$100,000 maturing 7/31/74	October 1973
B-470	Investment \$50,000 maturing 8/31/74	November 1973
B-471	Front footage – Bridgeport Way, 63 rd Ave. west to Flanagan Rd.	November 1973
B-472	Investment \$100,000 maturing 9/30/74	December 1973
B-473	Investment \$50,000 maturing 9/30/74	December 1973
B-474	Increasing service connection charges effective 3/1/74	January 1974
B-475	Investment \$100,000 maturing 10/31/74	January 1974
B-476	Investment \$100,000 maturing 11/30/74	February 1974
B-477	Investment \$50,000 maturing 1/31/75	February 1974
B-478	Investment \$100,000 maturing 1/31/75	March 1974
B-479	Burroughs billing machine offered for sale	April 1974
B-480	Investment \$50,000 maturing 2/28/75	May 1974
B-481	Investment \$100,000 maturing 3/31/75	May 1974
B-482	Front footage – 96 th St. east of South Tacoma Way	May 1974
B-483	Establishing rate for Oakbrook Golf Course water usage	
B-484	Front footage – Cody St., from 76 th to 78 th	June 1974
B-485	\$100,000 investment expiring before 4/30/75	July 1974
B-486	Certification of delinquencies with Pierce County Treasurer	July 1974
B-487	Payment to Pierce County Fire Protection District #2	July 1974
B-488	Abandonment of well A-2 Tillicum	July 1974
B-489	Purchase of \$100,000 in time certifications of deposits maturing 8/30/75	August 1974
B-490	Front footage – Douglas St. from Custer to 77 th St.	September 1974
B-491	\$50,000 investment maturing prior to 9/24/75	September 1974

B-492	\$100,000 investment maturing prior to 9/24/75	September 1974
B-493	Front footage – Grange St., 76 th to 75 th west	October 1974
B-494	\$100,000 investment expiring on or before 10/22/74	October 1974
B-495	Acceptance of T-4 well (Hipkins Road)	October 1974
B-496	Acceptance of Pacific Water Works pipe	October 1974
B-497	\$100,000 investment maturing on or before 11/19/75	November 1974
B-498	\$50,000 investment maturing on or before 11/19/75	November 1974
B-499	Increasing cutting & patching charges to \$50 & \$65	November 1974
B-500	Front footage – Grange St. – from 76 th to 75 th	November 1974
B-501	Acceptance of Jack Frost Co. bid for remodeling air conditioning	December 1974
B-502	\$100,000 investment maturing 12/31/75	December 1974
B-503	\$100,000 investment maturing 1/14/76	December 1974
B-504	\$50,000 investment maturing 2/11/76	January 1975
B-505	Authorizing payment of sick leave on retirement	January 1975
B-506	\$100,000 investment maturing 3/11/76	February 1975
B-507	\$50,000 investment maturing 3/20/76	March 1975
B-508	\$100,000 investment maturing 4/8/76	March 1975
B-509	Changing front footage charge on a portion of Pacific Highway 2 ¼ cent per square foot to \$3.00 a front foot	April 1975
B-510	Acceptance of air conditioning	June 1975
B-511	Front footage – Whitman Ave., from Lake Grove to 100 th St.	
B-512	\$100,000 investment maturing 8/27/76	August 1975
B-513	\$50,000 Investment maturing 8/21/76	August 1975
B-514	Front footage – Lakeview Ave., Hayden St. to Wall St.	September 1975
B-515	\$150,000 investment maturing 9/24/76	September 1975
B-516	\$50,000 investment maturing 9/18/76	September 1975
B-517	\$100,000 investment maturing 10/22/76	October 1975
B-518	Acceptance of L-4 well	October 1975
B-519	Renewal of contract with Pierce County Fire District #2	October 1975
B-520	\$100,000 investment maturing 11/19/76	November 1975
B-521	\$100,000 investment maturing 11/19/76	November 1975
B-522	Front footage – 75 th & Phillips Rd. north to Turquoise	November 1975
B-523	Providing for employment of attorneys pursuant to revised code of Washington chapter 57.08	
B-524	\$50,000 investment maturing 12/20/76	December 1975
B-525	\$100,000 investment maturing 12/30/76	December 1975
B-526	Abandonment of well L-1 Hemlock Hill	December 1975
B-527	Front footage – Dean St., 75 th to 77 th	January 1976
B-528	\$100,000 investment maturing 1/23/77	January 1976
B-529	\$50,000 investment maturing 2/11/77	January 1976
B-530	\$100,000 investment maturing 3/11/77	February 1976

B-531	\$50,000 investment maturing 3/19/77	March 1976
B-532	\$75,000 investment maturing 4/8/77	March 1976
B-533	Re-affirming requirements of occupation of districts house	April 1976
B-534	Sharondale St., from Pacific Highway to Halcyon Rd.	May 1976
B-535	\$50,000 investment maturing 5/20/77	May 1976
B-536	Adoption of guidelines for implementation of the SEPA	July 1976
B-537	\$100,000 investment maturing 8/20/77	August 1976
B-538	\$100,000 investment maturing 8/29/77	August 1976
B-539	\$100,000 investment maturing 9/24/77	September 1976
B-540	\$100,000 investment maturing 9/24/77	September 1976
B-541	Acceptance of Pacific Water Works pipe bid	September 1976
B-542	\$100,000 investment maturing 10/22/76	October 1976
B-543	\$50,000 investment maturing 10/20/76	October 1976
B-544	Contract with Pierce County Fire District	November 1976
B-545	\$200,000 investment maturing 11/20/77	November 1976
B-546	\$50,000 investment maturing 11/20/77	November 1976
B-547	Front footage – Edgewater Dr. north from 86 th St.	December 1976
B-548	\$50,000 investment maturing 12/22/77	December 1976
B-549	\$100,000 investment maturing 12/29/77	December 1976
B-550	\$50,000 investment maturing 12/22/77	December 1976
B-551	Acceptance of Western Utilities bid for hydrant	January 1977
B-552	\$100,000 investment maturing 1/21/78	January 1977
B-553	Front footage – Antonia St. through easement to Steilacoom Blvd.	January 1977
B-554	Increasing front footage charge to \$5.00	February 1977
B-555	Increasing fees for water service connections	February 1977
B-556	Front footage – Boston Ave. from I-5 to Lincoln Ave.	February 1977
B-557	\$50,000 investment maturing 2/25/78	February 1977
B-558	\$105,000 investment maturing 3/8/78	February 1977
B-559	\$50,000 investment maturing 3/14/78	February 1977
B-560	Front footage – Lake Louise Lane	March 1977
B-561	\$75,000 investment maturing 4/8/78	March 1977
B-562	Acceptance of contract with Richardson Well Drilling Co.	April 1977
B-563	Authorizing the advertising & listing for bid for leasing portion of 104 th & Bridgeport property	April 1977
B-564	Rescinding resolution B-483, setting forth rate for furnishing water to Oakbrook Gold Course	May 1977
B-565	Front footage – Lincoln Ave., from Boston to Chicago	May 1977
B-566	\$50,000 investment maturing 5/20/78	May 1977
B-567	Front footage – Elwood Dr. north from Steilacoom Blvd.	July 1977
B-568	Amendment to retirement resolution B-421	August 1977
B-569	\$100,000 investment maturing 6/20/78	August 1977
B-570	\$50,000 investment maturing 7/25/78	August 1977
B-571	\$100,000 investment maturing 9/26/78	September 1977

B-572	\$100,000 investment maturing 9/26/78	September 1977
B-573	Acceptance of E-3 well for operation & maintenance	September 1977
B-574	\$100,000 investment maturing 10/17/78	October 1977
B-575	\$50,000 investment maturing 10/20/78	October 1977
B-576	\$50,000 investment maturing 8/24/78	October 1977
B-577	\$100,000 investment maturing 11/24/78	November 1977
B-578	\$150,000 investment maturing 11/24/78	November 1977
B-579	\$100,000 investment maturing 12/28/78	December 1977
B-580	\$100,000 investment maturing 12/30/78	December 1977
B-581	Resolution of appreciation to William W. Philip	December 1977
B-582	Corporate resolution of authority – Puget Sound National Bank	January 1978
B-583	Corporate resolution of authority – Pacific National Bank of Washington	January 1978
B-584	\$100,000 investment maturing 1/20/79	January 1978
B-585	\$50,000 investment maturing 2/21/78	February 1978
B-586	\$105,000 investment maturing 3/8/79	February 1978
B-587	\$50,000 investment maturing 3/9/79	February 1978
B-588	\$75,000 investment maturing 4/7/79	March 1978
B-589	\$100,000 investment maturing 4/7/79	April 1978
B-590	Resignation of James L. McDaniel	May 1978
B-591	\$50,000 investment maturing 5/19/79	May 1978
B-592	\$50,000 investment maturing 5/19/79	May 1978
B-593	Appointment of William W. Philip	May 1978
B-594	Certificate of authority – Pacific National Bank of Washington	May 1978
B-595	Certificate of authority – Puget Sound National Bank	May 1978
B-596	\$75,000 investment maturing 6/27/78	June 1978
B-597	Front footage – Phillips Rd. from 75 th St. south to tie-in	August 1978
B-598	Fire meter standby charge - \$40.00 minimum	August 1978
B-599	\$200,000 investment maturing 9/19/79	August 1978
B-600	\$50,000 investment maturing 8/24/79	August 1978
B-601	Oak Lane, Mt. Tacoma Dr. to Lake Grove Ave.	September 1978
B-602	Acceptance of Western Utilities bid for 50 hydrants	September 1978
B-603	\$50,000 investment maturing 10/20/79	October 1978
B-604	\$150,000 investment maturing 10/20/79	October 1978
B-605	\$250,000 investment maturing 11/28/79	November 1978
B-606	\$100,000 investment maturing 12/28/79	December 1978
B-607	\$150,000 investment maturing 12/29/79	December 1978
B-608	\$100,000 investment maturing 1/19/80	January 1979
B-609	\$50,000 investment maturing 2/27/80	February 1979
B-610	\$125,000 investment maturing 3/8/80	February 1979
B-611	\$75,000 investment maturing 4/9/80	March 1979
B-612	\$100,000 investment maturing 4/20/80	April 1979

B-613	\$100,000 investment maturing 5/19/80	May 1979
B-614	Front footage – South Tacoma Way from South 90 th to South 92 nd	June 1979
B-615	\$75,000 investment maturing 6/27/80	June 1979
B-616	\$50,000 investment maturing 7/17/80	July 1979
B-617	\$100,000 investment maturing 8/24/80	August 1979
B-618	\$325,000 investment maturing 9/19/80	September 1979
B-619	Acceptance of Western Utilities bid for hydrants & valves	October 1979
B-620	Social Security – setting fair market value on District house	October 1979
B-621	Corporate resolution of authority – establishing LWD checking account.	October 1979
B-622	\$200,000 investment maturing 10/22/80	October 1979
B-623	Front footage – Zircon Dr., 91 st to 93 rd Ave.	November 1979
B-624	Front footage – 112 th St., Butte Dr., Glenwood Acres	November 1979
B-625	Front footage - Front Rd. & South 96 th St.	November 1979
B-626	Front footage – San Francisco Ave., from Bridgeport Way to Addison Dr.	November 1979
B-627	Front footage – West Diamond Blvd., from 101 st St 100 feet	November 1979
B-628	Front footage – 127 th St. from Addison Dr. to 47 th Ave.	November 1979
B-629	\$250,000 investment maturing 11/28/80	November 1979
B-630	\$75,000 investment maturing 11/28/80	November 1979
B-631	Authorizing adjustment of Kassuba old balances of \$2,383.85	December 1979
B-632	Increasing cutting & patching charges to \$75.00 and \$100.00	December 1979
B-633	Award to Gordon Kempe on his retirement	December 1979
B-634	\$125,000 investment maturing 12/29/80	December 1979
B-635	\$150,000 investment maturing 12/29/80	December 1979
B-636	Front footage - Lincoln Ave from Chicago to San Francisco	December 1979
B-637	Certificate of authority – Pacific National Bank of Washington	February 1980
B-638	\$50,000 investment maturing 1/18/81	January 1980
B-639	\$50,000 investment maturing 1/18/81	January 1980
B-640	Corporate resolution of authority – LWD checking account #701-537 P.S.N.B	February 1980
B-641	Corporate resolution of authority – LWD checking account #601-315 P.S.N.B	February 1980
B-642	\$50,000 investment maturing 2/27/81	February 1980
B-643	\$100,000 investment maturing 3/7/81	February 1980
B-644	Appointment of Wayne E. Dunbar to manager	February 1980
B-645	Appointment of Evelyn D. Grant as assistant superintendent	February 1980
B-646	Front footage – South 84 th St. east from Pine	March 1980
B-647	\$50,000 investment maturing 4/1/81	March 1980

B-648	\$100,000 investment maturing 4/14/81	March 1980
B-649	Amendment to resolution #156 – accumulation of sick leave	May 1980
B-650	\$100,000 investment maturing 5/23/81	May 1980
B-651	Increase water rates effective 9/1/80	May 1980
B-652	Increase tenant's deposit to \$15.00 effective 9/1/80	May 1980
B-653	Accepting bid of Evergreen Painters, Inc. 104 th & Bridgeport tank	June 1980
B-654	\$75,000 investment effective 6/24/80 for 40 days	June 1980
B-655	Acceptance of painting of 104 th & Bridgeport tank	June 1980
B-656	\$50,000 investment maturing 8/4/81	July 1980
B-657	Authorizing Bridgeport property to be listed for bid to be sold	July 1980
B-658	Adjourned meeting of 8/18/80	August 1980
B-659	\$125,000 investment maturing 8/22/80	August 1980
B-660	\$325,000 investment maturing 9/16/81	September 1980
B-661	\$50,000 investment maturing 9/30/81	September 1980
B-662	\$200,000 investment maturing 10/14/81	September 1980
B-663	\$425,000 investment maturing 11/6/81	October 1980
B-664	Front footage – North Lake & Nottingham Ave.	November 1980
B-665	Front footage- Veterans Dr., Nottingham Ave to Edgewood Dr.	November 1980
B-666	Flanagan Rd. F.F. payment, and/or contribution to main	November 1980
B-667	\$350,000 investment maturing 12/4/81	November 1980
B-668	\$115,000 investment maturing 1/2/82	December 1980
B-669	Resolution on meter ownership	December 1980
B-670	Resolution on meter ownership	January 1981
B-671	Corporate resolution of authority LWD #701-537 P.S.N.B.	January 1981
B-672	Corporate resolution of authority LWD #601-315 P.S.N.B.	January 1981
B-673	Certificate of authority P.M.B.W.	January 1981
B-674	\$50,000 investment maturing 2/15/82	January 1981
B-675	Approximately 98 th St. front footage payment	February 1981
B-676	Adjourned meeting	February 1981
B-677	\$125,000 investment maturing 3/6/82	February 1981
B-678	Front footage – west side of Pacific Highway	March 1981
B-679	\$50,000 investment maturing 3/18/82	March 1981
B-680	\$100,000 investment maturing 4/14/82	March 1981
B-681	Water service connection price increase	April 1981
B-682	Mileage motor vehicles	April 1981
B-683	Tillicum Tank bid acceptance contract	April 1981
B-684	Vacation- Lakewood Water District employees	May 1981
B-685	Front footage – South 94 th St.	May 1981
B-686	Investment \$50,000 30-days maturing 6/21/81	May 1981

B-687	Investment \$50,000 30-days maturing 6/23/81	May 1981
B-688	\$50,000 investment maturing 5/23/82	May 1981
B-689	Front footage – Bridgeport Way- Lakewood Dr. to 104 th	June 1981
B-690	\$40,000 investment maturing 7/20/81	June 1981
B-691	Acceptance of Evergreen Painters Inc., Tillicum Tank	July 1981
B-692	Bank resolution – First Interstate	July 1981
B-693	Bank resolution – Puget Sound National Bank	July 1981
B-694	Bank resolution – Puget Sound National Bank	July 1981
B-695	Pipe bid	July 1981
B-696	\$50,000 investment maturing 7/22/82	July 1981
B-697	\$75,000 investment maturing 8/4/82	July 1981
B-698	Resignation of Alvin G. Stearns	July 1981
B-699	Appointment of Lawrence R. Ghilarducci Jr. to fill unexpired term	July 1981
B-700	\$75,000 investment maturing 8/18/82	August 1981
B-701	\$125,000 investment maturing 8/21/82	August 1981
B-702	\$325,000 investment maturing 9/16/82	August 1981
B-703	\$125,000 investment maturing 9/23/82	September 1981
B-704	\$50,000 investment maturing 9/30/82	September 1981
B-705	\$225,000 investment maturing 10/8/82	September 1981
B-706	Resolution- District house – manager/ superintendent, replacing B-533	October 1981
B-707	\$150,000 investment maturing 10/22/82	October 1981
B-708	\$425,000 investment maturing 11/6/82	October 1981
B-709	\$100,000 investment maturing 11/23/82	November 1981
B-710	\$400,000 investment maturing 12/4/82	November 1981
B-711	Sandblasting/ painting 88 th & Pine St. Tank, Viking Paint	December 1981
B-712	\$125,000 investment maturing 12/31/82	December 1981
B-713	\$50,000 investment maturing 1/31/83	January 1982
B-714	\$125,000 investment maturing 3/5/82	February 1982
B-715	\$75,000 investment maturing 3/17/83	March 1982
B-716	\$100,000 investment maturing 4/14/83	March 1982
B-717	Well drilling – Richardson Well Company acceptance of bid	April 1982
B-718	\$50,000 investment maturing 4/20/83	April 1982
B-719	Pierce County Medical Insurance Plan. Supersedes B-256	May 1982
B-720	Holidays throughout the year	May 1982
B-721	\$125,000 investment maturing 5/20/83	May 1982
B-722	\$100,000 investment maturing 6/18/83	May 1982
B-723	Acceptance of painting of the 88 th St. & Pine St. Tank	June 1982
B-724	Front footage – McChord Dr. to Lincoln Ave.	June 1982
B-725	Front footage – San Francisco Ave., from Pacific Highway South to freeway	June 1982
B-726	\$150,000 investment maturing 7/15/82	June 1982

B-727	Rescinding resolution B-722, investment of \$100,000	June 1982
B-728	\$100,000 investment maturing 8/12/83	July 1982
B-729	Acceptance Lige Dickson Co. – grading & drainage, tank site	August 1982
B-730	\$125,000 investment maturing 8/20/83	August 1982
B-731	\$75,000 investment maturing 8/30/83	August 1982
B-732	\$200,000 investment maturing 9/9/83	August 1982
B-733	\$375,000 investment maturing 9/16/83	August 1982
B-734	Corporate resolution of authority P.S.N.B.	September 1982
B-735	Corporate resolution of authority P.S.N.B.	September 1982
B-736	Acceptance grading and drainage Hemlock	September 1982
B-737	Acceptance work of Richardson Well Drilling Co.	September 1982
B-738	Abandoned well Nyanza	September 1982
B-739	Petty cash fund – decreased to \$800.00	September 1982
B-740	Petty cash fund – decreased to \$500.00	September 1982
B-741	Front footage- San Francisco to Lincoln Ave.	September 1982
B-742	\$75,000 investment maturing 10/1/83	September 1982
B-743	\$260,000 investment maturing 10/7/83	September 1982
B-744	\$170,000 investment maturing 10/7/83	September 1982
B-745	Signature First Interstate Bank of Washington	
B-746	\$100,000 investment maturing 11/1/83	October 1982
B-747	\$125,000 investment maturing 11/5/83	October 1982
B-748	\$100,000 investment maturing 11/5/83	October 1982
B-749	\$100,000 investment maturing 11/5/83	October 1982
B-750	\$100,000 investment maturing 11/5/83	October 1982
B-751	Front footage – Glenwood Ave.	November 1982
B-752	\$200,000 investment maturing 12/21/82	November 1982
B-753	\$250,000 investment maturing 12/3/83	November 1982
B-754	Hydrant bid acceptance	December 1982
B-755	Emergency situation Hemlock	December 1982
B-756	\$90,000 investment maturing 1/18/83	December 1982
B-757	\$75,000 investment maturing 12/31/83	December 1982
B-758	\$75,000 investment maturing December 1983	December 1982
B-759	Resolution declaring District Jeep surplus	January 1983
B-760	Acceptance of I.B.M. and Oregon Computer Hardware and Software bid	January 1983
B-761	Acceptance of the sandblasting & painting under job #1487	January 1983
B-762	Abandonment of #A1 Tillicum Well and #A1 pump house	February 1983
B-763	Front footage – 77 th St.	February 1983
B-764	\$125,000 investment maturing 3/4/84	February 1983
B-765	Acceptance of Story & Dodge bid. Well 0-3	March 1983
B-766	\$100,000 investment maturing 3/24/84	March 1983
B-767	\$75,000 investment maturing 6/6/83	March 1983

B-768	Corporate authorization safe deposit box	March 1983
B-769	Rental contract safe deposit box	
B-770	Increase service charge to \$5.00, also reconnect charge is \$12.00	April 1983
B-771	Thomas Company, acceptance of bid	May 1983
B-772	\$70,000 investment maturing on 5/20/84	May 1983
B-773	\$50,000 investment maturing 6/1/84	May 1983
B-774	Bank signatures resolution first interstate	
B-775	Bank signatures resolution PS.N.B	June 1983
B-776	Bank signatures resolution P.S.N.B	June 1983
B-777	Story & Dodge acceptance well job #1494	June 1983
B-778	Acceptance Thomas Company, sandblasting & painting job #1503	June 1983
B-779	Investment \$50,000 maturing 6/30/84	June 1983
B-780	Investment \$150,000 maturing 7/15/84	June 1983
B-781	Rescind resolution B-523- appoints J. Quinn attorney for LWD, terminates William Bergsten	July 1983
B-782	Appoints J. Quinn, attorney	July 1983
B-783	Investment \$50,000 maturing 7/29/84	July 1983
B-784	Investment \$100,000 maturing 8/12/84	July 1983
B-785	Disposal of old Phillip's computer	August 1983
B-786	Investment \$125,000 maturing 8/19/84	August 1983
B-787	Investment \$125,000 maturing 8/30/84	August 1983
B-788	Investment \$80,000 maturing 9/8/84	August 1983
B-789	Investment \$225,000 maturing 9/9/84	August 1983
B-790	Investment \$400,000 maturing 9/16/84	August 1983
B-791	Front footage 123 rd & 47 th Avenue	September 1983
B-792	Front footage – Grange St. tie in 78 th & 79 th St.	September 1983
B-793	Investment \$50,000 maturing 1/15/84	September 1983
B-794	Investment \$500,000 maturing 10/7/84	September 1983
B-795	Front footage charge increased to \$10.00 per front foot	October 1983
B-796	Establishment of travel checking account- \$750.00	October 1983
B-797	Investment \$100,000 maturing 11/1/84	October 1983
B-798	Investment \$325,000 maturing 11/4/84	October 1983
B-799	Investment \$100,000 maturing 11/1/84	October 1983
B-800	Investment \$50,000 maturing 1/16/84	October 1983
B-801	Investment \$50,000 maturing 2/15/84	October 1983
B-802	Investment \$50,000 maturing 4/15/84 (short term)	November 1983
B-803	Investment \$300,000 maturing 12/2/84	November 1983
B-804	Appreciation to Harold W. Gloyde, 25-years service as commissioner	December 1983
B-805	Front footage- 122th St.	December 1983
B-806	Investment \$200,000 maturing 12/30/84	December 1983
B-807	Investment \$100,000 maturing 1/12/85	December 1983

B-808	Investment \$50,000 maturing 1/16/85	January 1984
B-809	Investment \$100,000 maturing 2/23/85	February 1984
B-810	Investment \$75,000 maturing 3/5/85	February 1984
B-811	Investment \$100,000 maturing 3/24/85	March 1984
B-812	Investment \$100,000 maturing 4/20/85	April 1984
B-813	Front footage – Douglas St., tie in 77 th , 78 th & 79 th	May 1984
B-814	Investment \$50,000 maturing 1/21/85	May 1984
B-815	Investment \$100,000 maturing 1/21/85	June 1984
B-816	Sick leave resolution, repeals B-156, B-422, B-505 & B-649 June 1984	June 1984
B-817	Investment \$150,000 maturing 1/12/85	June 1984
B-818	Service connection increases etc.	July 1984
B-819	Investment \$75,000 maturing 1/15/85	July 1984
B-820	Investment \$125,000 maturing 2/15/85	July 1984
B-821	Investment \$125,000 maturing 3/18/85	July 1984
B-822	Investment \$100,000 maturing 8/18/85	July 1984
B-823	Investment \$50,000 maturing 3/18/85	August 1984
B-824	Investment \$225,000 maturing 9/6/85	August 1984
B-825	Investment \$400,000 maturing 9/6/85	August 1984
B-826	Investment \$100,000 maturing 9/6/85	August 1984
B-827	Investment \$50,000 maturing 3/31/85	August 1984
B-828	Acceptance of Lige & Wm B. Dickson bid demolition tank wash	September 1984
B-829	Investment \$75,000 maturing 3/20/85	September 1984
B-830	Investment \$250,000 maturing 5/15/85	September 1984
B-831	Investment \$250,000 maturing 6/15/85	September 1984
B-832	Investment \$100,000 maturing 10/4/85	September 1984
B-833	Acceptance of the demolition Washington tank Lige-Dickson	October 1984
B-834	Acceptance bid – Maltby Tank & Barge Inc., \$627,370.00	October 1984
B-835	Investment \$150,000 maturing 10/20/85	October 1984
B-836	Investment \$325,000 maturing 11/1/85	October 1984
B-837	Investment \$100,000 maturing 11/1/85	October 1984
B-838	Official delegate Robert G. Forster	November 1984
B-839	Investment \$50,000 maturing 4/21/85	November 1984
B-840	Investment \$300,000 maturing 11/25/85	November 1984
B-841	Depreciation rates – fixed assets	December 1984
B-842	Investment \$175,000 maturing 4/20/85	December 1984
B-843	Investment \$300,000 maturing 6/20/85	December 1984
B-844	Investment \$125,000 maturing 7/20/85	December 1984
B-845	Remittance account retainage for Maltby Tank & Barge Co.	January 1985
B-846	Investment \$75,000 maturing on 7/18/85	January 1985
B-847	Investment \$125,000 maturing on 2/7/86	January 1985

B-848	Acceptance Monarch Painting Corporation – Oakbrook tank	February 1985
B-849	Investment \$75,000 maturing 3/14/86	February 1985
B-850	Investment \$250,000 maturing 2/21/86	February 1985
B-851	Investment \$50,000 maturing 4/2/86	March 1985
B-852	Investment \$50,000 maturing 11/11/85	March 1985
B-853	Water rates for September 1, 1985 increase	May 1985
B-854	Investment \$75,000 maturing 11/15/85	May 1985
B-855	Investment \$250,000 maturing 6/13/86	May 1985
B-856	Front footage – 75 th St. W, Bridgeport Way SW	June 1985
B-857	Cancellation of Mortgage agreements in future	June 1985
B-858	Front footage – Pacific Highway SW	June 1985
B-859	Investment \$300,000 maturing 12/20/85	June 1985
B-860	Investment \$125,000 maturing 7/15/86	June 1985
B-861	Investment \$75,000 maturing 7/31/86	July 1985
B-862	Investment \$75,000 maturing 8/8/86	July 1985
B-863	Investment \$50,000 maturing 5/22/86	August 1985
B-864	Investment \$325,000 maturing 3/6/86	August 1985
B-865	Investment \$400,000 maturing 9/4/86	August 1985
B-866	Investment \$282,000 maturing 2/28/86	September 1985
B-867	Water commissioners compensation increase to \$50.00	September 1985
B-868	Investment \$50,000 maturing 5/20/86	September 1985
B-869	Investment \$150,000 maturing 1/20/86	September 1985
B-870	Investment \$100,000 maturing 1/20/86	September 1985
B-871	Acceptance of storage tank improvements – Washington tank	October 1985
B-872	Front footage payments 86 th St. South	October 1985
B-873	Inclusion of American Lake Gardens to LWD	October 1985
B-874	112 th Street property purchase	October 1985
B-875	Front footage – Custer Rd. to 74 th St.	October 1985
B-876	Investment \$500,000 maturing on 4/30/86	October 1985
B-877	Investment \$200,000 maturing 10/31/86	October 1985
B-878	Fair Labor Standards Act “half-time policy”	November 1985
B-879	Investment \$50,000 maturing 11/27/85	November 1985
B-880	Investment \$200,000 maturing 3/20/86	December 1985
B-881	Investment \$200,000 maturing 4/21/86	December 1985
B-882	Investment \$74,150 maturing 1/5/86	December 1985
B-883	Investment \$25,850 maturing 3/5/86	December 1985
B-884	Investment \$250,000 maturing 12/20/86	December 1985
B-885	Brewer B. Thompson, appointed commissioner	January 1986
B-886	Puget Sound National Bank signatures	January 1986
B-887	Puget Sound National bank signatures	January 1986
B-888	First Interstate Bank signatures	January 1986

B-889	Resignation of Harold W. Gloyde	January 1986
B-890	Dental plan for employees	January 1986
B-891	Investment \$74,150 maturing 3/17/86	January 1986
B-892	Investment \$185,000 maturing 4/19/86	January 1986
B-893	Investment \$125,000 maturing 1/23/87	January 1986
B-894	Investment \$282,000 maturing 8/18/86	January 1986
B-895	Bond surety for Interstate 5, for A.L.G.T. project	January 1986
B-896	Investment \$200,000 maturing 3/14/86	January 1986
B-897	Investment \$300,000 maturing 5/16/86	January 1986
B-898	Investment \$200,000 maturing 6/13/86	January 1986
B-899	Investment \$325,000 maturing 3/6/87	February 1986
B-900	Investment \$25,850 maturing 3/5/87	February 1986
B-901	Investment \$200,000 maturing 2/20/87	February 1986
B-902	Investment \$185,000 maturing 3/20/87	March 1986
B-903	Investment \$200,000 maturing 7/21/86	April 1986
B-904	Investment \$100,000 maturing 10/21/86	April 1986
B-905	Investment \$400,000 maturing 6/16/86	April 1986
B-906	Investment \$350,000 maturing 7/21/86	April 1986
B-907	Investment \$250,000 maturing 8/21/86	April 1986
B-908	Investment \$156,000 maturing 7/30/86	April 1986
B-909	Investment \$70,000 maturing 7/30/86	April 1986
B-910	Investment \$250,000 maturing 5/30/86	April 1986
B-911	Investment \$100,000 maturing 6/30/86	April 1986
B-912	Investment \$50,000 maturing 9/17/86	April 1986
B-913	Investment \$50,000 maturing 11/26/86	April 1986
B-914	Void: Martin Luther King Jr. Day	
B-915	Acceptance ALGT Transmission Main 86-1 allied	May 1986
B-916	Job 1609 PI Well acceptance	May 1986
B-917	Investment \$90,000 maturing 6/30/86	May 1986
B-918	Investment \$185,000 maturing 10/15/86	May 1986
B-919	Investment \$250,000 maturing 10/30/86	May 1986
B-920	Front footage – 121 st St. & 47 th St	June 1986
B-921	Front footage – Concord Lane/ Lexington	June 1986
B-922	Front footage – Custer Rd. & 74 th St.	June 1986
B-923	Investment \$163,000 maturing 8/29/86	June 1986
B-924	Petty cash account 50 300 005 under \$10.00	June 1986
B-925	Investment \$85,000 maturing 10/18/86	June 1986
B-926	Investment \$200,000 maturing 8/18/86	June 1986
B-927	Investment \$400,000 maturing 11/17/86	June 1986
B-928	Investment \$100,000 maturing 10/30/86	June 1986
B-929	Investment \$90,000 maturing 8/15/86	June 1986
B-930	Investment \$125,000 maturing 12/15/86	June 1986
B-931	Investment \$37,000 maturing 7/28/86	June 1986

B-932	Investment \$36,000 maturing 10/6/86	
B-933	Investment \$28,000 maturing 11/10/86	
B-934	Investment \$42,000 maturing 11/3/86	July 1986
B-935	Investment \$75,000 maturing 10/13/86	July 1986
B-936	Investment \$350,000 maturing 10/20/86	July 1986
B-937	Investment \$70,000 maturing 11/10/86	July 1986
B-938	Investment \$156,000 maturing 11/17/86	July 1986
B-939	Investment \$75,000 maturing 11/3/86	July 1986
B-940	Investment \$50,000 maturing 9/22/86	July 1986
B-941	Investment \$120,000 maturing 2/16/87	August 1986
B-942	Acceptance job #1633 Farwest Tank	August 1986
B-943	Investment \$400,000 maturing 2/16/87	August 1986
B-944	Investment \$163,000 maturing 10/15/86	August 1986
B-945	Investment \$130,000 maturing 1/16/87	August 1986
B-946	Investment \$250,000 maturing 3/17/87	August 1986
B-947	Investment \$150,000 maturing 3/16/87	September 1986
B-948	Vacation resolution	September 1986
B-949	Investment \$50,000 maturing 1/20/87	September 1986
B-950	Investment \$100,000 maturing 12/15/86	September 1986
B-951	Investment \$250,000 maturing 11/26/86	September 1986
B-952	Investment \$100,000 maturing 1/20/87	September 1986
B-953	Investment \$100,000 maturing 4/17/87	September 1986
B-954	Investment \$50,000 maturing 11/17/86	September 1986
B-955	Investment \$100,000 maturing 12/19/86	September 1986
B-956	Investment \$50,000 maturing 1/27/87	September 1986
B-957	Investment \$100,000 maturing 1/19/87	October 1986
B-958	Investment \$100,000 maturing 12/15/86	October 1986
B-959	Investment \$150,000 maturing 11/17/86	October 1986
B-960	Investment \$120,000 maturing 1/19/87	October 1986
B-961	Investment \$100,000 maturing 2/13/87	October 1986
B-962	Service connections price increases	November 1986
B-963	Investment \$100,000 maturing 5/18/1987	November 1986
B-964	Investment \$50,000 maturing 4/17/84	November 1986
B-965	Investment \$50,000 maturing 4/17/87	November 1986
B-966	Investment \$250,000 maturing 4/17/87	November 1986
B-967	Investment \$50,000 maturing 5/18/87	November 1986
B-968	Investment \$150,000 maturing 5/18/87	November 1986
B-969	Investment \$200,000 maturing 6/15/87	November 1986
B-970	Investment \$200,000 maturing 7/15/87	November 1986
B-971	Martin Luther King Jr. Day holiday	December 1986
B-972	Investment \$100,000 maturing 6/15/87	December 1986
B-973	Front footage – Lake City Blvd.	December 1986
B-974	Investment \$250,000 maturing 7/15/87	December 1986

B-975	Investment \$100,000 maturing 8/18/87	December 1986
B-976	Investment \$100,000 maturing 9/15/87	December 1986
B-977	Investment \$100,000 maturing 7/20/87	January 1987
B-978	Investment \$150,000 maturing 3/17/87	January 1987
B-979	Investment \$125,000 maturing 10/19/87	January 1987
B-980	Investment \$125,000 maturing 9/30/87	January 1987
B-981	Investment \$150,000 maturing 6/15/87	January 1987
B-982	Investment \$400,000 maturing 11/16/87	January 1987
B-983	Jerry Wakefield, engineer for the District	February 1987
B-984	Investment \$120,000 maturing 10/19/87	February 1987
B-985	Investment \$100,000 maturing 8/18/87	February 1987
B-986	Investment \$200,000 maturing 10/19/87	February 1987
B-987	Investment \$350,000 maturing 3/7/88	February 1987
B-988	Investment \$100,000 maturing 9/15/87	March 1987
B-989	Acceptance of 86-2 job 1614 AMLGT Murray Rd. transmission	April 1987
B-990	Investment \$250,000 maturing 12/15/87	March 1987
B-991	Investment \$150,000 maturing 1/18/88	March 1987
B-992	Investment \$150,000 maturing 2/15/88	March 1987
B-993	Acceptance 86-3 transmission main	April 1987
B-994	Acceptance 86-4 I-5 crossing. N.W. Boring Co.	April 1987
B-995	Acceptance 86-6 water storage tank	April 1987
B-996	investment \$100,000 maturing 10/20/87	April 1987
B-997	Puget Sound Bank increased to \$1,200	April 1987
B-998	Investment \$100,000 maturing 1/18/88	April 1987
B-999	Investment \$250,000 maturing 4/20/88	April 1987
B-1000	Investment \$50,000 maturing 8/18/87	April 1987
B-1001	Bank signatures PSNB general fund 05-701-537	
B-1002	Bank signatures PSNB general funds 05-601-315	
B-1003	Safe deposit box PSNB SDB 056425	
B-1004	Bank signatures first interstate 50300 005	
B-1005	Exchange of property John Dower (Elks)	May 1987
B-1006	Investment \$160,000 maturing 5/16/88	May 1987
B-1007	Investment \$100,000 maturing 6/9/88	June 1987
B-1008	Investment \$150,000 maturing 6/9/88	June 1987
B-1009	Investment \$225,000 maturing 6/20/88	June 1987
B-1010	Investment \$100,000 maturing 5/16/88	July 1987
B-1011	Investment \$225,000 maturing 7/18/88	July 1987
B-1012	Investment \$200,000 maturing 7/18/88	July 1987
B-1013	Washington State deferred compensation plan	July 1987
B-1014	Sick leave policy changed from 120 days to 90 days	August 1987
B-1015	Investment \$100,000 maturing 5/16/88	August 1987
B-1016	Resignation of Brewer B. Thompson	August 1987

B-1017	Acceptance of Norton Corrosion Ltd., on cathodic protection	August 1987
B-1018	Appointment of Paul E. Fields as commissioner	August 1987
B-1019	First Interstate Bank signatures	August 1987
B-1020	Puget Sound signatures	August 1987
B-1021	Puget Sound signatures	August 1987
B-1022	Investment \$100,000 maturing 8/15/88	August 1987
B-1023	Investment \$100,000 maturing 8/15/88	August 1987
B-1024	Appointing Paul E. Fields	August 1987
B-1025	Investment \$117,000 maturing 4/16/88	September 1987
B-1026	Acceptance painting and sandblasting 104 th /Rebecca	September 1987
B-1027	Investment \$100,000 maturing 8/15/88	September 1987
B-1028	Investment \$150,000 maturing 8/15/88	September 1987
B-1029	Investment \$130,000 maturing 9/19/88	September 1987
B-1030	Investment \$100,000 maturing 9/20/88	October 1987
B-1031	Investment \$245,000 maturing 10/15/88	October 1987
B-1032	Investment \$300,000 maturing 10/21/88	October 1987
B-1033	Investment \$135,000 maturing 12/16/88	November 1987
B-1034	Investment \$350,000 maturing 11/21/88	November 1987
B-1035	Investment \$150,000 maturing 12/19/87	December 1987
B-1036	Property exchange 65 th Ave/ 72 nd St. Ct.	December 1987
B-1037	Resolution investment \$165,000 maturing 12/19/88	December 1987
B-1038	Resolution accepting garage remodel at the District office	January 1988
B-1039	Resolution investment \$220,000 maturing 1/19/88	January 1988
B-1040	Resolution allocation of \$763.00 for Storm Rd. / Angle Lane	February 1988
B-1041	Investment \$320,000 maturing 2/24/89	February 1988
B-1042	Investment \$300,000 maturing 3/17/89	March 1988
B-1043	Investment \$180,000 maturing 3/25/89 (short term)	March 1988
B-1044	Allocation \$4,470 112 th St.	March 1988
B-1045	First Interstate 50 300 005 signatures	
B-1046	PSNB signature	
B-1047	PSNB signature	
B-1048	Safe deposit PSNB	
B-1049	Investment \$250,000 maturing 4/10/89	April 1988
B-1050	Investment \$117,000 maturing 4/19/89	April 1988
B-1051	Investment \$160,000 maturing 5/8/89	May 1988
B-1052	Investment \$160,000 maturing 5/16/89	May 1988
B-1053	Investment \$100,000 maturing 5/22/89	May 1988
B-1054	Investment \$165,000 maturing 6/9/89	June 1988
B-1055	Resolution establishing a NSF charge in the amount of \$10.00	June 1988
B-1056	Front footage – 83 rd Street	June 1988
B-1057	Investment \$200,000 maturing 6/20/89	June 1988

B-1058	Investment \$100,000 maturing 9/18/89	July 1988
B-1059	Investment \$425,000 maturing 7/17/89	July 1988
B-1060	New vacation resolution	August 1988
B-1061	Investment \$200,000 maturing 8/21/89	August 1988
B-1062	Investment \$260,000 maturing 8/28/89	August 1988
B-1063	Investment \$100,000 maturing 9/18/89	August 1988
B-1064	Investment \$100,000 maturing 9/18/89	September 1988
B-1065	Establishing policies on delinquent bills	September 1988
B-1066	Investment \$200,000 maturing 9/1889	September 1988
B-1067	Investment \$140,000 maturing 1/15/90	October 1988
B-1068	Road approach bond Creekridge Reservoir \$2,000	October 1988
B-1069	Investment \$250,000 mature 10/16/89	October 1988
B-1070	Investment \$320,000 mature 10/21/89	October 1988
B-1071	Investment \$100,000 mature 11/20/89	November 1988
B-1072	Investment \$375,000 mature 11/20/89	November 1988
B-1073	Front footage – Lawrence 33 rd Ave. So. to Cedar	December 1988
B-1074	Front footage – Thorne Lane North	December 1988
B-1075	Front footage – Woodlawn, Maple	December 1988
B-1076	Front footage – 83 rd St., South Cedar	December 1988
B-1077	Jerry Wakefield PE Engineer for 1989/1990	December 1988
B-1078	Investment \$250,000 mature 12/18/89	December 1988
B-1079	Investment \$250,000 mature 1/15/90	December 1988
B-1080	Resolution B-1080 Invest \$240,000 mature 1/16/90	January 1989
B-1081	Cobra 2% surcharge on admin. expenses	January 1989
B-1082	Investment \$250,000 maturing 2/23/90	February 1989
B-1083	Substance abuse policy	March 1989
B-1084	Resolution investment \$270,000 maturing 3/20/90	March 1989
B-1085	Investment resolution B-1085 \$120,000 mature 4/19/90	April 1989
B-1086	Investment resolution \$210,000 maturing 5/21/90	May 1989
B-1087	Investment resolution \$100,000 maturing 4/19/90	May 1989
B-1088	Investment \$165,000 maturing 6/23/89	June 1989
B-1089	Investment \$100,000 maturing 6/18/90	June 1989
B-1090	Investment \$200,000 maturing 6/18/90	June 1989
B-1091	Investment \$100,000 maturing 6/18/90	June 1989
B-1092	Investment \$425,000 maturing 7/16/90	July 1989
B-1093	Investment \$140,000 maturing 5/21/90	July 1989
B-1094	Investment \$110,000 maturing 4/19/90	August 1989
B-1095	Investment \$250,000 maturing 8/20/90	August 1989
B-1096	Investment \$130,000 maturing 8/20/90	August 1989
B-1097	Investment \$105,000 maturing 3/20/90	September 1989
B-1098	Investment \$325,000 maturing 9/17/90	September 1989
B-1099	Cross Connection Control Program	October 1989
B-1100	Investment \$100,000 maturing 9/17/90	October 1989

B-1101	Investment \$140,000 maturing 10/15/90	October 1989
B-1102	Service connection price increases effective 1/1/90	October 1989
B-1103	Investment \$110,000 maturing 12/17/90	October 1989
B-1104	Investment \$250,000 maturing 10/15/90	October 1989
B-1105	Investment \$300,000 maturing 10/15/90	October 1989
B-1106	Investment \$118,000 maturing 12/17/90	October 1989
B-1107	Investment \$125,000 maturing 12/17/90	November 1989
B-1108	Investment \$400,000 maturing 11/20/90	November 1989
B-1109	Investment \$170,000 maturing 2/19/91	December 1989
B-1110	Investment \$340,000 maturing 1/15/91	January 1990
B-1111	Investment \$330,000 maturing 5/20/91	January 1990
B-1112	Investment \$150,000 maturing 2/20/91	February 1990
B-1113	Investment \$105,000 maturing 3/20/91	March 1990
B-1114	Front footage charge Carver Rd. job #1778	March 1990
B-1115	Investment \$375,000 maturing 3/29/91	March 1990
B-1116	Investment \$100,000 maturing 4/19/91	April 1990
B-1117	Investment \$260,000 maturing 4/19/91	April 1990
B-1118	Investment \$100,000 mature 4/20/91	May 1990
B-1119	Investment \$175,000 mature 2/21/91	May 1990
B-1120	Investment \$175,000 mature 4/19/91	May 1990
B-1121	Investment \$105,000 mature 6/17/91	June 1990
B-1122	Investment \$330,000 mature 6/17/91	June 1990
B-1123	Depreciation changes	July 1990
B-1124	Investment \$105,000 mature 7/15/91	July 1990
B-1125	Clover Creek Ground Water Management Program	July 1990
B-1126	Investment \$350,000 maturing 7/15/91	July 1990
B-1127	Investment \$136,000 maturing 8/19/91	August 1990
B-1128	Investment \$340,000 maturing 8/19/91	August 1990
B-1129	Investment \$160,000 maturing 9/17/91	September 1990
B-1130	Investment \$300,000 maturing 9/17/91	September 1990
B-1131	Investment \$155,000 maturing 11/20/91	October 1990
B-1132	Investment \$400,000 maturing 10/15/91	October 1990
B-1133	Investment \$415,000 maturing 10/22/91	October 1990
B-1134	Investment \$110,000 maturing 12/17/91	November 1990
B-1135	Investment \$375,000 maturing 11/20/91	November 1990
B-1136	Rescinds resolution 706 on the subject of company house	December 1990
B-1137	Investment committee formation	December 1990
B-1138	Procedure on investments	December 1990
B-1139	Investment \$300,000 maturing 12/17/91	December 1990
B-1140	Sole Source Vendor 1/21/91	January 1991
B-1141	Investment \$450,000 mature 1/21/92	January 1991
B-1142	Investment \$100,000 maturing 2/18/92	February 1991

B-1143	Investment \$420,000 maturing 2/18/92	February 1991
B-1144	Investment \$113,000 maturing 3/20/92	March 1991
B-1145	Investment \$500,000 maturing 3/20/92	March 1991
B-1146	Telephone/ written quotation on S.W. Rosters	April 1991
B-1147	Establishing S.W. Roster	April 1991
B-1148	Investment \$300,000 maturing 4/17/91	April 1991
B-1149	Investment \$300,000 maturing 4/24/91	April 1991
B-1150	Investment \$110,000 maturing 5/10/92	May 1991
B-1151	Investment \$425,000 maturing 5/20/92	May 1991
B-1152	Investment \$120,000 maturing 6/15/92	June 1991
B-1153	Investment \$380,000 maturing 6/15/92	June 1991
B-1154	Internal payroll system to be established	July 1991
B-1155	Investment \$225,000 maturing 7/21/92	July 1991
B-1156	Investment \$225,000 maturing 7/24/92	July 1991
B-1157	Investment \$120,000 maturing 8/19/92	August 1991
B-1158	Investment \$450,000 maturing 8/19/92	August 1991
B-1159	Investment \$165,000 maturing 9/22/92	September 1991
B-1160	Investment \$475,000 maturing 9/22/92	September 1991
B-1161	Investment \$100,000 maturing 12/22/92	October 1991
B-1162	Investment \$140,000 maturing 11/17/92	October 1991
B-1163	Investment \$400,000 maturing 10/20/92	October 1991
B-1164	Investment \$365,000 maturing 10/20/92	October 1991
B-1165	Meter ownership to District	November 1991
B-1166	Investment \$150,000 maturing 1/20/93	November 1991
B-1167	Investment \$475,000 maturing 11/18/92	November 1991
B-1168	Investment \$102,000 maturing 12/22/92	December 1991
B-1169	Investment \$370,000 maturing 12/22/92	December 1991
B-1170	Investment \$480,000 maturing 1/20/93	January 1992
B-1171	Diesel fuel surplus .80 cents per gallon	February 1992
B-1172	Investment \$480,000 maturing 2/18/93	February 1992
B-1173	Investment \$670,000 maturing 3/19/93	March 1992
B-1174	Investment \$106,000 maturing 4/21/93	April 1992
B-1175	Investment \$300,000 maturing 4/21/93	April 1992
B-1176	Investment \$265,000 maturing 4/21/93	April 1992
B-1177	Investment \$170,000 maturing 5/19/93	May 1992
B-1178	Investment \$350,000 maturing 5/19/93	May 1992
B-1179	Accepting bid on tank. S&K Painting	May 1992
B-1180	Investment \$140,000 maturing 6/23/93	June 1992
B-1181	Investment \$440,000 maturing 6/23/93	June 1992
B-1182	Investment \$113,000 maturing 7/21/93	July 1992
B-1183	Investment \$275,000 maturing 7/21/93	July 1992
B-1184	Acceptance painting Oakbrook Tank	August 1992
B-1185	Investment \$130,000 maturing 8/18/93	August 1992

B-1186	Investment \$500,000 maturing 8/21/93	August 1992
B-1187	Acceptance of Hokkaido Drilling bid	September 1992
B-1188	Investment \$110,000 maturing 9/3/93	September 1992
B-1189	Investment \$107,000 maturing 9/22/93	September 1992
B-1190	Investment \$593,000 maturing 9/22/93	September 1992
B-1191	Investment \$105,000 maturing 10/20/93	October 1992
B-1192	Investment \$400,000 maturing 10/20/93	October 1992
B-1193	Investment \$385,000 maturing 10/20/93	October 1992
B-1194	NSF charge increased to \$15.00 11/17/92	November 1992
B-1195	Investment \$125,000 maturing 11/17/93	November 1992
B-1196	Investment \$560,000 maturing 11/17/93	November 1992
B-1197	Investment \$110,000 maturing 12/22/93	December 1992
B-1198	Investment \$400,000 maturing 12/22/93	December 1992
B-1199	Investment \$300,000 maturing 1/19/94	January 1993
B-1200	Investment \$300,000 maturing 1/21/94	January 1993
B-1201	Investment #420,000 maturing 2/23/94	February 1993
B-1202	Investment \$730,000 maturing 3/18/94	March 1993
B-1203	Investment \$340,000 maturing 3/20/94	April 1993
B-1204	Investment \$340,000 maturing 4/22/94	April 1993
B-1205	Non-discrimination / or harassment	May 1993
B-1206	Not recommend contractor	May 1993
B-1207	Whistleblower policy	May 1993
B-1208	Prohibiting use of equipment/ materials by employees	May 1993
B-1209	Concealed weapons policy	May 1993
B-1210	Conflicts of interest policy	May 1993
B-1211	Copying of public records	May 1993
B-1212	Investment \$235,000 maturing 5/18/94	May 1993
B-1213	Investment \$300,000 maturing 5/20/94	May 1993
B-1214	Investment \$280,000 maturing 6/24/94	June 1993
B-1215	Investment \$280,000 maturing 6/22/94	June 1993
B-1216	Rate increase 1993 August	August 1993
B-1217	Investment \$220,000 maturing 7/19/94	July 1993
B-1218	Investment \$220,000 maturing 7/21/94	July 1993
B-1219	Investment \$106,000 maturing 8/19/94	August 1993
B-1220	Investment \$275,000 maturing 8/17/94	August 1993
B-1221	Investment \$275,000 maturing 8/19/94	August 1993
B-1223	Investment \$120,000 maturing 9/21/94	September 1993
B-1224	Investment \$115,000 maturing 9/21/94	September 1993
B-1225	Investment \$670,000 maturing 9/21/94	September 1993
B-1226	Investment \$155,000 maturing 11/21/94	October 1993
B-1227	Investment \$500,000 maturing 10/18/94	October 1993
B-1228	Investment \$375,000 maturing 12/20/94	October 1993
B-1229	Investment \$115,000 maturing 1/18/95	November 1993

B-1230	Investment \$360,000 maturing 11/21/94	November 1993
B-1231	Investment \$360,000 maturing 1/18/95	November 1993
B-1232	Adjourned meeting 11/17/93	December 1993
B-1233	Resignation Paul E. Fields	December 1993
B-1234	Appointing Mark M. Hullinger to fill unexpired term of Mr. Fields.	December 1993
B-1235	Key Bank signature card	December 1993
B-1236	Key Bank signature card	December 1993
B-1237	First Interstate Bank signature card	December 1993
B-1238	Investment \$108,000 maturing 12/20/94	December 1993
B-1239	Investment \$250,000 maturing 2/21/95	December 1993
B-1240	Appreciation to Mr. Fields	December 1993
B-1241	Investment \$190,000 maturing 7/18/95	December 1993
B-1242	Water service connection increases + cutting & patch	January 1994
B-1243	Investment \$300,000 maturing 2/21/95	January 1994
B-1244	Investment \$285,000 maturing 7/18/95	January 1994
B-1245	Investment \$120,000 maturing 6/20/95	February 1994
B-1246	Investment \$325,000 maturing 6/20/95	February 1994
B-1247	Acting manager RMB	February 1994
B-1248	Investment redirection policy no more resolutions	March 1994
B-1249	Investment made prior to meeting on 3/11/94 mature 2/21/95	March 1994
B-1253	Increase petty cash fund to \$800.00	April 1994
B-1254	Emergency delegate Randall M. Black rescinds resolution 838 5/16/94	May 1994
B-1255	Company vehicle outside of LWD 24 hour call	May 1994
B-1256	Signature card Key Bank new manager (original to bank)	May 1994
B-1257	Signature card Key Bank new manager (original to bank)	May 1994
B-1258	Signature card First International new manager (original to bank)	May 1994
B-1259	New investment authority signatures (new manager)	May 1994
B-1260	Resolution overtime policy	June 1994
B-1261	Resolution awards policy	July 1994
B-1262	Resolution thirty-minute response on-call	June 1994
B-1263	Door hanger policy on delinquencies	July 1994
B-1264	Vacation day award	July 1994
B-1265	Additional employee fringe benefit	July 1994
B-1266	Hemlock Hill emergency	December 1994
B-1267	Uniform policy	December 1994
B-1268	Vacation resolution	January 1995
B-1269	Treasurer position established	March 1995
B-1270	Payroll account separate	March 1995
B-1271	Retaining CPA for district	April 1995
B-1272	Setting per diem	April 1995

B-1273	Accepting Mt. Tacoma transmission main extension as complete	April 1995
B-1274	New investment committee	April 1995
B-1275	Chlorination emergency	April 1995
B-1276	Key Bank – deposit refund – signature changes	
B-1277	Key Bank – general fund – signature changes	
B-1278	Key Bank – travel fund – signature changes	
B-1279	First Interstate – petty cash – signature changes	
B-1280	Key Bank – safe deposit box – signature changes	
B-1281	Emergency – 108 th St./ Pierce County/ Tucci	August 1995
B-1282	Shift differential rates	September 1995
B-1283	Western State tank bond reimbursement	November 1995
B-1284	Accounting procedure changes	February 1996
B-1285	Connection price changes	February 1996
B-1286	Purchase of Real Property – Western State tank site	February 1996
B-1287	Cross connections	February 1996
B-1288	59 th Avenue main extension acceptance	February 1996
B-1289	108 th St. main improvement acceptance	February 1996
B-1290	Lake grove transmission main acceptance	February 1996
B-1291	Employee fringe benefits	March 1996
B-1292	Investment committee re investment policy	March 1996
B-1293	Local government investment pool	March 1996
B-1294	Close petty cash fund at First Interstate	April 1996
B-1295	Registration of bonds	May 1996
B-1296	Issue and sale of bond (\$4,000,000)	May 1996
B-1297	Transfer sick leave/ vacation to another employee	June 1996
B-1298	Charging customer fees from City of Lakewood	July 1996
B-1299	Town of Steilacoom wholesale rate	July 1996
B-1300	Amend fixed asset policy	July 1996
B-1301	Close advance travel account	July 1996
B-1302	Meadow Road system improvements acceptance	October 1996
B-1303	Angle Lane extension acceptance	October 1996
B-1304	Construction of four-stall garage	October 1996
B-1305	Compensation for commissioners services	November 1996
B-1306	Employee vacation changes	November 1996
B-1307	Developer's extension program	November 1996
B-1308	December 1996 emergency	January 1997
B-1309	Inclement weather emergencies	January 1997
B-1310	Cross training	February 1997
B-1311	Price increase in service connections	March 1997
B-1312	Grievance procedures	April 1997
B-1313	Vacation	April 1997
B-1314	Limited use of LWD real property	May 1997

B-1315	Non-smoking policy	June 1997
B-1316	Front footage charge \$33 – 80 th St. w/Pine- Tacoma Mall Blvd.	June 1997
B-1317	Fire meter service	January 1998
B-1318	Smoking assistance	January 1998
B-1319	Fund balance reallocation	February 1998
B-1320	Wellhead protection plan	February 1998
B-1321	Sick leave buy back	April 1998
B-1322	Commissioner per diem to \$70/ meeting	June 1998
B-1323	Key Bank – general fund signature change	October 1998
B-1324	Key Bank – payroll account signature change	October 1998
B-1325	Key Bank – deposit fund account signature change	October 1998
B-1326	Adopt current water system comprehensive plan	November 1998
B-1327	Columbia Bank – general fund signature card	December 1998
B-1328	Columbia Bank – payroll account signature card	December 1998
B-1329	Columbia Bank – deposit refund signature card	December 1998
B-1330	Columbia Bank – safe deposit box signature card	February 1999
B-1331	Floating Christmas holiday addition	February 1999
B-1332	Ratify water rate increase	May 1999
B-1333	Service connection price increase	August 1999
B-1334	Rate increase	September 1999
B-1335	Encouraging Continuing Education	February 2000
B-1336	Safety Boots	February 2000
B-1337	Prevention of Workplace Violence	May 2000
B-1338	Minimum Required Use of Vacation Leave	July 2000
B-1339	Vendor Lists	August 2000
B-1340	Small Works Roster	August 2000
B-1341	Columbia Bank - Payroll Account signature card	August 2000
B-1342	Columbia Bank – Deposit Refund Acct signature card	August 2000
B-1343	Columbia Bank – General Fund signature card	August 2000
B-1344	Reaffirm Rate Increase	November 2000
B-1345	Standard Mileage Rate for Personal Vehicle	December 2000
B-1346	Award of Contracts Estimated Less Than \$35,000	September 2001
B-1347	Appoint Finance Director as District's Agent for Claims	September 2001
B-1348	Adopt General Facilities Charge	September 2001
B-1349	Substitution of Bond – Contractors	October 2001
B-1350	Refinancing of Bonds	November 2001
B-1350.5	Amendment to District's 1997 Water System Comp. Plan	January 2002
B-1351	Rate Increase	February 2002
B-1352	Authorization of Liquidation of Principal Stocks	February 2002
B-1353	Amendment of General Facilities Charges established by Resolution No. B-1348	September 2002
B-1354	Adoption of Employee Handbook, repealing	September 2002

Resolution Nos. B-1014, B-1083, B-1205, B-1206
 B-1207, B-1208, B-1209, B-1260, B-1264, B-1291,
 B-1297, B-1309, B-1310, B-1312, B-1313, B-1318,
 B-1321, B-1331, B-1335, B-1337, and B-1338

B-1355	Draft resolution requesting Pierce County Auditor to call a special election for the purpose of determining whether or not the Lakewood Water District should add fluoride to water supplied by the District and proposing a ballot proposition	Not yet adopted
B-1356	Board of Commissioner Regular Meeting Schedule	October 17, 2002
B-1357	Amendment Rates and Charges, Fire Protection Service	January 16, 2003
B-1358	Overtime Rates—reinstatement of previous practice	May 15, 2003
B-1359	Sick Leave—clarification of existing res.; add'l retirement Benefit	June 26, 2003
B-1360	Overtime—amendment/clarification re. “work week”	August 21, 2003
B-1361	Bond Resolution—Issuance & sale of water revenue bonds	November 20, 2003
B-1362	SEPA Resolution	December 18, 2003
B-1363	Employee Award Program	March 18, 2004
B-1364	Sale of Surplus Vehicles and Office Equipment +Exhibit A	April 22, 2004
B-1365	Fluoride Vote on Gen'l Election Ballot 11/4/04	June 17, 2004
B-1366	LWD Sole Sources	December 16, 2004
B-1367	2005 Rate Increase (9.5%)	January 10, 2005
B-1368	Appointment of John S. Korsmo as Commissioner	February 17, 2005
B-1369	LWD Acceptance of Bldg from Lakewood Fire Distr.	April 21, 2005
B-1370	Modified GFC Schedule	September 22, 2005
B-1371	Reimbursement Resolution	January 19, 2006
B-1372	2006 Bond Sale Resolution	March 16, 2006
B-1373	Emergency COOP	December 1, 2006
B-1374	Revised Delinquent Charge for Multi-Units	December 21, 2006
B-1375	2007 Rate Increase (9.5%)	January 18, 2007
B-1376	Revised Lien Policy	January 18, 2007
B-1377	Revised Employee Recognition/Fringe Benefit Policy	January 18, 2007
B-1378	NIMS Compliance	January 18, 2007
B-1379	Revised Service Connection Charges	March 27, 2007
B-1380	Revised GFC Resolution	April 19, 2007
B-1381	Revised BOC Compensation per ESHB 1368	June 21, 2007

B-1382	GM Authority to Liquidate USA Mobility Stock	July 24, 2007
B-1383	Front Footage	August 16, 2007
B-1384	GFC One-Time Charge for New Connections	August 16, 2007
B-1385	District Abitibi Water Rights History/RB Authority	April 17, 2008
B-1386	Wholesale Water Pricing	May 15, 2008
B-1387	Revised Delinquent Billing Processes	July 17, 2008
B-1388	Revised Account Deposit Processes	June 19, 2008
B-1389	Local Facilities Charge	September 25, 2008
B-1390	Hazard Mitigation Plan 2008	October 16, 2008
B-1391	Identify Theft Prevention Program	October 16, 2008
B-1392	2009 Rate Increase	February 19, 2009
B-1393	Washington WARN Agreement	August 20, 2009
B-1394	Withdrawal of Abitibi II Application/Authorization of Litigation Against DOE	September 28, 2009
B-1395	Local Facilities Charge for Southgate Area	December 17, 2009
B-1396	Greenhouse Gas Emission Reduction Policy	June 17, 2010
B-1397	Revised Connection Charges	July 15, 2010
B-1398	Ratifying 2011 Rate Increase	March 17, 2011
B-1399	Condemnation Process for 9212 & 9214 Lawndale	April 21, 2011
B-1400	Revised Service Fees	June 30, 2011
B-1401	2012 Rate Increase	January 30, 2012
B-1402	Revised Service Connection Charges and Residential Fire Sprinkler System Policy revision adoption	January 31, 2012
B-1403	Bond Refinancing—Bonds #1 and #2 (issued 2001 and 2003)	March 15, 2012
B-1404	Sole Source Resolution—repealing B-1366	July 26, 2012
B-1405	Revised Life Expectancy/Depreciation Rates for Fixed Assets (Increasing DI pipe's from 70 years to 100)	October 23, 2012
B-1406	Designation of FEMA/State of Washington Hazard Mitigation Grant Program Application Signing Agent (GM)	October 23, 2012
B-1407	Appointment of Gregory James Rediske to Board of Commissioners	November 6, 2012
B-1408	2013 Rate Increase	January 17, 2013
B-1409	Purchase of Mt. Tacoma Mobile Home Park Water Rights	March 21, 2013
B-1410	Revised Service Connection Charges (superseding B-1397)	March 21, 2013

B-1411	Adoption of 2013 Comp Plan (covering 2012-2017)	June 28, 2013
B-1412	Sale of Surplus Property on 115 th Street	December 19, 2013
B-1413	2014 Rate Increase and Revised Rate Schedule Exhibit A—History and Explanation of R&R Funding	December 19, 2013
B-1414	Hydrant Meter Rental Policy and Resolution Exhibit A—Hydrant Meter Rental Policy	March 20, 2014
B-1415	Bond Resolution: Issuance & Sale of Water Revenue Bonds	March 20, 2014
B-1416	Public Works Trust Fund Loan Application Resolution	April 17, 2014
B-1417	Condition of Services—Water Serviced Ownership and Access	May 30, 2014
B-1418	Public Disclosure	May 30, 2014
B-1419	2014 Surplus	October 30, 2014
B-1420	LWD CAP (Customer Assistance Program)	November 20, 2014
B-1421	2015 Rate Increase	December 18, 2014
B-1422	Region 5 All Hazard Mitigation Plan—2015-2020 Edition	February 19, 2015
B-1423	Employee Education Assistance Program	July 28, 2015
B-1424	Half-day Office Close for Employee Holiday Luncheon	October 15, 2015
B-1425	Board Approval of JBLM Proposal Submittal and Possible Negotiations if LWD prevails	November 19, 2015
B-1426	2016 Rate Increase	December 17, 2015
B-1427	Delinquent Processes/Policy—change late fee to 10%	January 21, 2016
B-1428	Fire Meters—Amended Rate and Charges	January 21, 2016
B-1429	Miscellaneous Charges—new and revised fees	February 18, 2016
B-1430	Delinquent Processes (repealing B-1427)	February 18, 2016
B-1431	Fixed Assets	February 18, 2016
B-1432	Cross Connection Control Program	March 15, 2018
B-1433	Miscellaneous Charges (repealing B-1429)	April 28, 2016
B-1434	Sick Leave (repealing B-1359)	April 28, 2016
B-1435	2016 Bond Refinancing (of 2006 Bonds) Resolution	April 28, 2016
B-1436	Surplus Items	April 28, 2016
B-1437	Vacation Roll-over and Cash-out Policy	September 1, 2016
B-1438	2017 Rate Increase	January 19, 2017
B-1439	Sick Leave—w/Retirement Criteria for Payout	April 20, 2017
B-1440	2017 Revenue Bond Issuance Resolution	July 29, 2017

B-1441	2018 Rate Increase	December 21, 2017
B-1442	Revised Sick Leave Policy to reflect Initiative 1443	Pending
B-1443	Reimburse Resolution (to cover cashflow 'til bonds for WTME)	February 15, 2018
B-1444	Issuance of Junior Lien Water Revenue Bond Anticipation Note	April 24, 2018
B-1445	Resolution Authorizing Condemnation—Nyanza Tank Property	May 17, 2018
B-1446	Resolution Authorizing Condemnation—WTME	June 21, 2018
B-1447	Sick Leave (repealing B-1434)	Pending
B-1448	2019 Rate Increase	December 20, 2018
B-1449	LGIP Resolution (authorizing Fin. Dir. to invest)	December 20, 2018
B-1450	Issuance of 2019 Jr. Lien Water Revenue BAN	March 19, 2019

Pertinent resolutions to the Comprehensive Plan

With the Board of Commissioners being the legislative body governing the District we have included what we feel are the most pertinent resolutions affecting the District operations from a high level. These include the latest rate increase resolution, decommissioning of wells additions of water rights purchases Wholesale pricing annexing of areas and asset life assessment resolution and the like. Currently that district has 1450 resolutions on the books. We have digitized the older resolutions for inclusion in to the Appendices.

LAKWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON

Resolution No. A-9

A RESOLUTION authorizing the Borrowing of money to enable LAKWOOD WATER DISTRICT to extend, enlarge and otherwise improve the supply and distribution of water by the District.

WHEREAS, the development of and increase of population in Lakewood Water District is such that to supply the needs of present and prospective water customers, additional sources of supply, and additional reservoirs and transmission mains and related facilities are urgently required, and the Commissioners have or are about to call for bids for the drilling of a large well, the erection of a standpipe, and construction of transmission mains and appurtenances, and require funds in addition to those presently in hand for such purposes;

BE IT RESOLVED by the Commissioners of Lakewood Water District, a municipal corporation of Pierce County, Washington, as follows:

Section 1. That said District, in order to provide funds for the extension, enlargement, and other improvement of the supply and distribution of water within the district and for the making of the particular improvements hereinabove recited, shall borrow such amounts as from time to time shall be determined by the Commissioners of the District to be required for said purposes up to, but not exceeding, the total amount at any one time outstanding and unpaid of Thirty Thousand Dollars (\$30,000.00).

Section 2. That the President and Secretary of said Lakewood Water District, or any two of the Commissioners of said District, be and they are hereby authorized, in the name and on behalf of said District, to borrow at one time or from time to time sums up to but not in excess of a total indebtedness at any time created under the authority hereof and outstanding and unpaid of Thirty Thousand Dollars (\$30,000.00), on such terms and conditions as said officers or commissioners may negotiate; PROVIDED, however, that any indebtedness so created shall bear interest at not to exceed four per cent per annum, and the principal thereof shall be repayable at not to exceed \$1500.00 per month; and that said officers or commissioners of the District be and they are hereby authorized to execute and deliver, in the name and on behalf of the District, any and all such notes or other evidences of indebtedness as may properly be required to evidence the liability of the District for any and all indebtedness created pursuant hereto.

Section 3. For the purpose of providing for the prompt and due payment of the principal of and interest on any and all indebtedness that may be created pursuant hereto, there is hereby established a special fund to be known as "Current Improvement Fund." Beginning in the month of March, 1950, and in each month thereafter so long as any of the indebtedness created pursuant hereto shall be outstanding and unpaid, the District shall, after having set aside from its gross revenues an amount sufficient to pay the principal and interest upon its outstanding Water Revenue Bonds, Series 1, as required by Resolution No.12 of the District,

MINUTES OF REGULAR MONTHLY MEETING OF THE
COMMISSIONERS
of
LAKEWOOD WATER DISTRICT

Held at the office of the District at 8:30 P.M. on Thursday, February 17, 1950.

Present: Commissioners, Metzger and Link. F. W. Schwab, Manager, was also present.

The reading of the minutes of the previous meeting was dispensed with.

Mr. Metzger presented some amendments to the well specifications. After some discussion, the specifications were approved as amended and advertisement for bids authorized.

A resolution was presented and approved authorizing the Commissioners to borrow funds from the National Bank of Washington, not to exceed thirty thousand dollars (\$30,000.00) and said funds to be obtained only as needed. A fund, to be known as "Lakewood Special Construction Fund", is to be set up and twenty-six hundred dollars (\$2,600.00) is to be deposited in this fund each month to cover interest and repayment of any monies borrowed under this resolution.

On motion duly made and passed, the American Pipe and Construction Company was awarded the contract for the new standpipe. Their twenty-nine (29) day earlier delivery date made their bid the best.

Mr. Metzger did not like the form of agreement presented by Worthen & Wing and is rewriting same. The agreement generally was approved.

The Manager reported that Jim March had deposited a check for his portion of the M & M Huson-Lake Street Extension. The commissioners authorized the signing of the contract for this work.

The question of a further Easterly extension of the two (2) inch main on 99th St., was discussed. After some discussion, it was decided that as Oak Park Addition was to the East of Belmont Street and presently served, the District would, no doubt, have to make the tie-in between Bridgeport Way and Lake Steilacoom Avenue on Belmont. Therefore, any further extension on 99th Street should be four (4) inch pipe and should extend to the West line of Belmont Street.

The Manager reported that Bill W. Tietz had made his initial deposit for the completion of the Oak Park Extension and was authorized to make arrangements with Worthen & Wing, pending completion of the agreement with them, to prepare this job for advertising.

The Manager reported that he had talked with Jack Briggs regarding a well site on his property West of Steilacoom Lake. Although he did not care to give us a site in the location preferred, he did agree to the Southwest corner of his property which is, from the standpoint of our present lines, not so desirable but in other respects is very satisfactory. The manager was instructed to discuss this with Mr. Worthen and if satisfactory with him, to proceed with acquiring an option on this property.

There being no further business, the meeting adjourned at 11:45 P.M.

F. D. Metzger, Secretary

set aside and pay into said Current Improvement Fund out of the remaining gross revenues of the water system owned by the District, including any and all additions, extension, improvements, betterments and replacements, the sum of \$1600.00.

Any and all indebtedness created pursuant hereto and the notes and other evidences thereof shall be a lien and charge against all revenues of the District, superior to all other charges whatsoever, including operating and maintenance expenses, except the charges for and the amounts required to pay the principal and interest of the Water Revenue Bonds, Series 1, of the District from time to time outstanding and unpaid; PROVIDED, however, that such indebtedness may nevertheless be paid not only from the special fund hereby created, but from any other funds of the District which from time to time may be available for such purpose.

Section 4. That the President and Secretary of Lakewood Water District, or any two Commissioners thereof, be and they are hereby authorized, for, in the name and on behalf of the District, to do any and all things which they may deem or be advised by counsel of their choosing are within the scope and intent of or necessary to give effect to and carry out the purpose of this resolution, which is as hereinabove stated.

Passed by the Commissioners of Lakewood Water District, this 16th day of February, 1950.

A. H. Link

J. A. Meyer

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MINUTES OF REGULAR MEETING

OF

LAKESWOOD WATER DISTRICT BOARD OF COMMISSIONERS

SEPTEMBER 21, 1950

The meeting was called to order at 8: P.M. Mr. McCann, Mr. Metzger present, also Mr. Schwab, manager.

Messrs. Frank Gillette and Jack Pinkham attended the meeting representing the Planter's Club of Lakewood, the purpose of their attendance being to inquire what the club could do to assist the district in beautifying the tank and well sites. They were advised that the district was preparing a new comprehensive plan to present to the voters and if such a plan was accepted there would be some money available for beautification purposes, and that the district would at that time appreciate any cooperation that the club could give them.

Mr. Ralph Davison also was present at the meeting inquiring as to the reason for the job in Park Hill not being completed. He felt that the job had been dragging along unnecessarily and the fact that it was not completed was making it difficult for him to advance his plans for the improvement of this area. He was advised that everything possible would be done to get the job completed as soon as possible. He also questioned the location of the 4" line on Belmont, stating that it appeared to him that the line was about 10' on his property. Also, he thought that the blow-off on the end of the line was not properly placed since it would be in the middle of the turn-around which is provided at this point. He was told that this would be investigated and if things were as he stated, it would be corrected.

The question of installing the new service connections was discussed, the subject being brought up due to the shortage of pipe at the present time. It is getting almost impossible to obtain 1" galvanized pipe and it was suggested that the people be told at the time they make application that we can not guarantee when the service can be installed. However, if they are able to pick up sufficient pipe to make the connection, we will credit them for such pipe at the rate of \$.20 per foot; this has been agreed to by the contractor.

The manager was instructed to write the County Commissioners that we will not assess any taxes in the year 1951. The letter from the County Assessor giving us the valuation of the property in the District was received and filed.

The matter of an additional billing machine was discussed and Mr. McCann reported that the present price of a machine duplicating the one we have is now priced at \$4,192.00, less 10% government discount, and that delivery could be made in seven to eight months.

Mr. Worthen, the engineer, came into the meeting at 8:40 P.M. at which time he was asked about the Park Hill job, and he said that the job had been dragging and he was making every effort to get it completed and had been assured by the contractor that it would be cleaned up immediately. He also stated that he would check on the location of the 4" line immediately.

Mr. McCann reported on the meeting with Paul Newman and the County Engineer regarding the re-establishment of property lines at Washington Blvd. and Gravelly Lake Drive. The purpose of this was to work out a deal with the

County to change the lines at this intersection which would make it possible for the new building to be placed further front on our property. There was nothing definite decided, but he felt that the proposition would be given very favorable consideration.

The bill from Mr. Kuehl for engineering services on the new stand pipe was presented and approved.

The main on Edgewater Drive was again brought up for discussion due to a proposed further extension of the main on 87th street which will be extended to Edgewater Drive and South on Edgewater to Steilacoom Blvd. It was decided that when the bids for this further extension are called an alternate bid will also be asked for to extend the full length of Edgewater and give the customers on this line the opportunity to take advantage of reduced construction costs at this time.

The question of a hydrant on Clover Creek Drive was discussed and we will have this hydrant as an alternate on the bid for the installation on the main on 122nd street and try to get the property owners affected to share in the cost of installing this hydrant.

Mr. Schwab stated that he had a request from Mr. George Steen, Jr., for a main to be installed on a private road but advised Mr. Steen that we would not install mains on private roads and give service from them. Mr. Worthen stated that this development had been blocked by the Planning Commission due to zoning regulations and that there no doubt would be no further need for consideration in this matter.

Mr. Worthen read his monthly report on activities of the Engineers. Various items were discussed.

Mr. Worthen put particular stress upon the difficulties that they have been experiencing on two jobs in which the parties negotiated their own contracts for the installations, and felt that something should be done to eliminate or at least discourage this practice. After a discussion of the subject, it was decided that in the future where a party wished to negotiate a contract for the installation rather than have it done through the District Channels, there would be a minimum charge of 20% for engineering and that it might even run higher, each job being considered on its individual merits.

Mr. Worthen also felt that there should be a definite policy established regarding the distance that a main should be extended to serve a particular piece of property; in other words, whether the main should be extended just a sufficient distance to serve the premises in question or should it be extended clear across the front of the property. After a thorough discussion of this matter, it was decided that the policy in the future will be that the main must be extended across the building site to be served.

Preliminary plans for the new office were reviewed and discussed, with some changes being suggested. Mr. Worthen will submit a sketch embodying these suggestions for further consideration of the commissioners.

Mr. Worthen had with him a new style cast iron fitting to be used in connection with asbestos cement pipe. This fitting eliminates the use of yarn and lead in making a connection to it and also eliminates the need of short lengths of pipe on the fitting as is now used. Mr. Worthen plans on the next job for which specifications are prepared to permit the contractor to bid on the basis of the use of this fitting.

The matter of the connection being put in for Mr. F. E. Moran in Tillicum without him paying his proportionate share of the main contribution on Union Avenue from which he is getting service was discussed and the manager was instructed to write Mr. Moran stating that unless his proportionate share of this cost is paid within ten (10) days his water service will be discontinued.

The matter of the charge for water consumed by customers discontinuing service less than ten (10) days after the regular reading date came up for discussion. The following resolution covering this subject was adopted:

RESOLUTION NO. A-19

A resolution relating to the water supply system of Lakewood Water District and to the rates or prices to be charged for the sale of water; amending section 2 of resolution No. 41; and specifying the date upon which this resolution shall become effective.

WHEREAS, with due regard to the cost of operation and maintenance of the water system now being operated and to be acquired and added to by Lakewood Water District and to the interest and principal amortization requirements of the issue of \$180,000.00 in par value of Lakewood Water District, Pierce County, Water Revenue Bonds heretofore authorized and all other charges and expenses, it is deemed necessary that the rates and charges for water supplied by the District should be in certain respects increased, NOW, THEREFORE

BE IT RESOLVED by the Board of Water Commissioners of Lakewood Water District, as follows:

Section 1. That Paragraphs A and D, pertaining to minimum charges of Section 2 of Resolution No. 41 heretofore adopted by said Board of Water Commissioners shall be and is hereby amended to read as follows:

"Section 2 - Rates

The rates for water supplied shall be as follows:

- A. For Single Unit Premises other than premises served from the twelve inch main supplying the Pacific Naval Advance Base.

A minimum charge of \$2.00 per month or fraction thereof exceeding ten (10) days, which charge shall allow for a consumption of 600 cubic feet of water, plus a consumption charge for water consumed in excess of 600 cubic feet in accordance with the following schedule; where the fraction of a month is less than ten days and the consumption less than 600 cubic feet the charge shall be thirty-five cents (35¢) per one hundred (100) cubic feet of water consumed, with a minimum charge of one dollar (\$1.00).

- \$.15 per 100 cubic feet for the next 3400 cubic feet
- .10 per 100 cubic feet for the next 6000 cubic feet
- .08 per 100 cubic feet for all consumption over 10,000 cubic feet

- D. For Customers Taking Service from twelve inch main Supplying the Pacific Naval Advance Base

For customers taking service from 12" main supplying the Pacific Naval Advance Base, a minimum charge of \$2.00 per month or fraction thereof for each

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unit; exceeding ten days which charge shall allow for a consumption of 600 cubic feet of water per month per unit. (e.g. 600 cubic feet x the number of single units per customer), plus a consumption charge for the number of cubic feet of water consumed in any month in excess of 600 x the number of units per customer at the rates herein above provided in single unit premises, other than those served from said 12" main for water consumed in any month in excess of 600 cubic feet; where the fraction of a month is less than ten days and the consumption less than 600 cubic feet per unit, the charge shall be \$.35 per hundred cubic feet per unit consumed, with a minimum charge of \$1.00 per unit.

Section 2. The amendments hereby made in the rules, regulations and rates heretofore established by resolution No. 41 of the Board of Water Commissioners of Lakewood Water District shall be effective September 22, 1950.

Vouchers in the amount of \$36,349.07 were approved.

There being no further business, the meeting adjourned.

Richard W. McCann

President

LAKWOOD WATER DISTRICT COMMISSIONERS

F. D. Metzger
Secretary

RESOLUTION NO: B-1099

A RESOLUTION of the Board of Commissioners of the Lakewood Water District establishing a Cross-Connection Prevention Program pursuant to Washington Administrative Code 248-54.

WHEREAS, Washington Administrative Code 248-54 requires all cross-connections to be tested and approved; and

WHEREAS, the Commissioners desire to protect the health of water consumers and the potability of the public water system of Lakewood Water District by establishment of a Cross-Connection Prevention Program; and

WHEREAS, the Lakewood Water District has developed a program for permitting an inspection of cross-connections designed to minimize or eliminate cross-connections, to the extent possible, in order to prevent contamination of this public water system.

NOW, THEREFORE, BE IT RESOLVED:

1) Any cross-connection discovered in any part of the Lakewood Water District water system, which, in the judgement of the Manager and Superintendent of the District could be a danger to the water quality are hereby declared to be unlawful, unless and until backflow prevention devices are installed and inspected, and found to be in compliance with Washington Administrative Code 248-54.

2) A system of issuance of permits, performance of testing and inspection of all backflow prevention devices shall be, and is hereby, established.

3) The cross-connection control program hereby established will be used in all commercial and industrial developments within the Lakewood Water District.

4) Annual testing of all backflow prevention devices will be required, subject to notice to be given to the property owner and/or occupier by Lakewood Water District.

5) The Lakewood Water District will maintain a list of certified testers, approved by the State of Washington, but the maintenance of such list shall not be deemed a recommendation or a guarantee of the quality of the work of any certified tester.

6) The Manager/Superintendent is directed to cause to be prepared an inventory or list of all existing facilities where cross-connections are known to exist or are suspected. These cross connections shall be placed upon a priority list for correction, beginning with those cross-connections which are deemed to present the greatest danger to the public water supply.

7) The Manager/Superintendent is directed to establish a public education program, consisting of pamphlets, letters, notices, and public meetings if necessary, to explain the necessity for the implementation of this program.

8) Any Customer or property owner who refuses, or is unable to comply with this resolution, the Cross-Connection Prevention Program, or WAC 248-54 shall be advised that water service will be discontinued if there is a continuing failure to comply.

ADOPTED THIS 16th day of October, 1989.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS:



President

ATTEST:



Secretary

LAKWOOD WATER DISTRICT

RESOLUTION B-1287

A RESOLUTION of the Board of Commissioners of the Lakewood Water District superseding Resolution B-1099 dealing with Cross Connection Control Program pursuant to Washington Administrative Code 246-290-490 or the current WAC addressing Cross Connection.

WHEREAS, WAC 246-290-490 or the current WAC addressing Cross Connection, requires all cross connections to be tested and approved; and

WHEREAS, the Board of Commissioners desire to protect the health of water consumers and the potability of the public water system of Lakewood Water District by establishing a cross connection control program; and

WHEREAS, the Lakewood Water District has developed a program for permitting an inspection of cross connections designed to reduce or eliminate cross connections, to the extent possible, to prevent contamination of this public water system;

RESOLVED,

1. Any cross connection discovered in any part of the Lakewood Water District water system that, in the judgement of the Manager and/or Superintendent of the District could be a danger to the water quality, are hereby declared to be unlawful until backflow prevention assemblies are installed, inspected and found to be in compliance with WAC 246-290-490 or the current WAC addressing Cross Connection.
2. A system of issuance of permits, performance of testing and inspection of all backflow control assemblies shall be, and is hereby, established.
3. The cross connection control program now established will be used in all commercial and industrial developments within the Lakewood Water District.
4. We will require annual testing of all backflow control assemblies, subject to notice, to be given to the property owner and/or occupier by Lakewood Water District.
5. The Lakewood Water District will maintain a list of certified testers, approved by the State of Washington, but they will not deem the maintenance of such list a recommendation or a guarantee of the quality of the work of any certified tester.
6. The Manager/Superintendent is directed to prepare an inventory or list of all existing facilities where they know that cross connections exist or are suspected. These cross connections shall be placed upon a priority list for correction beginning with those deemed to present the greatest danger to the public water supply.
7. The Manager/Superintendent is directed to establish a public education program consisting of pamphlets, letters, notices and public meetings, if necessary, to explain the necessity for the implementation of this program.
8. Any customer or property owner who refuses, or is unable to comply with this Resolution, the Cross Connection Control Program or WAC 246-290-490 or the current WAC addressing Cross Connection, shall be advised that we will stop their water supply if there is a continuing failure to comply.

Adopted this 28th day of February 1996.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

BY: 
PRESIDENT

ATTEST:


SECRETARY

an annexation having been presented by thirty-nine property owners in the Northeast Quarter (NE $\frac{1}{4}$) of Section 8, Township 19 North, Range 2, East of the Willamette Meridian for annexation to the District.

WHEREAS, the Commissioners of the Lakewood Water District have signified their willingness to consider such annexation, NOW THEREFORE

BE IT RESOLVED: THAT the Manager was instructed to set a hearing date of September 10, 1956 at 7:30 P.M. at the District's office, 11900 Gravelly Lake Drive SW, Tacoma 99, Washington, and to proceed with publication notices and advertisements as required by law to effect hearing at the above date.

Passed this 23rd day of July, 1956.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

By *Oliver Malm*
Oliver Malm, Vice-President

Attest:

Roland J. Day
Roland J. Day Secretary

RESOLUTION NO. B-112

A RESOLUTION providing for the annexation of the Northeast Quarter (NE $\frac{1}{4}$) of Section 8, Township 19 North, Range 2 East of the Willamette Meridian less the West half and the South half of the East half of the Southwest Quarter (SW $\frac{1}{4}$) of said Northeast Quarter (NE $\frac{1}{4}$) of said Section 8. The above proposed annexation area is contiguous to the boundaries of the Lakewood Water District along Holden Road and on approximately 1330 feet of 112th Street (formerly Mud Lake Road) to the existing boundaries of the Lakewood Water District.

WHEREAS, a petition with thirty-nine signatures of property owners in the above area and accompanied by a plat thereof has been received by the Commissioners of the Lakewood Water District, AND

WHEREAS, Messrs. Worthen & Wing, as Engineers for the District, have checked the legal descriptions of the various property owners and have certified that the property covered by the signers of the petition constitutes more than 60% of the area of land for which annexation is petitioned; AND

WHEREAS, the Commissioners at a meeting held August 6, 1956 found the petition for annexation filed with the Board of Commissioners complies with the requirements of law, as proved to the satisfaction of the Board of Commissioners, and therefore entertained the petition, fixed the date of public hearing for September 10, 1956 at 7:30 P.M. at the District's office, 11900 Gravelly Lake Drive SW, Pierce County, Washington, and caused notice of the hearing to be published in the issues of August 16th and August 30th, 1956 of the Lakewood Log, and also the posting of notices at three public places within the area proposed for annexation, inviting interested persons to appear before the Board and make objections to the proposed boundary lines or to the annexation of said territory to the Lakewood Water District, AND

WHEREAS, the hearing having been held, NOW THEREFORE

BE IT RESOLVED: THAT the following described area situated in Pierce County, Washington is hereby annexed to the Lakewood Water District to-wit:

The Northeast Quarter (NE $\frac{1}{4}$) of Section 8, Township 19 North, Range 2 East of the Willamette Meridian less the West half and the South half of the East half of the Southwest Quarter (SW $\frac{1}{4}$) of said Northeast Quarter (NE $\frac{1}{4}$) of said Section 8.

AND the new boundary lines of the District shall include the area so annexed by this Resolution, AND

BE IT FURTHER RESOLVED: THAT such annexation will be conducive to the public health, welfare and convenience, and of special benefit to the territory annexed and to the Lakewood Water District as a whole, AND

BE IT FURTHER RESOLVED: THAT a special charge of \$100.00 shall be made for all water Service Applications in the annexed area in addition to all charges, rates, and regulations as may now or

RES. B-112 CONT'D

hereafter be established by the Commissioners of the Lakewood Water District, AND

BE IT FURTHER RESOLVED: THAT a certified copy of this Resolution shall be filed with the Board of Commissioners of Pierce County, Washington.

Passed this 10th day of September, 1956.

LAKEWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

By 

Robert J. Lloyd, President

ATTEST:


Roland J. Day, Secretary



WHEREAS, a petition with thirty-seven signatures of property owners in the above area and accompanied by a plat thereof has been received by the Commissioners of the Lakewood Water District, and

WHEREAS, the property covered by the signers of the petition constitutes more than 60% of the area of land for which annexation is petitioned; AND

WHEREAS, the Commissioners at a meeting held February 24, 1958 found the petition for annexation filed with the Board of Commissioners complies with the requirements of law, as proved to the satisfaction of the Board of Commissioners, and therefore entertained the petition, fixed the date of public hearing for March 6, 1958 at 7:30 P. M. at the District's office, 11900 Gravelly Lake Drive SW, Pierce County, Washington, and caused notice of the hearing to be published in the February 27, 1958 issue of the Lakewood Log, and also the posting of notices at three public places within the area proposed for annexation, inviting interested persons to appear before the Board and make objections to the proposed boundary lines or to the annexation of said territory to the Lakewood Water District, AND

WHEREAS, the hearing having been held, NOW THEREFORE

BE IT RESOLVED: THAT the following described area situated in Pierce County, Washington, is hereby annexed to the Lakewood Water District to-wit:

All of that part of Section 31, Twp. 20 N. and Section 6, Twp. 19 N., both in Range 3 E. of the W. M., lying east of the present eastern boundary of the Lakewood Water District; south of the Tacoma City Limits and west and northwest of the northwest right-of-way line of the Tacoma-Seattle-Everett freeway in the above sections.

AND the new boundary lines of the District shall include the area so annexed by this Resolution. AND


BE IT FURTHER RESOLVED: THAT such annexation will be conducive to the public health, welfare and convenience, and of special benefit to the territory annexed and to the Lakewood Water District as a whole, AND

BE IT FURTHER RESOLVED: THAT all property owners or residents within said annexed area desiring water service from Lakewood Water District shall, with their initial application for water service, pay a flat charge of \$100.00 as a special charge or rate for water service thereafter to be furnished in accordance with such application, which special rate shall be in addition to all charges and rates for service connections and water service now or hereafter established by said District, and is made necessary by the additional cost of water service to the annexed area.

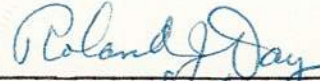
BE IT FURTHER RESOLVED: THAT a certified copy of this Resolution shall be filed with the Board of Commissioners of Pierce County, Washington.

Passed this 24th day of March, 1958.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

by 
Oliver Malm, President

Attest:


Roland J. Day, Secretary

RESOLUTION NO. B-206

A RESOLUTION providing for the annexation of all that part of Sec. 5 and Sec. 6 in Twp. 19 N., Range 2 E. of the W. M. lying north and east of the Fort Lewis boundary and south and east of the Steilacoom City boundary and west of Farwest Drive, and all that part of Sec. 32 in Twp. 20 N., Range 2 E. of the W. M. abutting and lying west of Farwest Drive and Western Washington State Hospital and east and north of the City of Steilacoom boundary, and that part of said Section southeast of right-of-way line of the Northern Pacific Railway and south of Chambers Creek, and all that part of Sec. 27, Twp. 20 N., Range 2 E. of the W. M. lying westward of the easterly line of Chambers Creek County Road and south of Chambers Creek, but also including that part of the N $\frac{1}{2}$ of the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Sec. 27 lying south of Chambers Creek County Road, and also all that part of Sec. 28, Twp. 20 N., Range 2 E. of the W. M. lying south of Chambers Creek, but not including any part of the Western Washington State Hospital property, and all that part of Sec. 29, Twp. 20 N., Range 2 E. of the W. M. lying south and southeast of Chambers Creek. This area to be newly annexed lies north and west and abuts the present northern and western boundaries of the Lakewood Water District.

WHEREAS, a petition with eighty-two signatures of property owners in the above area and accompanied by a plat thereof has been received by the Commissioners of the Lakewood Water District, and

WHEREAS, the property covered by the signers of the petition constitutes more than 60% of the area of land for which annexation is petitioned;
AND

WHEREAS, the Commissioners at a meeting held June 27, 1960 found the petition for annexation filed with the Board of Commissioners complies with the requirements of law, as proved to the satisfaction of the Board of Commissioners, and therefore entertained the petition, fixed the date of public hearing for July 14, 1960 at 7:30 P. M. at the District's office, 11900 Gravelly Lake Drive, S. W., Pierce County, Washington, and caused notice of the hearing to be published in the June 30, 1960 issue of the Lakewood Log, and also the posting of notices at three public places within the area proposed for annexation, inviting interested persons to appear before the Board and make objections to the proposed boundary lines or to the annexation of said territory to the Lakewood Water District, AND

WHEREAS, the hearing having been held, NOW THEREFORE

BE IT RESOLVED: THAT the following described area situated in Pierce County, Washington, is hereby annexed to the Lakewood Water District, to-wit:

All that part of Sec. 5 and Sec. 6 in Twp. 19 N., Range 2 E. of the W. M. lying north and east of the Fort Lewis boundary and south and east of the Steilacoom City boundary and west of Farwest Drive, and all that part of Sec. 32 in Twp. 20 N., Range 2 E. of the W. M. abutting and lying west of Farwest Drive and Western Washington State Hospital and east and north of the City of Steilacoom boundary, and that part of said Section southeast of right-of-way line of the Northern Pacific Railway and south of Chambers Creek, and all that part of Sec. 27, Twp. 20 N., Range 2 E. of the W. M. lying westward of the easterly line of Chambers Creek County Road and south of Chambers Creek, but also including that part of the N $\frac{1}{2}$ of the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of said Sec. 27 lying south of Chambers Creek County Road, and also all that part of Sec. 28, Twp. 20 N., Range 2 E. of the W. M. lying south of Chambers Creek, but not including any part of the Western Washington State Hospital property, and

all that part of Sec. 29, Twp. 20 N., Range 2 E. of the W. M. lying south and southeast of Chambers Creek. This area to be newly annexed lies north and west and abuts the present northern and western boundaries of the Lakewood Water District.

AND the new boundary lines of the District shall include the area so annexed by this Resolution. AND

BE IT FURTHER RESOLVED: THAT such annexation will be conducive to the public health, welfare and convenience, and of special benefit to the territory annexed and to the Lakewood Water District as a whole, AND

BE IT FURTHER RESOLVED: THAT all property owners or residents within said annexed area desiring water service from Lakewood Water District shall, with their initial application for water service, pay a flat charge of \$100.00 as a special charge or rate for water service thereafter to be furnished in accordance with such application, which special rate shall be in addition to all charges and rates for service connections and water service now or hereafter established by said District, and is made necessary by the additional cost of water service to the annexed area.

BE IT FURTHER RESOLVED: THAT a certified copy of this Resolution shall be filed with the Board of Commissioners of Pierce County, Washington.

Passed this 25th day of July, 1960.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

by Oliver Mahon
President

ATTEST

Harold B. Korte
Assistant Secretary

RESOLUTION NO. B-389

A RESOLUTION OF LAKEWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON, ORDERING THE ABANDONMENT OF WELLS M-1 AND M-2, ALSO KNOWN AS JOHN DOWER WELLS NO. 1 AND NO. 2.

WHEREAS, Lakewood Water District is the owner of two wells, known as Wells M-1 and M-2, and also known as John Dower Wells No. 1 and 2, on the following described property in Pierce County, Washington, to-wit:

A portion of Government Lot 6 in the Northwest Quarter of the Southwest Quarter of Section 26, Township 20 North, Range 2 East of the W.M. described as follows: Beginning at the Northeast corner of said Lot; thence along the North line of said Lot 6 West 823.20 feet; thence parallel with the said East line of said Lot 6 South 298.64 feet for the point of beginning; thence at right angles of the said East line of Lot 6 East 208.00 feet; thence South parallel to the said East line 450.85 feet to the Northerly line of the right of way of the Hewitt-Steilacoom County Road; thence Northwesterly along same 219.22 feet to a point 823.20 feet West of the said East line of said Lot 6; thence North on a line parallel to said East line 381.39 feet to the point of beginning, being two (2) acres; EXCEPT the East 60 feet thereof; and

WHEREAS, there is an extremely high sulfur content in the water coming from both of the aforesaid wells, making the water completely unusable even after aerating, and further a very high iron content exists in the water coming from the wells making the water unsuitable for domestic use; and

WHEREAS, the said wells are situated in positions that may constitute a hazard to children and passersby; Now, therefore,

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, that Wells M-1 and M-2, also known as John Dower Wells No. 1 and No. 2, are hereby abandoned, and the manager is hereby ordered to dismantle and remove all usable fixtures and equipment and to place the well sites in such a condition that they will not

constitute a hazard to children or other persons.

PASSED by the Commissioners at a regular meeting thereof this

16th day of June, 1969.

LAKWOOD WATER DISTRICT

By *Oliver Mahan*
President

Attest:

Harold C. Rice Jr.
Secretary

RESOLUTION NO. B-495

A RESOLUTION accepting for operation and maintenance a new well to be known as T-4 located on the District's property on Hipkins Road.

WHEREAS, the well T-4 has been completed in accordance with the contract entered into with Western Water Supply Co., Inc. on April 25, 1974, NOW THEREFORE


BE IT RESOLVED: THAT the Lakewood Water District accepts the well T-4 for operation and maintenance.

Adopted this 21st day of October, 1974.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

by 
President

ATTEST:


ASST. Secretary

RESOLUTION NO. B-518

A RESOLUTION accepting for operation and maintenance a new well to be known as L-4 located on the District's property on Hemlock Hill.

WHEREAS, the well L-4 has been completed in accordance with Change Order A to the contract entered into with Western Water Supply Co., Inc. now d/b/a Soil Sampling Service, Inc. on April 25, 1974, NOW THEREFORE

BE IT RESOLVED: THAT the Lakewood Water District accepts the well L-4 for operation and maintenance.

Adopted this 20th day of October, 1975.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

by 
President

ATTEST:


Secretary

RESOLUTION NO. B-526

A RESOLUTION OF LAKEWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON, ORDERING THE ABANDONMENT OF WELL L-1, HEMLOCK HILL.

WHEREAS, Lakewood Water District is the owner of the well known as L-1 on the following described property in Pierce County, Washington, to-wit:

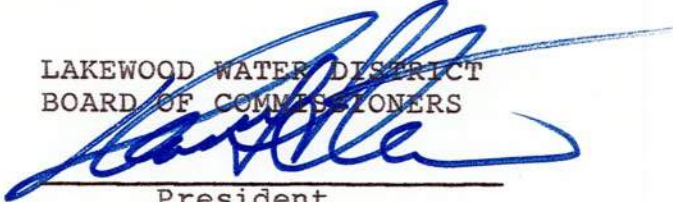
a portion of Reserve Block 1, Madrona Heights Subdivision, in the SE $\frac{1}{4}$ of the NW $\frac{1}{4}$, Sec. 4, Twp. 19 N., R. 2 E.

WHEREAS, due to the irreparable damage to the screen caused by electrolysis, this well is no longer usable, NOW THEREFORE,

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District, that Well L-1 is hereby abandoned, and the manager is hereby ordered to dismantle and remove all usable fixtures and equipment and to place the well site in such a condition that it will not be a hazard.


PASSED this 15th day of December, 1975.

LAKEWOOD WATER DISTRICT
BOARD OF COMMISSIONERS



President

ATTEST:



Secretary

RESOLUTION NO. B-669

A RESOLUTION relating to the water supply system of Lakewood Water District and to the ownership of the meter, and amending "C" of Section 24, Resolution 13 as heretofore amended by Resolution B-113, and specifying the date upon which this Resolution shall become effective.

WHEREAS, the Customer has heretofore retained ownership of his meter, and the District now desires to assume ownership of the meter and box in order to maintain, repair and replace a meter without charge to the customer, NOW THEREFORE

BE IT RESOLVED by the Board of Commissioners of the Lakewood Water District, Pierce County, Washington,

THAT Paragraph "C" of Section 24, Chapter 6 of Resolution 13, as heretofore amended by Resolution No. B-113 be and the same is amended to read as follows:

"The meter and box shall be part of the water service connection and ownership hereafter shall be retained by the District."

ALSO, BE IT RESOLVED: THAT the above amendment shall be effective January 1, 1981.

ADOPTED this 15th day of December, 1980.

BOARD OF COMMISSIONERS
LAKEWOOD WATER DISTRICT

W. W. Phelps

Vice President

Harold C. Rife

Secretary

RESOLUTION NO. B-670

A RESOLUTION relating to the ownership of a meter installed prior to January 1, 1981 and setting forth the means of obtaining ownership by the District of such meter to comply with accounting systems of municipal water district, and to capitalize said meter to the plant account.

WHEREAS, it is necessary for the District to obtain ownership of meters installed prior to January 1, 1981 in order to maintain, repair and replace said meters without charge to the customer by receiving each meter as a donation from the owner, NOW THEREFORE

BE IT RESOLVED: THAT the District shall obtain the owner's signature transferring ownership of the meter to the District, AND

BE IT FURTHER RESOLVED: THAT the date of this resolution shall be retroactive to January 1, 1981.

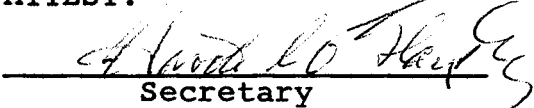
ADOPTED this 19th day of January, 1981.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS



President

ATTEST:



Secretary

RESOLUTION NO: B-762

A RESOLUTION of the Lakewood Water District
Pierce County, Washington, ordering the abandonment of
District Well #A1 Tillicum, also the old A1 Pumphouse.

WHEREAS, Lakewood Water District is the owner of the well,
known as A.1 on the following described property in
Pierce County Washington, to wit:

LOT 1, BLOCK 30, Plat of American Lake
within TILlicum TOWNSITE, S.E.¼, S.E.¼
Section 16, Township 19 N. Range 2 E,
of the W.M., Pierce County.

WHEREAS, due to the obsolete casing size, and because the
well has not been in use for a number of years, and because
it is no longer usable, NOW THEREFORE:

BE IT RESOLVED: THAT the Lakewood Water District A.1
WELL is hereby abandoned.

NOW THEREFORE: BE IT RESOLVED ALSO, that the A.1 Pumphouse,
due to age and maintenance requirements be abandoned.

The Manager is hereby ordered to dismantle and remove all
usable fixtures and equipment and to leave the well site
in such a condition that it will not be a hazard.

PASSED this 21st day of February, 1983.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS



President

ATTEST:



Secretary

RESOLUTION NO: B-873

A RESOLUTION providing for the inclusion of all of that part and portion of sections 22 & 23 of Township 19 North Range 2 East of the Willamette Meridian, lying southerly of interstate Highway 5 excepting therefrom any portion lying within a military reservation. More commonly known as AMERICAN LAKE GARDENS.

WHEREAS: the Commissioners at a special meeting held September 24, 1985, found the Memorandum of Agreement filed with the Board of Commissioners complies with the requirements of law, as proved to the satisfaction of the Board of Commissioners, and, therefore, affixed their signatures to this document, at the District's office 11900 Gravelly Lake Drive S.W., Pierce County, Washington. The full list of signing governmental agencies are as follows -

U.S. Air Force, McChord A.F.B.
As Agent for the Department of Defense,
and
U.S. Environmental Protection Agency
and
Lakewood Water District
and
Washington Department of Social & Health Services
and
Washington Department of Ecology
and
County of Pierce, Washington
and
Tacoma Pierce County Health Department.

BE IT RESOLVED: THAT the following described area situated in Pierce County, Washington, is hereby extended to the Lakewood Water District, to-wit -

ALL OF THAT PART AND PORTION OF SECTION 22 & 23 TOWNSHIP 19 NORTH RANGE 2 EAST OF THE WILLAMETTE MERIDIAN, LYING SOUTHERLY OF INTERSTATE HIGHWAY 5, EXCEPTING THEREFROM ANY PORTION LYING WITHIN A MILITARY RESERVATION. MORE COMMONLY KNOWN AS AMERICAN LAKE GARDENS.

AND the new boundary lines of the District shall include the area so included by this RESOLUTION. AND

BE IT FURTHER RESOLVED: THAT such extention will be conducive to the public health, welfare and convenience, and of special benefit to the territory included and to the Lakewood Water District as a whole, AND

BE IT FURTHER RESOLVED: THAT all property owners or residents within said extended area desiring water service from LAKEWOOD WATER DISTRICT, shall, with the exception of their initial application for water service be exempt of a special charge or rate for water service thereafter to be furnished in accordance with such application. All charges and rates for service connections and water service now or hereafter established by said District will apply.

ADOPTED this 21st day of October, 1985.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS.



President

ATTEST:



Secretary

RESOLUTION NO: B-1099

A RESOLUTION of the Board of Commissioners of the Lakewood Water District establishing a Cross-Connection Prevention Program pursuant to Washington Administrative Code 248-54.

WHEREAS, Washington Administrative Code 248-54 requires all cross-connections to be tested and approved; and

WHEREAS, the Commissioners desire to protect the health of water consumers and the potability of the public water system of Lakewood Water District by establishment of a Cross-Connection Prevention Program; and

WHEREAS, the Lakewood Water District has developed a program for permitting an inspection of cross-connections designed to minimize or eliminate cross-connections, to the extent possible, in order to prevent contamination of this public water system.

NOW, THEREFORE, BE IT RESOLVED:

- 1) Any cross-connection discovered in any part of the Lakewood Water District water system, which, in the judgement of the Manager and Superintendent of the District could be a danger to the water quality are hereby declared to be unlawful, unless and until backflow prevention devices are installed and inspected, and found to be in compliance with Washington Administrative Code 248-54.
- 2) A system of issuance of permits, performance of testing and inspection of all backflow prevention devices shall be, and is hereby, established.
- 3) The cross-connection control program hereby established will be used in all commercial and industrial developments within the Lakewood Water District.
- 4) Annual testing of all backflow prevention devices will be required, subject to notice to be given to the property owner and/or occupier by Lakewood Water District.
- 5) The Lakewood Water District will maintain a list of certified testers, approved by the State of Washington, but the maintenance of such list shall not be deemed a recommendation or a guarantee of the quality of the work of any certified tester.

6) The Manager/Superintendent is directed to cause to be prepared an inventory or list of all existing facilities where cross-connections are known to exist or are suspected. These cross connections shall be placed upon a priority list for correction, beginning with those cross-connections which are deemed to present the greatest danger to the public water supply.

7) The Manager/Superintendent is directed to establish a public education program, consisting of pamphlets, letters, notices, and public meetings if necessary, to explain the necessity for the implementation of this program.

8) Any Customer or property owner who refuses, or is unable to comply with this resolution, the Cross-Connection Prevention Program, or WAC 248-54 shall be advised that water service will be discontinued if there is a continuing failure to comply.

ADOPTED THIS 16th day of October, 1989.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS:



President

ATTEST:



Secretary

RESOLUTION NO: B-1125

A RESOLUTION of the Board of Commissioners of the Lakewood Water District to concur with the Clover Chambers Creek Ground Water Management Program to effectively manage the basin groundwater.

WHEREAS, The State of Washington Department of Ecology declared Clover Chambers Creek Basin as a Ground Water Management Area under RCW 90.44 and WAC 173-100: and

WHEREAS, 267,000 Pierce County residents utilize the Clover Chambers Creek Basin ground water as all or a portion of their drinking water; and

WHEREAS, protection of this resource from contamination, degradation and depletion is of primary importance to the Lakewood Water District; and

WHEREAS, The Lakewood Water District advocates environmentally sound management of the Clover Chambers Creek Basin; now

THEREFORE: BE IT RESOLVED BY THE LAKEWOOD WATER DISTRICT, THAT, they concur with Clover Chambers Creek Ground Water Management Program and will work with the Tacoma Pierce County Health Department in the future to implement those sections of the plan applicable to protection of the Clover Chambers Creek Basin ground water within their jurisdiction.

Adopted this 16th day of July, 1990.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS.



President

ATTEST:



Secretary.

RESOLUTION B-1165

A RESOLUTION of the Board of Commissioners of the Lakewood Water District establishing that service connections to the point of metering, including metering devices, boxes and other appurtenances, are the property of the Lakewood Water District. The District will be responsible for normal upkeep and maintenance, the exception being the District will be required to collect costs for damage caused by the carelessness of others, such costs will be billed to the customer or other responsible parties; NOW

THEREFORE:

BE IT RESOLVED:

THAT Lakewood Water District declares that service connections to the point of metering, including metering devices, boxes and other appurtenances, are the property of the Lakewood Water District, so that the District will be responsible for normal upkeep and maintenance.

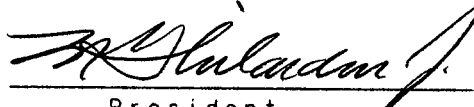
BE IT FURTHER RESOLVED:

That maintenance and repair of damage caused through carelessness of others, will be billed to the customer or the responsible parties.

This resolution will become effective on January 1st, 1992.

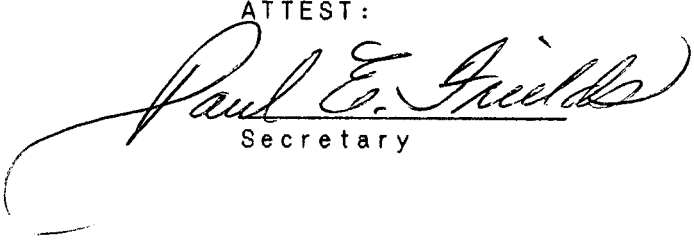
Adopted this 18th day of November, 1991

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS.



President

ATTEST:



Secretary

LAKWOOD WATER DISTRICT

RESOLUTION B-1287

A RESOLUTION of the Board of Commissioners of the Lakewood Water District superseding Resolution B-1099 dealing with Cross Connection Control Program pursuant to Washington Administrative Code 246-290-490 or the current WAC addressing Cross Connection.

WHEREAS, WAC 246-290-490 or the current WAC addressing Cross Connection, requires all cross connections to be tested and approved; and

WHEREAS, the Board of Commissioners desire to protect the health of water consumers and the potability of the public water system of Lakewood Water District by establishing a cross connection control program; and

WHEREAS, the Lakewood Water District has developed a program for permitting an inspection of cross connections designed to reduce or eliminate cross connections, to the extent possible, to prevent contamination of this public water system;

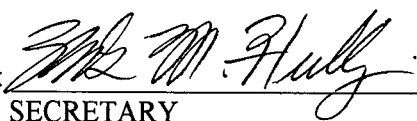
RESOLVED,

1. Any cross connection discovered in any part of the Lakewood Water District water system that, in the judgement of the Manager and/or Superintendent of the District could be a danger to the water quality, are hereby declared to be unlawful until backflow prevention assemblies are installed, inspected and found to be in compliance with WAC 246-290-490 or the current WAC addressing Cross Connection.
2. A system of issuance of permits, performance of testing and inspection of all backflow control assemblies shall be, and is hereby, established.
3. The cross connection control program now established will be used in all commercial and industrial developments within the Lakewood Water District.
4. We will require annual testing of all backflow control assemblies, subject to notice, to be given to the property owner and/or occupier by Lakewood Water District.
5. The Lakewood Water District will maintain a list of certified testers, approved by the State of Washington, but they will not deem the maintenance of such list a recommendation or a guarantee of the quality of the work of any certified tester.
6. The Manager/Superintendent is directed to prepare an inventory or list of all existing facilities where they know that cross connections exist or are suspected. These cross connections shall be placed upon a priority list for correction beginning with those deemed to present the greatest danger to the public water supply.
7. The Manager/Superintendent is directed to establish a public education program consisting of pamphlets, letters, notices and public meetings, if necessary, to explain the necessity for the implementation of this program.
8. Any customer or property owner who refuses, or is unable to comply with this Resolution, the Cross Connection Control Program or WAC 246-290-490 or the current WAC addressing Cross Connection, shall be advised that we will stop their water supply if there is a continuing failure to comply.

Adopted this 28th day of February 1996.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

BY: 
PRESIDENT

ATTEST: 
SECRETARY

**LAKWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON
A Municipal Corporation**

RESOLUTION B-1299

A RESOLUTION of the Board of Commissioners of the Lakewood Water District, Pierce County, Washington, approving an "Agreement for Wholesale Supply of Water" with the Town of Steilacoom.

WHEREAS, the Lakewood Water District ("District"), a special purpose municipal corporation, provides water service to residents within its corporate boundaries; and

WHEREAS, the District has prepared and adopted a Comprehensive Plan that shows that the District's supply of water is in excess of its needs; and

WHEREAS, the Town of Steilacoom ("Town") desires to purchase potable water from the District; and

WHEREAS, District planning documents show that the District can supply the Town of Steilacoom with potable water from its excess supply; and

WHEREAS, the District is authorized by Title 57 RCW to sell excess water on a wholesale basis; and

WHEREAS, the Board of Commissioners of the Lakewood Water District find that the best interest of the District and the public will be served by approval of a wholesale water supply contract with the Town in the form attached hereto;

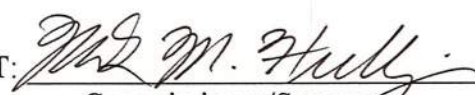
NOW THEREFORE, The Board of Commissioners of the Lakewood Water District resolve that the "Agreement for Wholesale Supply of Water" with the Town of Steilacoom in the form attached hereto is approved and shall be executed by the Board.

Adopted at a regular open meeting of the Board of Commissioners of the Lakewood Water District on this 15th day of July 1996.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

By: 
Commissioner/President

By: 
Commissioner/Vice President

ATTEST: 
Commissioner/Secretary

RESOLUTION B-1307

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE LAKEWOOD WATER DISTRICT, ADOPTING AND APPROVING THE DEVELOPER'S EXTENSION PROGRAM, ESTABLISHING THE POLICY OF THE LAKEWOOD WATER DISTRICT APPLICABLE TO ALL EXTENSIONS TO THE WATER SYSTEM TO BE INSTALLED BY DEVELOPERS OR PROPERTY OWNERS.

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District:

WHEREAS, the Water District has statutory authority to allow developers and property owners to cause to be designed and constructed extensions to the water system, including improvements such as water mains and appurtenances thereto; and

WHEREAS, it is necessary for the District to establish policies, standards and conditions pursuant to which developers will be allowed to construct such improvements and dedicate them to the Water District for purposes of ownership, operation and maintenance; and

WHEREAS, the staff of the Lakewood Water District, assisted by the District's engineers and attorneys, have drafted checklists, policies, instructions, agreements, bonds and other necessary instruments and documents; and

WHEREAS, the Board finds that the program proposed for adoption appropriately protects the existing water system and facilities of the Water District and therefore the public interest;

NOW, THEREFORE, be it hereby resolved as follows:

Section 1. The Developer's Extension Program and all exhibits and forms recommended by the staff, the engineers and the attorneys as attached hereto as Exhibit A to this Resolution are hereby approved as the official Developer's Extension Program for the Lakewood Water District.

Section 2. The Water District staff is hereby directed to make available to the public, including all developers and property owners interested in the program, all information and aspects of the program including any required standards and conditions imposed by the Water District in connection with the program.

ADOPTED this 18th day of November, 1996.

**LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS**

BY: 
PRESIDENT

ATTEST: 
SECRETARY

RESOLUTION NO. B-1320

A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT TO ADOPT THE WELLHEAD PROTECTION PLAN.

WHEREAS, Economic Engineering Services, Inc, in association with Robinson & Noble, Inc. have prepared a Wellhead Protection Plan as requested by the Board of Commissioners; and

WHEREAS, the purpose of the Wellhead Protection Plan is to establish a program to protect the District's wells from contamination and promote long-term management of ground water quality; and

WHEREAS, the Commissioners have reviewed and accepted the Wellhead Protection Plan as submitted by the consulting engineers;

NOW, THEREFORE BE IT HEREBY RESOLVED AS FOLLOWS:

The Board of Commissioners of Lakewood Water District hereby adopt and approve the Wellhead Protection Plan dated October 22, 1997, which is hereby incorporated herein by reference, and which is filed in the books and records of the District as the official Wellhead Protection Program of the Lakewood Water District. The Program shall be monitored and updated periodically as deemed necessary by the Manager of the District.

ADOPTED this 17 day of February 1998.

LAKEWOOD WATER DISTRICT

BY: *J. A. Gulandson*

Its: PRESIDENT

ATTEST: *J. M. Holly*

SECRETARY

**LAKEWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON**

DRAFT RESOLUTION NO. B-1355—*Never Adopted*

A RESOLUTION of the Board of Commissioners of the Lakewood Water District, Pierce County, Washington, requesting the Pierce County Auditor to call a special election for the purpose of determining whether or not the Lakewood Water District should add Fluoride to water supplied by the District and proposing a ballot proposition.

Whereas the Lakewood Water District is a special purpose municipal corporation formed under the law of the State of Washington for the purpose of providing water supply to residents within its municipal boundaries; and

Whereas, the Lakewood Water District derives its water from local aquifers under authority of water permits and rights granted by the Department of Ecology, and supplies that water to its residents through an infrastructure of wells, pumps, storage, transmission and distribution facilities; and

Whereas, the Tacoma-Pierce County Board of Health has adopted a resolution requiring water suppliers in Pierce County serving 5000 or more people to add fluoride to their water; and

Whereas, The Lakewood Water District does not add fluoride to its water supply and the Board of Commissioners desires to receive the direction of District voters with regard to adding fluoride to water supplied by the District; and

Whereas, RCW 57.08.012 authorizes the Board of Commissioners to submit to voters of the District the question of adding fluoride to District water, and RCW 29.13.020 (2) authorizes the Board of Commissioners to request the Pierce County Auditor to hold special elections; now, therefore,

The Board of Commissioners of the Lakewood Water District resolves that:

Section 1. The Pierce County Auditor is requested to hold a special election in the Lakewood Water District, at the expense of the District, on the first Tuesday of February 2003, and at that time to submit to the voters of the District the ballot proposition set forth in Section 2.

Section 2. The Board of Commissioners proposes the following ballot proposition:

LAKWOOD WATER DISTRICT PROPOSITION NO. 1.

DIRECTING ADDITION OF FLUORIDE TO WATER SUPPLIED BY THE DISTRICT

THE TACOMA-PIERCE COUNTY BOARD OF HEALTH HAS DIRECTED WATER SUPPLIERS IN PIERCE COUNTY SERVING 5000 CUSTOMERS OR MORE TO ADD FLUORIDE TO THEIR WATER. LAKEWOOD WATER DISTRICT'S BOARD OF COMMISSIONERS DISPUTES THE HEALTH BOARD'S AUTHORITY TO ORDER FLUORIDATION AND SUBMITS THE ISSUE TO THE DISTRICT'S VOTERS FOR DECISION AS AUTHORIZED BY LAW.

Shall the Board of Commissioners add fluoride to water supplied by the Lakewood Water District in accordance with the rules and regulations of the Washington State Department of Health?

Yes _____

No _____

Section 3. The Board of Commissioners request that the Pierce County Auditor submit the foregoing ballot proposition to the Pierce County Prosecuting Attorney for that officer's review and approval, or revision, if necessary, as required by RCW 29.27.066.

Adopted by the Board of Commissioners of the Lakewood Water District at a regular meeting thereof this 17th day of October 2002.

President/Commissioner

Vice President/Commissioner

Secretary/Commissioner

Attest:

District Secretary

Approved as to Form:

Joseph F. Quinn
District Attorney, WSB #6810

Lakewood Water District
RESOLUTION NO. B-1362

A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT establishing policies and procedures for activities requiring compliance with the State Environmental Policy Act (SEPA).

Recitals

- Lakewood Water District (District) is a duly constituted Special Purpose District and Utility formed under Title 57 RCW, and
- The District sponsors projects which fall under the provisions of the State Environmental Policy Act (SEPA), Chapter 43.21C RCW, and the SEPA rules, Chapter 197-11 WAC, and
- Under the provisions of WAC 197-11-050 and WAC 197-11-922, the District can be “lead agency” thereby becoming responsible for specified duties and actions required by SEPA and SEPA rules, and
- The District’s customers and the public would be best served if the District served as “lead agency” for its own projects – by making the process more responsive to public concerns, and by providing a more efficient process, and
- SEPA and the SEPA Rules require that the District adopt procedural rules governing the SEPA review and appeals process and the exercise of substantive authority, and
- The District’s SEPA procedures should be condensed to reflect the District’s focused role, since the District does not have land use permit authority and does not anticipate assumption of lead agency status for any private proposals.

NOW, THEREFORE, BE IT RESOLVED THAT: Lakewood Water District hereby adopts the following policies and procedures for compliance with the State Environmental Policy Act (SEPA).

PART ONE
AUTHORITY

Section 1 - Authority. Lakewood Water District (District) adopts this Resolution under the State Environmental Policy Act (SEPA), RCW 43.21C.120, and the SEPA rules, WAC 197-11-904.

This Resolution contains the District's SEPA procedures and policies.

The SEPA rules, chapter 197-11 WAC, must be used in conjunction with this Resolution.

PART TWO
GENERAL REQUIREMENTS

Section 1 - Purpose of this part and adoption by reference. This part contains the basic requirements that apply to the SEPA process. The District adopts the following sections of chapter 197-11 of the Washington Administrative Code by reference:

WAC	
197-11-040	Definitions.
197-11-050	Lead agency.
197-11-055	Timing
197-11-060	Content of environmental review.
197-11-070	Limitations on actions during SEPA process.
197-11-080	Incomplete or unavailable information.
197-11-090	Supporting documents.
197-11-100	Information required of applicants.
197-11-250	SEPA/Model Toxics Control Act integration.
197-11-253	SEPA lead agency for MTCA actions.
197-11-256	Preliminary evaluation.
197-11-259	Determination of nonsignificance for MTCA remedial actions.
197-11-262	Determination of significance and EIS for MTCA remedial actions.
197-11-265	Early scoping for MTCA remedial actions.
197-11-268	MTCA interim actions.

Section 2 - Additional definitions. In addition to those definitions contained within WAC 197-11-700 through 197-11-799 and 197-11-220, when used in this Resolution, the following terms shall have the following meanings, unless the context indicates otherwise:

(1) "SEPA rules" means chapter 197-11 WAC adopted by the Department of Ecology.

(2) "Resolution" means the Resolution or other procedure used by the District to adopt regulatory requirements.

(3) "Early notice" means the District's response to a proposal where it considers issuance of a determination of significance likely.

Section 3 - Designation of responsible official. (1) For those proposals for which the District is the lead agency, the responsible official shall be the District Manager unless otherwise designated by the District Board of Commissioners.

(2) For all proposals for which the District is the lead agency, the responsible official shall make the threshold determination, supervise scoping and preparation of any required environmental impact statement (EIS), and perform any other functions assigned to the "lead agency" or "responsible official" by those sections of the SEPA rules that were adopted by reference in this Resolution.

(3) The District shall retain all documents required by the SEPA rules (chapter 197-11 WAC) and make them available in accordance with chapter 42.17 RCW.

Section 4 - Lead agency determination and responsibilities. (1) When the District initiates a proposal that involves a nonexempt action, it shall determine the lead agency for that proposal under WAC 197-11-050, 197-11-253, and 197-11-922 through 197-11-940; unless the lead agency has been previously determined or the District is aware that another agency is in the process of determining the lead agency.

(2) When the District is the lead agency for a proposal, the responsible official shall supervise compliance with the threshold determination requirements, and if an EIS is necessary, shall supervise preparation of the EIS.

(3) When the District is not the lead agency for a proposal, the District shall use and consider, as appropriate, either the DNS or the final EIS of the lead agency in making decisions on the proposal. The District shall not prepare or require preparation of a DNS or EIS in addition to that prepared by the lead agency, unless required under WAC 197-11-600. In some cases, the District may conduct supplemental environmental review under WAC 197-11-600.

(4) If the District receives a lead agency determination made by another agency that appears inconsistent with the criteria of WAC 197-11-253 or 197-11-922 through 197-11-940, it may object to the determination. Any objection must be made to the agency originally making the determination and resolved within fifteen days of receipt of the determination, or the District must petition the Department of Ecology for a lead

agency determination under WAC 197-11-946 within the fifteen-day time period. Any such petition on behalf of the District may be initiated by the District Manager.

(5) The District Manager is authorized to make agreements as to lead agency status or shared lead agency duties for a proposal under WAC 197-11-942 and 197-11-944:

(6) When the District is lead agency for a MTCA remedial action, the Department of Ecology shall be provided an opportunity under WAC 197-11-253(5) to review the environmental documents prior to public notice being provided. If the SEPA and MTCA documents are issued together with one public comment period under WAC 197-11-253(6), the District shall decide jointly with Ecology who receives the comment letters and how copies of the comment letters will be distributed to the other agency.

PART THREE

CATEGORICAL EXEMPTIONS AND THRESHOLD DETERMINATIONS

Section 1 - Purpose of this part and adoption by reference. This part contains the rules for deciding whether a proposal has a "probable significant, adverse environmental impact" requiring an environmental impact statement (EIS) to be prepared. This part also contains rules for evaluating the impacts of proposals not requiring an EIS. The District adopts the following sections by reference, as supplemented in this part:

WAC

197-11-300	Purpose of this part.
197-11-305	Categorical exemptions.
197-11-310	Threshold determination required.
197-11-315	Environmental checklist.
197-11-330	Threshold determination process.
197-11-335	Additional information.
197-11-340	Determination of nonsignificance (DNS).
197-11-350	Mitigated DNS.
197-11-360	Determination of significance (DS)/initiation of scoping.
197-11-390	Effect of threshold determination.

Section 2 - Use of exemptions. (1) the District shall determine whether the proposal is exempt. The District's determination that a proposal is exempt shall be final

and not subject to administrative review. If a proposal is exempt, none of the procedural requirements of this Resolution apply to the proposal. The District shall not complete an environmental checklist for an exempt proposal.

(2) In determining whether or not a proposal is exempt, the District shall make certain the proposal is properly defined and shall identify the governmental licenses required (WAC 197-11-060).

(3) If a proposal includes both exempt and nonexempt actions, the District may authorize exempt actions prior to compliance with the procedural requirements of this Resolution, except that:

(a) The District shall not give authorization for:

(i) Any nonexempt action;

(ii) Any action that would have an adverse environmental impact; or

(iii) Any action that would limit the choice of alternatives.

(b) The District will withhold approval of an exempt action that would lead to modification of the physical environment, when such modification would serve no purpose if nonexempt action(s) were not approved; and

(c) A District will withhold approval of exempt actions that would lead to substantial financial expenditures when the expenditures would serve no purpose if nonexempt action(s) were not approved.

Section 3 - Environmental checklist. A completed environmental checklist (or a copy), in the form provided in WAC 197-11-960, shall be filed at the same time as an application for a permit, license, certificate, or other approval not specifically exempted in this ordinance; except, a checklist is not needed if the District determines that an EIS is required, SEPA compliance has been completed, or SEPA compliance has been initiated by another agency. The District shall use the environmental checklist to determine the lead agency and, if the District is the lead agency, for making the threshold determination. The responsible official shall review the checklist responses and note comments, concerns, and corrections, or the need for new information.

Section 4 - DNS Issuance / Comment Period. (1) As provided in this section and in WAC 197-11-340, the responsible official may issue a DNS.

(2) A fourteen-day comment period and public notice is required following the issuance of a DNS for any proposal that meets the criteria of WAC 197-11-340(2)(a).

PART FOUR

ENVIRONMENTAL IMPACT STATEMENT (EIS)

Section 1 - Purpose of this part and adoption by reference. This part contains the rules for preparing environmental impact statements. The District adopts the following sections by reference, as supplemented by this part:

WAC

- 197-11-400 Purpose of EIS.
- 197-11-402 General requirements.
- 197-11-405 EIS types.
- 197-11-406 EIS timing.
- 197-11-408 Scoping.
- 197-11-410 Expanded scoping. (Optional)
- 197-11-420 EIS preparation.
- 197-11-425 Style and size.
- 197-11-430 Format.
- 197-11-435 Cover letter or memo.
- 197-11-440 EIS contents.
- 197-11-442 Contents of EIS on nonproject proposals.
- 197-11-443 EIS contents when prior nonproject EIS.
- 197-11-444 Elements of the environment.
- 197-11-448 Relationship of EIS to other considerations.
- 197-11-450 Cost-benefit analysis.
- 197-11-455 Issuance of DEIS.
- 197-11-460 Issuance of FEIS.

Section 2 - Preparation of EIS - Additional considerations. (1) Preparation of draft and final EISs (DEIS and FEIS) and draft and final supplemental EISs (SEIS) is the responsibility of the District under the direction of the responsible official. Before the District issues an EIS, the responsible official shall be satisfied that it complies with this Resolution and Chapter 197-11 WAC.

(2) The DEIS and FEIS or draft and final SEIS shall be prepared by District staff, or by a consultant selected by the District.

PART FIVE COMMENTING

Section 1 - Adoption by reference. This part contains rules for consulting, commenting, and responding on all environmental documents under SEPA, including

rules for public notice and hearings. The District adopts the following sections by reference, as supplemented in this part:

WAC

197-11-500	Purpose of this part.
197-11-502	Inviting comment.
197-11-504	Availability and cost of environmental documents.
197-11-508	SEPA register.
197-11-510	Public notice.
197-11-535	Public hearings and meetings.
197-11-545	Effect of no comment.
197-11-550	Specificity of comments.
197-11-560	FEIS response to comments.
197-11-570	Consulted agency costs to assist lead agency.

Section 2 - Public notice. (1) Whenever possible, the District shall integrate the public notice required under this section with existing notice procedures for the District's approval(s) required for the proposal.

(2) Whenever the SEPA Rules adopted by this Resolution require public notice to be given by the District, the District shall give public notice as follows:

(a) If public notice is required for a nonexempt license, the notice shall state whether a DS or DNS has been issued and when comments are due.

(b) If no public notice is otherwise required for the permit or approval, the District shall give notice by publishing notice in a newspaper of general circulation in the county, city, or general area where the proposal is located;

(c) Whenever the District issues a DS under WAC 197-11-360(3), the District shall state the scoping procedure for the proposal in the public notice and in the DS as required in WAC 197-11-408.

(3) Whenever the District issues a DEIS under WAC 197-11-455(5) or a SEIS under WAC 197-11-620, notice of the availability of those documents shall be given by:

(a) Indicating the availability of the DEIS in any public notice required for a nonexempt license by publishing notice in a newspaper of general circulation in the county, city, or general area where the proposal is located.

Section 3 - Designation of official to perform consulted agency responsibilities for the District. (1) The District Manager shall be responsible for preparation of written comments for the District in response to a consultation request

prior to a threshold determination, participation in scoping, and reviewing a DNS or DEIS.

(2) The District Manager shall be responsible for the District's compliance with WAC 197-11-550 whenever the District is a consulted agency and is authorized to develop operating procedures that will ensure that responses to consultation requests are prepared in a timely fashion and include data from the District.

USING EXISTING ENVIRONMENTAL DOCUMENTS

Section 1 - Purpose of this part and adoption by reference. This part contains rules for using and supplementing existing environmental documents prepared under SEPA or National Environmental Policy Act (NEPA) for the District's own environmental compliance. The District adopts the following sections by reference:

WAC

197-11-600 When to use existing environmental documents.

197-11-610 Use of NEPA documents.

197-11-620 Supplemental environmental impact statement--Procedures.

197-11-625 Addenda—Procedures.

197-11-630 Adoption—Procedures.

197-11-635 Incorporation by reference--Procedures.

197-11-640 Combining documents.

PART SEVEN

SEPA AND AGENCY DECISIONS

Section 1 - Purpose of this part and adoption by reference. This part contains rules (and policies) for SEPA's substantive authority, such as decisions to mitigate or reject proposals as a result of SEPA. This part also contains procedures for appealing SEPA determinations to agencies or the courts. The District adopts the following sections by reference:

WAC

197-11-650 Purpose of this part.

197-11-655 Implementation.

197-11-660 Substantive authority and mitigation.

Section 2 – Designation of agency substantive SEPA policies. (1) The policies and goals set forth in this ordinance are supplementary to those in the existing authorization of the District.

(2) The District may attach conditions to a permit or approval for a proposal so long as:

(a) Such conditions are necessary to mitigate specific probable adverse environmental impacts identified in environmental documents prepared pursuant to this resolution; and

(b) Such conditions are in writing; and

(c) The mitigation measures included in such conditions are reasonable and capable of being accomplished; and

(d) The District has considered whether other local, state, or federal mitigation measures applied to the proposal are sufficient to mitigate the identified impacts; and

(e) Such conditions are based on one or more policies in subsection (4) of this section and cited in the license or other decision document.

(3) The District may deny a permit or approval for a proposal on the basis of SEPA so long as:

(a) A finding is made that approving the proposal would result in probable significant adverse environmental impacts that are identified in a FEIS or final SEIS prepared pursuant to this ordinance; and

(b) A finding is made that there are no reasonable mitigation measures capable of being accomplished that are sufficient to mitigate the identified impact; and

(c) The denial is based on one or more policies identified in subsection (4) of this section and identified in writing in the decision document.

(4) The District designates and adopts by reference the following policies as the basis for the Districts exercise of authority pursuant to this section:

(a) The District shall use all practicable means, consistent with other essential considerations of state policy, to improve and coordinate plans, functions, programs, and resources to the end that the state and its citizens may:

- (i) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (ii) Assure for all people of Washington safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- (iii) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- (iv) Preserve important historic, cultural, and natural aspects of our national heritage;
- (v) Maintain, wherever possible, an environment which supports diversity and variety of individual choice;
- (vi) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- (vii) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(b) The District recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

(c) The District adopts by reference the policies in the following plans:

- (i) Comprehensive Plan for Lakewood Water District, dated November 1995, as the same may be amended from time to time; and
- (ii) Pierce County Coordinated Water System Plan and Regional Supplement 1995, as the same may be amended from time to time.

PART EIGHT DEFINITIONS

Section 1 - Purpose of this part and adoption by reference. This part contains uniform usage and definitions of terms under SEPA. The District adopts the following sections by reference:

WAC

WAC

- 197-11-700 Definitions.
- 197-11-702 Act.
- 197-11-704 Action.
- 197-11-706 Addendum.
- 197-11-708 Adoption.
- 197-11-710 Affected tribe.
- 197-11-712 Affecting.
- 197-11-714 Agency.
- 197-11-716 Applicant.
- 197-11-718 Built environment.
- 197-11-720 Categorical exemption.
- 197-11-721 Closed record appeal.
- 197-11-722 Consolidated appeal.
- 197-11-724 Consulted agency.
- 197-11-726 Cost-benefit analysis.
- 197-11-728 County/city.
- 197-11-730 Decision maker.
- 197-11-732 Department .
- 197-11-734 Determination of nonsignificance (DNS).
- 197-11-736 Determination of significance (DS).
- 197-11-738 EIS.
- 197-11-740 Environment.
- 197-11-742 Environmental checklist.
- 197-11-744 Environmental document.
- 197-11-746 Environmental review.
- 197-11-750 Expanded scoping.
- 197-11-752 Impacts.
- 197-11-754 Incorporation by reference.
- 197-11-756 Lands covered by water.
- 197-11-758 Lead agency.
- 197-11-760 License.
- 197-11-762 Local agency.
- 197-11-764 Major action.
- 197-11-766 Mitigated DNS.
- 197-11-768 Mitigation.

WAC

- 197-11-770 Natural environment.
- 197-11-772 NEPA.
- 197-11-774 Nonproject.
- 197-11-775 Open record hearing.
- 197-11-776 Phased review.
- 197-11-778 Preparation.
- 197-11-780 Private project.
- 197-11-782 Probable.
- 197-11-784 Proposal.
- 197-11-786 Reasonable alternative.
- 197-11-788 Responsible official.
- 197-11-790 SEPA.
- 197-11-792 Scope.
- 197-11-793 Scoping.
- 197-11-794 Significant.
- 197-11-796 State agency.
- 197-11-797 Threshold determination.
- 197-11-799 Underlying governmental action.

PART NINE

CATEGORICAL EXEMPTIONS

Section 1 - Adoption by reference. The District adopts by reference the following rules for categorical exemptions, as supplemented in this Resolution, including WAC 173-806-070 (Flexible thresholds), WAC 173-806-080 (Use of exemptions), and WAC 173-806-190 (Critical areas):

WAC

- 197-11-800 Categorical exemptions.
- 197-11-880 Emergencies.
- 197-11-890 Petitioning DOE to change exemptions.

PART TEN

AGENCY COMPLIANCE

Section 1 - Purpose of this part and adoption by reference. This part contains rules for agency compliance with SEPA, including rules for charging fees

under the SEPA process, designating categorical exemptions that do not apply within critical areas, listing agencies with environmental expertise, determining the lead agency, and applying these rules to current agency activities. The District adopts the following sections by reference:

WAC

- 197-11-900 Purpose of this part.
- 197-11-902 Agency SEPA policies.
- 197-11-916 Application to ongoing actions.
- 197-11-920 Agencies with environmental expertise.
- 197-11-922 Lead agency rules.
- 197-11-924 Determining the lead agency.
- 197-11-926 Lead agency for governmental proposals.
- 197-11-928 Lead agency for public and private proposals.
- 197-11-930 Lead agency for private projects with one agency with jurisdiction.
- 197-11-932 Lead agency for private projects requiring licenses from more than one agency, when one of the agencies is a county/city.
- 197-11-934 Lead agency for private projects requiring licenses from a local agency, not a county/city, and one or more state agencies.
- 197-11-936 Lead agency for private projects requiring licenses from more than one state agency.
- 197-11-938 Lead agencies for specific proposals.
- 197-11-940 Transfer of lead agency status to a state agency.
- 197-11-942 Agreements on lead agency status.
- 197-11-944 Agreements on division of lead agency duties.
- 197-11-946 DOE resolution of lead agency disputes.
- 197-11-948 Assumption of lead agency status.

PART ELEVEN

FORMS

Section 1 - Adoption by reference. The District adopts the following forms and sections by reference:

WAC

- 197-11-960 Environmental checklist.

- 197-11-965 Adoption notice.
- 197-11-970 Determination of nonsignificance (DNS).
- 197-11-980 Determination of significance and scoping notice (DS).
- 197-11-985 Notice of assumption of lead agency status.
- 197-11-990 Notice of action.

**PART TWELVE
SEVERABILITY**

Section 1 - Severability. If any provision of this Resolution or its application to any person or circumstance is held invalid, the remainder of this Resolution, or the application of the provision to other persons or circumstances, shall not be affected.

ADOPTED this _____ day of _____, 2003.

ATTEST

LAKWOOD WATER DISTRICT

District Secretary

Commissioner

Commissioner

Approved as to form:

JOSEPH F. QUINN, WSB #6810
Attorney for District

Commissioner

RESOLUTION NO. B-1365

A RESOLUTION of the Board of Commissioners of the Lakewood Water District, Pierce County, Washington, requesting the Pierce County Auditor to submit to the voters of the Lakewood Water District in the 2004 General Election a proposition on the issue of adding fluoride to the District's water supply.

Whereas, the subject of adding fluoride to the public water supply in Pierce County has been of substantial interest to residents of the Lakewood Water District ("District"); and

Whereas, RCW 57.08.012 authorizes the Board of Commissioners to submit the proposition of fluoridation of the water supply to the electors of the District; and

Whereas, the Board of Commissioners of the District has determined that the best interests of the District and its residents will be served by submitting the question of adding fluoride to the District's water supply to the voters of the District; now, therefore,

The Board of Commissioners of the Lakewood Water District, Pierce County, Washington, does hereby resolve that:

1. The Pierce County Auditor is requested to submit the following ballot proposition to the electors of the Lakewood Water District in the General Election to be held in November 2004:

BALLOT TITLE

Proposition No. 1
Submitted by the Lakewood Water District
Fluoridation of the Lakewood Water District's Water Supply

The Board of Commissioners of the Lakewood Water District, Pierce County, Washington, adopted Resolution No. B-1365 submitting to the voters of the Lakewood Water District the proposition of whether or not fluoride should be added to the water supply of the Lakewood Water District. Should fluoride be added to the water supply of the Lakewood Water District?

Fluoridation—Yes _____
Fluoridation—No _____

2. The General Manager of the Lakewood Water District is directed to submit a certified copy of this Resolution to the Pierce County Auditor and to perform such other acts as may be necessary to cause this proposition to be placed on the ballot for the General Election to be held in November 2004.

ADOPTED BY THE BOARD OF COMMISSIONERS of the Lakewood Water District at a Special Meeting thereof held on the 17th day of June 2004.

President/Commissioner

Vice President/Commissioner

Secretary/Commissioner

Randall Black certifies under penalty of perjury that: I am the General Manager of the Lakewood Water District, and that the records of the District are maintained under my custody and control. Attached hereto is a true and accurate copy of Lakewood Water District Resolution No. B-1365, the original of which is on file at the District's business office.

Randall M. Black

_____, 2004

Lakewood, Washington

EXPLANATORY STATEMENT

The law of the State of Washington permits, but does not require, the addition of fluoride to public water supplies in accordance with regulations adopted by the Washington Department of Health. Water Districts are further authorized to submit the question of fluoridation to District voters. The water supply of the Lakewood Water District comes from groundwater that is not currently treated by the addition of fluoride. If the proposition is approved, the Lakewood Water District will add fluoride to the District's water supply in accordance with regulations of the State Department of Health. If the proposition is not approved, the Lakewood Water District will not add fluoride to the District's water supply.

LAKWOOD WATER DISTRICT

RESOLUTION NO. B-1385

A RESOLUTION CONFIRMING THE INTENTION OF LAKEWOOD WATER DISTRICT ("DISTRICT") TO ACQUIRE THE ABITIBI 2 WATER RIGHTS (CERTIFICATE 4585B) FOR MUNICIPAL WATER SUPPLY PURPOSES AND RATIFYING THE ACTIONS OF THE GENERAL MANAGER WITH RESPECT TO THE ACQUISITION OF SAID WATER RIGHTS

WHEREAS, the District is a member of the Water Cooperative of Pierce County ("Cooperative") and has made various commitments to Cooperative members and in water system plans to sell and deliver wholesale water to Cooperative members to the extent the District has water rights and capacity available for that purpose;

WHEREAS, in September 2000 the District General Manager, Randall Black, informed the Board that Abitibi Consolidated Sales Corporation ("Abitibi") was closing its newsprint plant in Steilacoom and was interested in selling water rights to municipal purveyors, and the Board subsequently authorized Mr. Black to express the District's interest in purchasing water rights and to determine the quantity and price of water rights available for purchase;

WHEREAS, the District met with Abitibi several times in 2001 to investigate and negotiate the purchase of Abitibi's water rights, and Mr. Black informed the Board about the negotiations at Board meetings on September 17, October 15, and December 14, 2001. At the December 14, 2001 meeting, Mr. Black indicated he and the District's water rights attorney and hydrogeology consultant were meeting with Abitibi the week of December 17, 2001 to negotiate an agreement and that Abitibi had already indicated its intention to sell water rights to the District;

WHEREAS, the District and Abitibi representatives met December 20, 2001 and negotiated most of the terms of an agreement for Abitibi to sell to the District its deep aquifer ground water rights from Certificates 299-A and 4585-A, which were later communicated to Abitibi in a letter of intent drafted by the District's water rights attorney, Thomas Pors;

WHEREAS, the ground water option in the LOI was negotiated by Abitibi for the purpose of reserving a portion of the ground water rights in excess of 6.0 MGD (the "Abitibi 2 rights") for the potential use by purchasers of it industrial real estate/former newsprint plant site in Steilacoom. The Board wanted to purchase all the Abitibi ground water rights without having to renegotiate the price and terms at a later date and instructed Mr. Pors and Mr. Black to lock in the purchase price and terms for the reserved Abitibi 2 rights, which is reflected in the LOI and the Agreement;

WHEREAS, the Board authorized Mr. Black to enter into a LOI with Abitibi on May 20, 2002, which LOI included the purchase of 6.0 MGD of ground water rights from Abitibi and a ground water option for the Abitibi 2 rights;

WHEREAS, the Board also held an executive session with its water rights counsel, Thomas Pors, and Mr. Black on May 20, 2002 to discuss the negotiations with Abitibi and the Board's intentions with respect to the acquisition and pricing of water rights from Abitibi, and during the executive session the Board instructed Mr. Black to lock up and purchase all of the Abitibi ground water rights because it was a rare opportunity to acquire an existing water right that would serve a major portion of the District and the Cooperative's future supply demands;

WHEREAS, the Board authorized Mr. Black to enter into a Water Rights Purchase and Sale Agreement and Escrow Instructions ("PSA"), which was executed on November 30, 2002 and included the purchase of 6.0 MGD of ground water rights from Abitibi and a ground water option for the Abitibi 2 rights, consistent with the LOI;

WHEREAS, on December 9, 2002 the District filed applications to change the Abitibi 1 water rights, which applications were originally estimated to take six to nine months to process but were not approved by Ecology until July 2005 when Ecology also issued a tentative determination of the remaining quantity of Abitibi 2 water rights at 1.4 MGD;

WHEREAS, from May 2002 to the present, the Board has authorized the District General Manager to negotiate wholesale supply contracts for the sale and distribution of the Abitibi water rights, to initiate planning studies for the construction of necessary interties, and to update the District's various plans to include the Abitibi water rights as sources of both wholesale and retail supply; and whereas the District General Manager has reported frequently to the Board on the progress of these negotiations and plans; and whereas these negotiations

and plans have included not only the Abitibi 1 water rights but also the Abitibi 2 water rights and, more recently, 2.6 MGD of Pierce County's Chambers Bay water rights;

WHEREAS, Abitibi orally notified Mr. Black in the fall of 2003 that Abitibi was no longer reserving the Abitibi 2 ground water rights for prospective purchasers, but Abitibi did not provide a written notice of that to the District;

WHEREAS, Mr. Black followed the direction of the Board to acquire the Abitibi 2 ground water rights from Abitibi and orally informed Abitibi by the end of 2003 that the District would acquire the Abitibi 2 ground water rights pursuant to the PSA;

WHEREAS, the District and its water rights council, Mr. Pors, believed that the Abitibi 2 water rights were protected from relinquishment for nonuse of water by the determined future development exemption (DFD) from the time of execution of the LOI in May 2002 or no later than the execution of the PSA in November 2002, and did not recommend formal documentation of the exercise of the ground water option until February 2005 after new case law suggested that option agreements may require formal exercise in order to establish a DFD exemption;

WHEREAS, on February 17, 2005 the Board authorized Mr. Pors to draft an addendum to the Purchase and Sale Agreement for the acquisition of the Abitibi 2 water rights;

WHEREAS, Mr. Black delivered a written exercise of the Abitibi 2 ground water option to Abitibi on March 2, 2005;

WHEREAS, in February and March 2005 the District's counsel, Tom Pors, advised the Board that the Abitibi 2 water rights should be obtained via a separate water right change application so as not to slow the progress of Ecology on preparing reports approving the Abitibi 1 change applications, which were nearing completion;

WHEREAS, the Addendum to Purchase and Sale Agreement noted that the District orally exercised the ground water option in 2003 and included a waiver by both the District and Abitibi of any requirement in the PSA for written notices relating to the exercise of the ground water option;

WHEREAS, the Addendum was executed by both parties in January 2006 and the District subsequently filed an application to transfer the Abitibi 2 water rights to the District;

WHEREAS, the Department of Ecology has since questioned the timely existence of a DFD for the Abitibi 2 water rights before five years of nonuse of water by Abitibi; and

WHEREAS, the District wishes to clarify the record of its intent to purchase the Abitibi 2 water rights so that it may proceed with obtaining approval of the water rights transfer and to close the purchase of these water rights from Abitibi.

NOW, THEREFORE, IT IS HEREBY RESOLVED:

Section 1. Clarification of District's Historical Intent and Development Plan. The District intended to acquire the Abitibi 2 water rights for municipal water supply purposes from the time it authorized and executed the LOI in May 2002 and the PSA in November 2002. The Board instructed its General Manager to acquire the Abitibi 2 rights because it was a rare opportunity to acquire an existing water right that would serve a major portion of the District and the Cooperative's future supply demands. The Board understood that Abitibi had one year from the date of execution of the PSA to inform the District if and to what extent it would continue reserving the Abitibi 2 water rights for a purchaser of the Abitibi mill site, after which the District could exercise its option to purchase those water rights. The Board also adopts the factual statements set forth in the recitals to this resolution.

Section 2. Board's Acquiescence in General Manager's Efforts to Acquire Water Rights. The Board, having been informed of its General Manager's efforts to acquire the Abitibi 2 water rights as described in the recitals to this resolution, acquiesces in, approves and ratifies the actions of the General Manager, with an effective date of the date such actions were taken by the General Manager.

Section 3. Board's Ratification of General Manager's Exercise of Ground Water Option. The Board, having been informed of its General Manager's oral exercise of the Abitibi 2 ground water option in 2003, having previously acknowledged and implicitly ratified such action in the Addendum to the PSA, and having been informed of the General Manager's March 2, 2005 written exercise of the Abitibi 2 ground water option, hereby expressly ratifies the action of its General Manager to exercise the Abitibi 2 ground water option, with an effective date of the date such oral exercise occurred, understood to be by year-end 2003.

Section 4. Board's Approval of Efforts to Resolve Legal Issues with State of Washington. The Board authorizes the continuing efforts of its General Manager and District water rights counsel Tom Pors to resolve legal and factual issues relating to the establishment of a DFD for the acquisition of the Abitibi 2 water rights, including retaining the services of the Gordon Thomas Honeywell law firm to assist with conflict resolution efforts with state officials.

Adopted this 17th day of April, 2008.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

L.R. Ghilarducci, Jr., President

Vice President

Secretary

ATTEST:

Secretary

Approved as to Form:

Michael P. Ruark, Attorney

RESOLUTION NO. B-1386

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE
LAKEWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON,
ESTABLISHING A POLICY FOR PRICING WHOLESALE WATER

WHEREAS, The Lakewood Water District (the "District"), a special purpose municipal corporation, was organized to provide potable water to residents within its corporate boundaries; and

WHEREAS, the District is authorized to provide water within and without its corporate boundaries, has current wholesale water agreements, and it is pursuing a policy of expanding its wholesale water operations; and

WHEREAS, the District has obtained and may obtain additional municipal water rights for the purpose of selling wholesale water, and the District desires to adopt policies with respect to pricing of wholesale water sales; now, therefore,

The Board of Commissioners of the Lakewood Water District resolve:

1. The price of water for any prospective purchase of wholesale water from the District to be sold under authority of the District's Wholesale Water Rights shall be set by the District according to the current market price for wholesale water in Western Washington, as established by records from the Department of Ecology, records of recent sales of wholesale water rights, or water right market evaluations by individuals or firms recognized as qualified to value water rights; provided, that wholesale water sold under the Abitibi Water Right shall never be priced less than \$1,500.00 per acre foot.
2. This resolution shall take effect immediately, provided, that it shall not apply to the Rainier View Water Company and Spanaway Water Company requests to purchase wholesale water from the District.

ADOPTED BY THE BOARD OF COMMISSIONERS of the Lakewood Water District, Pierce County, Washington, at a regular, open meeting thereof on this 15th day of May, 2008.

President, Commissioner

Vice President, Commissioner

Secretary, Commissioner

Attest:

District Secretary

Approved as to Form:

Michael P. Ruark, Attorney

LAKWOOD WATER DISTRICT

RESOLUTION NO. B-1390

A RESOLUTION of the Board of Commissioners of the LAKEWOOD WATER DISTRICT, a municipal corporation, adopting the Lakewood Water District Hazard Mitigation Plan.

WHEREAS, the Federal Emergency Management Agency (FEMA), pursuant to the Disaster Mitigation Act of 2000 (DMA2K) has mandated that all local and state governments develop and submit for approval a Hazard Mitigation Plan to address pre-disaster planning issues and as a condition of future project funding; and

WHEREAS, the Lakewood Water District has written its Hazard Mitigation Plan in conjunction with the Pierce County Multi-jurisdictional Hazard Mitigation Plan approved by Washington State Department of Emergency Management (DEM) and Federal Emergency Management Agency (FEMA); and

WHEREAS, the Hazard Mitigation Plan is completed and ready for adoption by the Board of Commissioners of the Lakewood Water District;

BE IT THEREFORE RESOLVED AS FOLLOWS:

Section I. The Board of Commissioners of the Lakewood Water District hereby adopts the "Lakewood Water District Hazard Mitigation Plan" set forth in Exhibit A which is attached hereto and incorporated herein by reference.

Section II. The General Manager is authorized to pursue available funding opportunities to implement mitigation initiatives designed by the Plan.

Adopted this 16th day of October, 2008.

LAKWOOD WATER DISTRICT

President, Commissioner

Vice President, Commissioner

Secretary, Commissioner

ATTEST:

District Secretary

Approved as to Form:

Michael P. Ruark, Attorney

**Lakewood Water District
Pierce County, Washington**

RESOLUTION NO. B-1393

RESOLUTION OF THE BOARD OF COMMISSIONERS OF LAKEWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON, AUTHORIZING AND APPROVING THE MUTUAL AID AND ASSISTANCE AGREEMENT FOR WASHINGTON STATE FOR INTRASTATE WASHINGTON WATER/WASTEWATER AGENCY RESPONSE NETWORK (WARN).

WHEREAS, Lakewood Water District ("District") is a municipal corporation providing water and wastewater utility services pursuant to Title 57 RCW; and

WHEREAS, the District Board of Commissioners has reviewed the Mutual Aid and Assistance Agreement for Washington State for Intrastate Water/Wastewater Agency Response Network (WARN) in the form attached hereto as **Exhibit A** and incorporated herein by this reference ("Mutual Aid Agreement"), and

WHEREAS, the District has previously prepared and adopted an Emergency Response Plan to assist the District in responding to regional natural and man-made emergencies and disasters; and

WHEREAS, the District Board of Commissioners finds that it is in the best interest of the District to participate in mutual aid with other public agencies to coordinate response activities and share resources during emergencies; and

WHEREAS, Chapter 39.34 RCW, The Interlocal Cooperation Act, authorizes public agencies to undertake joint action and to cooperate for their mutual advantage; now therefore,

BE IT RESOLVED, by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, as follows:

1. The Mutual Aid Agreement in the form attached hereto as **Exhibit A** is hereby approved and the President of the Board of Commissioners is authorized to sign the Mutual Aid Agreement on behalf of the District.
2. The District General Manager is hereby appointed as the Authorized Official and the Operations Manager is hereby appointed as the Alternate Authorized Official for actions to be taken on behalf of the District under the Mutual Aid Agreement.

3. The Operations Manager is authorized to serve as the District's representative on the Washington State WARN Regional Committee and to vote on the District's behalf on matters which may come before the Regional Committee.
4. District staff are directed to implement the terms of the Mutual Aid Agreement, to transmit a certified copy of this executed Resolution and an original signed Mutual Aid Agreement to the Washington State WARN Statewide Committee Chair, and to advise the Regional Committee of the names of the District's designated Authorized Official, alternate Authorized Official, and the District staff member to serve as the District's representative on the Washington State WARN Regional Committee.

ADOPTED by the Board of Commissioners of Lakewood Water, Pierce County, Washington, at a regular open public meeting held on the 20th day of August, 2009.

BOARD OF COMMISSIONERS
LAKEWOOD WATER DISTRICT

By: _____
Commissioner

By: _____
Commissioner

By: _____
Commissioner

Certification:

The undersigned, as Secretary of the Board of Commissioners of Lakewood Water District, hereby certifies that the foregoing is a true and accurate copy of the Resolution No. B-1393 adopted by the Board of Commissioners at the regular open public meeting held on the 20th day of August, 2009.

By: _____
Secretary, Board of Commissioners

**LAKWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON**

RESOLUTION NO. B-1396

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF LAKWOOD WATER DISTRICT, PIERCE COUNTY, WASHINGTON, ESTABLISHING A GREENHOUSE GAS EMISSION REDUCTION POLICY.

WHEREAS, the Lakewood Water District ("District") is a special purpose municipal corporation authorized and existing under the laws of the State of Washington, Title 57 RCW, and is authorized by law to provide water utility service to the geographic area in Pierce County known as Lakewood; and

WHEREAS, in 2008, the Washington State Legislature adopted chapter 70.235 RCW entitled "Limiting Greenhouse Gas Emissions"; and

WHEREAS, in 2009, the Washington State Legislature amended chapter 70.235 RCW to include RCW 70.235.070 requiring state agencies to consider whether funding recipients have adopted policies for the reduction of greenhouse gas emissions; and

WHEREAS, the District may apply to certain state agencies for capital funding subject to the requirements of RCW 70.235.070; and

WHEREAS, the District desires to adopt policies for the reduction of greenhouse gas emissions in accordance with RCW 70.235.070 to maintain eligibility for state capital funding for infrastructure and economic development projects; now, therefore,

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, as follows:

Section 1. The Greenhouse Gas Emission Reduction Policy attached hereto as **Exhibit A** and incorporated herein in full by this reference is hereby approved and adopted effective the date set forth below.

ADOPTED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, at the regular open public meeting thereof held on the 17th day June, 2010.

Commissioner and President

Commissioner and Vice President

Commissioner and Secretary

ATTEST:

District Secretary

RESOLUTION NO B-1405

This resolution of the Board of Commissioners of the Lakewood Water District, Pierce County, Washington, amends resolution dated November 21, 1946, recorded on page 87, Book One, Minutes of the District, establishing depreciation rates to fixed assets and to supersede amended rates implemented in 1953, and supersedes Resolution No. B-1123, July 16, 1990. NOW THEREFOR: BE IT RESOLVED:

THAT, Section 2: with respect to the assets so acquired and other similar assets for the purposes of establishing a proper depreciation reserve, the estimated life of and the annual depreciation rate to be applied to the several items or classes of such assets is respectively fixed and determined as follows—

	<u>Estimated Life</u>	<u>Depreciation Rate</u>
Mains	40 years	2.5%
Services	40 years	2.5%
Hydrants	40 years	2.5%
Wells	35 years	2.86%
Pumps	20 years	5%
Tanks	40 years	2.5%
House	25 years	4%
Storage Shed	25 years	4%
Pump House	25 years	4%
Utility Equipment	5 years	20%
Trucks	5 years	20%
Office Furniture	10 years	10%
Communications	20 years	5%
Water Treatment Equipment	15 years	6.67%

THAT, on January 1, 1999, the District amended Section 2 to read as follows—

	<u>Estimated Life</u>	<u>Depreciation Rate</u>
Mains	70 years	1.43%
Services	40 years	2.5%
Hydrants	40 years	2.5%
Wells	30 years	3.33%
Pumps	20 years	5%
Booster Pumps	10 years	10%
Starters for Pumps (new)	8 years	12.5%
Tanks	60 years	1.67%
Tank Control Valves (new)	20 years	5%
Pump House	25 years	4%
Flushing Pits	25 years	4%
General Plant	25 years	4%
Meters in Service	20 years	5%
Meter Boxes in Service	10 years	10%
Miscellaneous Equipment	5 years	20%
Transportation Equipment (392.0000)	5 years	20%
Transportation Equipment (392.1000, new)	8 years	12.5%
Transportation Equipment (392.2000, new)	10 years	10%
Transportation Equipment (392.3000, new)	15 years	6.67%
Office Furniture	7 years	14.29%
Office Equipment	5 years	20%
Office Improvements (new)	10 years	10%
Communication Equipment	7 years	14.29%
Power Operated Equipment	25 years	4%
Shop Tools & Garage Equipment	10 years	10%
Telemetry Equipment	10 years	10%
Water Treatment Equipment	5 years	20%
Water Treatment Facility	35 years	2.86%
Other Tangible Property	25 years	4%

NOW BE AMENDED TO READ:

Section 2:

That with respect to the assets as acquired and other similar assets and for the purposes of establishing and maintaining a proper depreciation reserve, the estimated life of and the annual depreciation rate to be applied to the fixed assets is determined as follows—

	<u>Estimated Life</u>	<u>Depreciation Rate</u>
Mains (new)	100 years	1%
Services	40 years	2.5%
Hydrants	40 years	2.5%
Wells	30 years	3.33%
Pumps	20 years	5%
Booster Pumps	10 years	10%
Starters for Pumps	8 years	12.5%
Tanks	60 years	1.67%
Tank Control Valves	20 years	5%
Pump House	25 years	4%
Flushing Pits	25 years	4%
General Plant	25 years	4%
Meters in Service	20 years	5%
Meter Boxes in Service	10 years	10%
Miscellaneous Equipment	5 years	20%
Transportation Equipment (392.0000)	5 years	20%
Transportation Equipment (392.1000)	8 years	12.5%
Transportation Equipment (392.2000)	10 years	10%
Transportation Equipment (392.3000)	15 years	6.67%
Office Furniture	7 years	14.29%
Office Equipment	5 years	20%
Office Improvements (new)	10 years	10%
Communication Equipment	7 years	14.29%
Power Operated Equipment	25 years	4%
Shop Tools & Garage Equipment	10 years	10%
Telemetry Equipment	10 years	10%
Water Treatment Equipment	5 years	20%
Water Treatment Facility	35 years	2.86%
Other Tangible Property	25 years	4%

NOTE: Land and water rights are not depreciated.

This resolution is effective January 1, 2012.

Adopted this 23rd day of October, 2012

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

President

Vice President

Secretary

ATTEST:

District Secretary

LAKWOOD WATER DISTRICT

RESOLUTION NO. B-1409

A RESOLUTION PURCHASE OF WATER RIGHTS

WHEREAS, Mt. Tacoma Mobile Home Park ("Mt. Tacoma MHP") has connected to the District water system as a result of contamination in their well and expressed an interest in selling their water rights, represented by Certificate G2-22621C, to the District to help defray the costs of this connection;

WHEREAS, the Board previously authorized the General Manager to negotiate for the purchase of the Mt. Tacoma MHP's water rights;

WHEREAS, District staff and water rights counsel have advised the General Manager regarding the probable scope and validity of the Mt. Tacoma MHP water rights and their value as municipal purpose water rights; and the General Manager has informed the Board that the Mt. Tacoma MHP owner is willing to sell the water rights for a reasonable price that reflects the probable scope and value of the water rights; and

WHEREAS, the District can utilize the water rights in more than one way, either by changing their place of use to a District well or as mitigation for another District water rights application.

NOW, THEREFORE, IT IS HEREBY RESOLVED:

Section 1. Authorization to Purchase Mt. Tacoma MHP Water Rights. The Board authorizes the General Manager to acquire the Mt. Tacoma MHP water rights, represented by Certificate G2-22621C, for \$5,600.00 plus the costs of researching title, document preparation, recording fees and excise taxes, and to sign any necessary documents required to complete the acquisition, record a deed for the water rights transferring title to the District, and notify the Department of Ecology regarding the change in ownership.

Section 2. Analysis of Options for Utilizing the Mt. Tacoma MHP Water Rights. The General Manager shall direct his staff, consultants, and water rights counsel at such time and in such manner as he shall see fit, to advise the District regarding the best use or uses of the Mt. Tacoma MHP water rights; and, at his discretion, the General Manager is authorized to apply for a water right change to use the water rights at one or more of the District's wells or as mitigation for another application.

Adopted this ____ day of _____, 2013.

LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS

L.R. Ghilarducci, Jr., President

ATTEST:

District Secretary

**RESOLUTION NO. B-1411
LAKEWOOD WATER DISTRICT**

**A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT TO
ADOPT THE CURRENT APPROVED WATER SYSTEM COMPREHENSIVE PLAN**

WHEREAS, Murray, Smith & Associates, in association with the staff of Lakewood Water District, has prepared and submitted to the Washington State Department of Health, a Comprehensive Water System Plan (DOH Submittal #12-1210) as outlined in WAC 246-290, revised June 12, 2013; and

WHEREAS, the Municipal Water Law went into effect in 2008, and as identified in RCW 296-290-100 (8)(b), the governing body must adopt the plan prior to DOH approval.

NOW, THEREFORE BE IT HEREBY RESOLVED AS FOLLOWS:

The Board of Commissioners of Lakewood Water District hereby adopts the Comprehensive Water System Plan which shall be in effect through 2017, and is hereby incorporated herein by reference, and which is filed in the books and records of the District as the current adopted Comprehensive Water System Plan.

Adopted this 28th day of June 2013.

LAKEWOOD WATER DISTRICT

BY: _____
L. R. Ghilarducci, Jr.

Its: President

ATTEST: _____
District Secretary

RESOLUTION NO. B-1413

A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT ADOPTING AN OVERALL 24 PERCENT WATER RATE INCREASE AND REVISED RATE STRUCTURE AS OUTLINED IN THE 2014 BUDGET, EFFECTIVE JANUARY 1, 2014.

WHEREAS, the Commissioners of the District, in accordance with RCW 57.08.081, have the authority and responsibility to establish rates and charges for the District; and

WHEREAS, the Commissioners of the District have caused to be completed an analysis of the District's fiscal needs for the future; and

WHEREAS, the five-year capital budget was considered;

WHEREAS, the rate model analysis showed that revenues are inadequate to properly provide for increased operation and maintenance costs, system replacements, additions and betterment, and to allow for sufficient reserves consistent with prudent utility practices, unless a recommended overall 24 percent rate increase as outlined in the 2014 Budget is made effective January 1, 2014, with the first billings reflecting the increase to be on or after March 1, 2014. This overall increase includes the revenue for the fixed fee based on meter size to fund the District's 50-year transmission and distribution R&R (Replacement and Rehabilitation) program as well as a rate increase of 16 percent for the volume charge and the base charge to fund general operation, maintenance, and other capital projects; and

WHEREAS, there is a need to revise the District's rate structure to capture funds for the 50-year R&R Program funds in a fixed fee based on meter size, removing all R&R funds from the base charge, with the volume charge remaining on the same tiered schedule as in previous years; see Exhibit A for additional information regarding the revised rate structure.

NOW, THEREFORE BE IT HEREBY RESOLVED AS FOLLOWS:

SECTION 1. The Board of Commissioners of Lakewood Water District hereby adopts and approves by resolution a rate increase as outlined in the 2014 Budget and above for all active accounts; it further hereby adopts and approves the following revised rate structure:

Effective January 1, 2014, rates shall include an increase by an estimated, overall 24 percent for most residential ratepayers; the actual rate increase percentage will vary according to customer meter size. The first billings reflecting the increase will be received on or after March 1, 2014.

Lakewood Water District Rates for Active Accounts

Water Consumption	Current Rates	New Base Charge	New Consumption Rates
0-800 cubic feet	\$21.63 (min. charge)	\$6.07	\$0
801-2000 cubic feet	\$ 1.11/ccf		\$1.29/ccf
2001 and over	\$ 1.51/ccf		\$1.75/ccf

New R&R Fixed Fee Per Meter Size	
Meter Size	Fixed Fee
5/8"	\$ 22.00
1"	\$ 24.20
1.5"	\$ 30.80
2"	\$ 39.60
3"	\$ 63.80
4"	\$242.00
6"	\$308.00
8"	\$638.00
10"	\$836.00
12"	\$990.00

SECTION 2. According to standard District practice, the District will use all means necessary and appropriate to inform all ratepayers of this resolution and water rate increase. Be it known, a letter will be sent to all rate payers the first week of January 2014. Additionally, notice of the recommended increase in the 2013 Budget process was published in *The News Tribune* December 12, 2013, as well as on the District's website at www.lakewood-water-dist.org.

SIGNED the 19th day of December 2013.

LAKWOOD WATER DISTRICT

President

Commissioner

Attest:

Commissioner

District Secretary

Exhibit A
Resolution No. B-1413

The District undertook a proposed change in its rate structure to fund the 50-year R&R (Replacement and Rehabilitation) Program. The District's rate model includes assumptions to minimize any future large increases to District customers. The basic assumptions used in costing the R&R program are: there are 185 miles of pipe that cost approximately \$1M a mile to replace over a period of 50 years. These assumptions arrive at \$3.7M of pipe to be replaced each year.

The cost will be funded approximately 50 percent from debt and 50 percent from rates. The model assumes an annual 3 percent inflation escalator of the R&R construction costs. At a minimum, these escalated costs will be included in the District's annual R&R fixed fee. The rate model will be reviewed annually to assure the projected rates can be maintained.

The rate funding will need to be certain, so a fixed charge based on meter size was established to fund the R&R program. This R&R fixed charge is equitably allocated based on meter service equivalent (MSE), per American Water Works Association (AWWA) standards. The R&R fixed fee will fund approximately 50 percent of the program, plus associated debt payment and taxes.

The current base charge includes a portion to fund R&R. The proposed R&R fixed charge will now include all R&R program funding coming from rates; therefore, the base charge was reduced and will continue to help fund remaining capital items and existing debt payments.

Exhibit A
Resolution No. B-1413

The District undertook a proposed change in its rate structure to fund the 50-year R&R (Replacement and Rehabilitation) Program. The District's rate model includes assumptions to minimize any future large increases to District customers. The basic assumptions used in costing the R&R program are: there are 185 miles of pipe that cost approximately \$1M a mile to replace over a period of 50 years. These assumptions arrive at \$3.7M of pipe to be replaced each year.

The cost will be funded approximately 50 percent from debt and 50 percent from rates. The model assumes an annual 3 percent inflation escalator of the R&R construction costs. At a minimum, these escalated costs will be included in the District's annual R&R fixed fee. The rate model will be reviewed annually to assure the projected rates can be maintained.

The rate funding will need to be certain, so a fixed charge based on meter size was established to fund the R&R program. This R&R fixed charge is equitably allocated based on meter service equivalent (MSE), per American Water Works Association (AWWA) standards. The R&R fixed fee will fund approximately 50 percent of the program, plus associated debt payment and taxes.

The current base charge includes a portion to fund R&R. The proposed R&R fixed charge will now include all R&R program funding coming from rates; therefore, the base charge was reduced and will continue to help fund remaining capital items and existing debt payments.

Rev'd 1/16/14 (see minutes of 1/16/14 BOC Regular Meeting)

**LAKWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON**

RESOLUTION NO. B-1417

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF LAKEWOOD WATER DISTRICT OF PIERCE COUNTY, WASHINGTON, RATIFYING AND CONFIRMING THE DISTRICT'S OWNERSHIP OF WATER SERVICES; ADOPTING POLICIES REGARDING THE MAINTENANCE OF ACCESS TO WATER SERVICES; AND RESCINDING AND SUPERSEDING RESOLUTION NOS. B-669, B-670, AND B-1165.

WHEREAS, Lakewood Water District, a Title 57 special purpose district ("District"), owns and operates a water system in Pierce County; and

WHEREAS, the District Board of Commissioners previously adopted policies stating the District shall own, maintain, and be responsible for all water services necessary to provide water service to District customers; and a water service consists of a water meter box, water meter, the water service line connected to a District water main running to the water meter box, and other appurtenances related to such water service; and the District now desires to ratify and confirm such policy to own and be responsible for all District water services; and

WHEREAS, District water services and meters are continuously accessed by District staff and District contractors for reading, maintenance, repair, replacement, relocation and other purposes, and it is important that access to such meters not be obstructed or restricted by shrubbery, trees, root systems, fences, rockeries, construction debris, dirt, bark, landscaping (including yard grade), or other obstructions that damage or make District water boxes and meters inaccessible; and

WHEREAS, the District Board of Commissioners now desires to formalize and adopt policies requiring District customers to maintain continuous and unobstructed access to District water services, water meter boxes and water meters; and

WHEREAS, pursuant to RCW 57.08.005(3), the District has full authority to regulate and control the use, content, distribution, and price of water supply, and it shall promote the general health and welfare to adopt policies providing for continuous and unobstructed access to District water services, water meter boxes, and water meters; now, therefore,

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, as follows:

1. A District water service shall be defined as the water service line connected to a District water main running to the water meter box, the water meter installed therein, and related appurtenances to serve an identified property.
2. The District's policy that the District own, maintain, repair, replace as appropriate, and be responsible for all water services including the water meter box and water meter necessary to provide water service to District customers is hereby ratified and confirmed.
3. The policies and process regarding the maintenance of continuous access to District water services, including water meter boxes and water meters installed therein, in the form attached hereto as **Exhibit A** and incorporated herein by this reference, are hereby approved and adopted effective the date set forth below.
4. All District resolutions, policies and procedures, including Resolution Nos. B-670, B-696, and B-1165 are hereby modified, rescinded, and superseded to be in accordance with the policies set forth in this Resolution.
5. This Resolution and the policies and procedures approved and adopted herein shall be effective the date set forth below.

ADOPTED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, at a special open public meeting thereof held on the 30th day of May, 2014.

Board of Commissioners

President and Commissioner

Vice President and Commissioner

Secretary and Commissioner

EXHIBIT A

DISTRICT POLICIES AND PROCEDURES REGARDING THE MAINTENANCE OF ACCESS TO DISTRICT WATER METER BOXES AND WATER METERS

1. The owners of real property receiving District water service shall maintain a clear area around and above the District water service serving the respective property, including the District water meter box and water meter, and a clear and accessible path to the District water meter box and water meter serving such property as follows:
 - Minimum two (2) feet radius around and six (6) feet above the meter box and water meter
 - Minimum two (2) feet wide by six (6) feet high clear pathway access from the right-of-way or easement to the meter box and water meter
2. Shrubbbery, trees, fences, rockeries, construction debris, dirt, bark, landscaping, or other obstructions that damage or make District water boxes and meters inaccessible are hereby prohibited; provided, ground cover around the water meter box or in the access pathway to such box not greater than two (2) inches in depth shall be allowed.
3. If the area around the District's water meter box is not adequately maintained in accordance with these policies, the District shall notify the property owner/occupant of the respective property by **first** letter and advise them access to the District meter box does not comply with District access requirements, provide the property owner/occupant with a copy of such access requirements, and require the property owner/occupant to comply with such access requirements and restore access to the District meter box within thirty (30) days of the date of such **first** letter.
4. If the customer has not fully complied with the District meter box access requirements within thirty (30) days of the date of the **first** letter set forth in Section 3 above, the District shall notify the property owner/occupant of the respective property by **second** letter that access to the District meter box does not comply with District access requirements, and require the property

owner/occupant to comply with such access requirements and restore access to the District meter box within fifteen (15) days of the date of the **second** letter, and that if such access is not fully restored within fifteen (15) days of the date of such **second** letter, the District shall have the right, at the District's election, to:

a. Assess the customer's District water service account a \$50.00 penalty for failure to maintain and restore access to the District meter box; or

b. Perform all work necessary to restore access to the District meter box, and charge the property owner/occupant for the full cost and expense for District staff to restore such access; and all such costs to do so shall be added to the customer's District water service account and shall be subject to payment and collection pursuant to the requirements of RCW 57.08.081, or as such statute may be modified or superseded, and applicable District resolutions relating thereto.

Such **second** letter shall be transmitted by both regular and certified mail, return receipt requested.

5. If the District elects, pursuant to Section 4(a) above, to assess a \$50 penalty for failure to maintain and restore access to the District water meter box, and the customer has not fully complied with the District meter box access requirements within fifteen (15) days of the date of the imposition of such penalty, the District shall notify the property owner/occupant of the respective property by **third** letter that access to the District meter box does not comply with District access requirements, and require the property owner/occupant to comply with such access requirements and restore access to the District meter box within fifteen (15) days of the date of the **third** letter, and that if such access is not fully restored within fifteen (15) days of the date of such **third** letter, the District shall have the right, but not the obligation, to relocate the water meter box and water meter and charge the property owner/occupant for the full cost and expense for District staff to relocate such water meter box and water meter; and all such costs to do so shall be added to the customer's District water service account and shall be subject to payment and collection pursuant to the requirements of RCW 57.08.081, or as such statute may be modified or superseded, and applicable District resolutions relating thereto.

Such **third** letter shall be transmitted by both regular and certified mail, return receipt requested.

6. If the District General Manager, or his/her designee, determines that immediate access to an obstructed District water meter box and water meter is necessary to protect public health and safety, including the protection of the District water system, the General Manager and his/her designee shall have the right and authority to waive notice to the owner of real property that access to a District

water meter box or water meter is obstructed and shall have District staff undertake all actions necessary to restore District access to such water meter box and water meter, including relocating such meter box and water meter, and all such costs to do so shall be added to the customer's District water service account and shall be subject to payment and collection pursuant to the requirements of RCW 57.08.081, or as such statute may be modified or superseded, and applicable District resolutions relating thereto; provided the District shall notify the property owner as soon as reasonably possible by letter, transmitted by regular and certified mail, of the actions taken by the District to restore access to the water meter box and water meter and that the District's costs to do so have been charged to the property owner's District water service account and must be paid in full.

7. The District General Manager, and his/her designee, shall also have the authority to determine to refund or credit penalties assessed against District customers pursuant to this policy under special circumstances, and to make administrative revisions to this policy, provided such revisions further the intent of this water meter box and water meter access policy and program.

LAKWOOD WATER DISTRICT
PIERCE COUNTY, WASHINGTON

RESOLUTION NO. B-1425

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF LAKEWOOD WATER DISTRICT OF PIERCE COUNTY, WASHINGTON, AUTHORIZING THE SUBMISSION OF THE "DECEMBER 2015 PROPOSAL FOR WATER UTILITY PRIVITIZATION JOINT BASE LEWIS MCCORD" TO THE UNITED STATES DEFENSE LOGISTICS AGENCY (DLA) PURSUANT TO DLA SOLICITATION NO. SPE600-15-R-0809 FOR SUCH PROPOSALS.

WHEREAS, Lakewood Water District (District) is a Washington municipal special purpose district authorized and existing pursuant to Title 57 of the Revised Code of Washington (RCW) in Pierce County, Washington; the District owns and operates a water utility system and provides water utility services to retail and wholesale customers located within and without the District pursuant to RCW 57.08.005(3); and

WHEREAS, pursuant to RCW 57.08.005(12), the District is authorized to contract with individuals, associations and corporations, the State of Washington, and the United States; and

WHEREAS, pursuant to RCW 57.08.044, the District is authorized to contract with any municipal corporation or corporation for the acquisition, ownership, use and operation of property, facilities or services within or without the District to provide water to property owners located within or without the District's limits; and

WHEREAS, pursuant to RCW 39.34.020(1) and RCW 39.34.030(1), the District is authorized to undertake joint and cooperative action with the United States, and, pursuant to RCW 39.34.080, to contract with another public agency such as the United States to perform any governmental service, such as the operation of a water system and the provision of water service which each public agency is authorized by law to perform; and

WHEREAS, pursuant to RCW 39.32.070, the District is authorized to enter into contracts with the United States, or any agency thereof, for the purchase of property and equipment; and

WHEREAS, pursuant to 10 U.S.C. Sec. 2688, the United States Secretary of Defense (Secretary) is authorized to convey utility systems owned by the United States to a private or public utility company; and the Secretary, through the United States Defense Logistics Agency (DLA), has published a solicitation (Solicitation) for proposals to privatize the water and sewer utilities and serving Joint Base Lewis McChord (JBLM) located in Pierce County, Washington; and the Solicitation invites proposals to acquire the water system and/or sewer system serving JBLM, and to enter into a fifty (50) year agreement with DLA to provide utility services to JBLM from the acquired system(s); and

WHEREAS, District Staff have recommended the District submit a proposal to DLA to acquire the JBLM water system, and to provide water utility service to JBLM by fifty year agreement with the DLA; and District Staff have provided a proposal to the District Board of Commissioners prepared by District staff and District engineering, financial and other consultants, such proposal referenced herein as the “December 2015 Proposal for Water Utility Privatization Joint Base Lewis McChord” consisting of four volumes addressing the requirements of the Solicitation (collectively, the Proposal); and District Staff have requested the approval of the Board of Commissioners to submit the Proposal to DLA by the Solicitation deadline of December 15, 2015; and

WHEREAS, the District Board of Commissioners having been advised by District Staff and District consultants regarding the Proposal, and having considered the benefits the District can provide to the United States due to its organizational and financial stability, geographical proximity to JBLM, experience with Washington State Department of Health regulations, and additional reliability and redundancy of source, storage, personnel, and equipment; and

WHEREAS, the District Board of Commissioners having determined that submitting the Proposal, and if the District contracts with DLA to acquire the JBLM water system and provide water service to JBLM, is also in the best interest of the District’s existing ratepayers because the District will establish a separate utility system to own and operate the JBLM water system with segregated finances, water service to JBLM will bear a portion of fixed District administrative costs, the District will earn a reasonable and customary mark-up on operation and maintenance and transition period services, and JBLM and the District will benefit from the combined capacity of the two systems which will improve water system flexibility, emergency response capability, and organization depth while ensuring reliable utility service to the region’s largest and most important employer; now, therefore,

BE IT RESOLVED by the Board of Commissioners of Lakewood Water District of Pierce County, Washington, as follows:

1. District Staff are hereby authorized and directed to submit the “December 2015 Proposal for Water Utility Privatization Joint Base Lewis McChord” consisting of four volumes to the DLA pursuant to the terms, conditions and requirements of the Solicitation.

2. Randall M. Black, the District General Manager, is hereby authorized and directed to execute on the District's behalf any and all forms, submittals, applications and other documentation related to the District's Proposal as required by the DLA.

3. District Staff are authorized and directed to keep the District Board of Commissioners further advised regarding the status of the Proposal and any discussions and negotiations with the DLA if the District's Proposal is selected by the DLA for consideration.

ADOPTED by the Board of Commissioners of Lakewood Water District, Pierce County, Washington, at a regular open public meeting held on the 19th day of November, 2015.

LAKWOOD WATER DISTRICT

By: _____
L. R. Ghilarducci, Jr.
President and Commissioner

By: _____
John S. Korsmo, Jr.
Commissioner

By: _____
Greg J. Rediske
Secretary and Commissioner

ATTEST

I, Greg J. Rediske, Secretary of the Board of Commissioners of Lakewood Water District, Pierce County, Washington, do hereby certify that the foregoing resolution is a true and correct copy of Resolution No. B-1425 of such Board, duly adopted at a regular meeting thereof held on the 19th day of November, 2015, signed by the members of such Board in attendance at such meeting and attested by myself in authentication of such adoption.

Greg J. Rediske, Secretary
Board of Commissioners
Lakewood Water District
Pierce County, Washington

CROSS CONNECTION CONTROL
POLICY AND PROCEDURES
Exhibit A, Resolution No. B-1432

The following are the policies and procedures for the Cross Connection Control Program of the Lakewood Water District (the District) in accordance with WAC 246-290-490 and the Pacific Northwest Section-American Water Works Association Cross Connection Manual (PNWS-AWWA “Yellow Manual”). These procedures shall be strictly followed unless the Lakewood Water District requires more stringent measures to be added in the best interests of LWD and/or in protecting the public water supply. Any variance from the procedures must have the consent of the Lakewood Water District Cross Connection Control Coordinator and/or General Manager and Superintendent. The District General Manager reserves the right to change any part of this policy at any time if he/she feels it is conducive to the best interests of the District’s customers.

I. DISCONTINUATION OF WATER SERVICE FOR FAILURE TO COMPLY

The Lakewood Water District reserves the right to discontinue water service to any customer or property that refuses to comply or is otherwise non-compliant with Resolution No. B-1432, the State Board of Health Drinking Water Regulations, WAC 246-290-490 on Cross Connection Control, the PNWS-AWWA “Yellow Manual,” or when public safety is at risk pertaining to a known high hazard.

The District and the City of Lakewood, by a five-year interlocal agreement dated September 12, 2017, agreed it was cost effective to avoid duplication of efforts by having the parties provide a single system for tracking, inspection, and approval of backflow prevention devices installed on properties connected to the District’s water system, both in-premises and otherwise; and the parties in the ILA agreed District staff would perform the District’s cross connection control program and the City’s responsibilities to provide in-premise cross connection control.

There will be a \$150 charge for all plan reviews conducted by the District.

II. NEW CONSTRUCTION

All new construction (residential, business, commercial, industrial) shall be required to have an inspection by the District before occupancy will be given by the City of Lakewood Building Department. The District will assess the degree of hazard for each situation. This includes existing premises that are installing new fixtures, irrigation systems, etc. Once the permits are obtained, installation is complete, and backflow test reports submitted, the District will sign off on the project.

III. EXISTING PREMISES

The Lakewood Water District shall inspect existing premises in the following manner:

- (1) Commercial/Industrial facilities shall be contacted on a degree of hazard basis, beginning with the most dangerous known situations with a high potential for

- water contamination; and
- (2) Residential facilities shall be contacted if it has been established there is a potential cross connection on the premises, e.g., irrigation system, pool, or hot tub. Customers shall be contacted by the order of their account in the District's meter-reading routes.
 - (3) Refusal to allow inspection will result in the automatic requirement of backflow protection at the service meter (premise isolation) to the extent deemed necessary by the District, at the customer's expense, within 20 days, or service shall be discontinued.

IV. APPLICATION OF BACKFLOW ASSEMBLIES

The Lakewood Water District reserves the right to decide how or where a backflow prevention assembly shall be installed. The District uses the standards explained in the most current edition of the PNWS-AWWA 'Yellow Manual.' Each facility is different, and it will be up to the discretion of the Cross Connection Control Program Coordinator and/or the General Manager or Superintendent how a particular hazard is addressed. Any exception to an approved installation will be documented in writing by the Cross Connection Control Coordinator.

V. ASSEMBLIES APPROVED FOR INSTALLATION

A backflow assembly is considered an approved assembly only if it appears on the list issued by the Washington State Department of Health Drinking Water Program. If it is not on this list, it is not an approved backflow prevention assembly and shall not be used. This list is updated annually and is available to be reviewed at the District for information purposes. Complimentary copies are available upon request; for multiple copies, there is a fee of 10 cents a page after the first 10 pages.

VI. INSTALLATION REQUIREMENTS FOR BACKFLOW ASSEMBLIES

A backflow prevention assembly shall be installed in compliance with the instructions that appear in the latest approved edition of the PNWS-AWWA Cross Connection Control Manual ("Yellow Manual"). Only the Lakewood Water District reserves the right to establish variances to this chapter, and any and all variances shall be on a case-by-case basis.

VII. TESTING PROCEDURES

If a backflow test report is filled out properly with all the information required by the Lakewood Water District, it shall be filed as a completed test report. It is up to the State of Washington to monitor and train the Certified Backflow Assembly Testers in the various test procedures available. The testing procedures shall be those methods that are approved and acceptable to the State Department of Health and the Lakewood Water District.

VIII. QUALIFICATIONS FOR BACKFLOW ASSEMBLY TESTERS

Only State-certified Backflow Assembly Testers may submit tests to the District. They shall also submit proof of possessing a current Certified Backflow Assembly Tester card (or other approved tester certification accepted by and recognized by the State

Department of Health) for the calendar year in which they are testing. The current Certified Backflow Assembly Testers shall also show proof that the equipment being used to test has been calibrated within one year prior to the test they are submitting. If a Certified Backflow Assembly Tester cannot or will not meet these requirements, the test report will be returned to the testers, and their customer will be notified.

IX. TESTING OF BACKFLOW ASSEMBLIES

All backflow prevention assemblies required by the District shall be tested annually at a minimum and upon installation or relocation and/or after repair. The District does not test any backflow assemblies. It is the customer's responsibility to sign up to participate in the District's Backflow Testing Program or hire a State-certified backflow assembly tester.

X. ANNUAL TESTING

The District shall send a letter at the beginning of the month to customers whose test is due. The test report is due by the end of the month or thirty (30) days from the date of the letter. If the test is not submitted, the District will send a second "reminder" letter. This letter shall allow fifteen (15) days to submit the test. If the test is still not submitted, the District shall send a "final" certified letter. This letter will have a final due date. If the report still is not received by the District by the final due date, the District will hang a door hanger stating the water service will be discontinued the following day. Water service will be resumed only when a current backflow test is submitted to the District. This complete process shall not exceed a total of sixty (60) days.

XI. TESTER WAIVERS

Test waivers may be obtained from the District, signed by the customer, and returned to the District, waiving the District's responsibility to mail a test notice to the customer and mailing it directly to the tester. These waivers will be granted on a case-by-case basis, and only testers on the Lakewood Water District list will be able to add new waivers during the current year; all pre-existing waivers will be grandfathered in.

Waivers signed by the customer and on record with the District only allows for thirty (30) days for test reports to be submitted to the District. After the thirty (30)-day deadline, all testers with outstanding waivers will be notified and have seven (7) days after the date of notification to turn in any outstanding test reports. After that time, the District will pull the waiver on the account and notify the customer directly. If a company or tester is continually submitting test reports late with "waiver tests," they run the risk of removal from the District's tester list.

XII. LIST OF TESTERS

The District shall maintain a list of Certified Backflow Assembly Testers to distribute to its customers. The District does not promote one tester/company over another. The requirements for a tester/company to be on the list are (1) is licensed with the State of Washington; (2) has up-to-date certified backflow assembly tester(s) employed by the company; (3) has all testing equipment calibrated at least annually; (4) is bonded as a

general or specialty contractor, (5) carries at least \$500,000.00 in liability insurance, and; (6) has no reported issues or complaints from customers or non-compliance with this policy.

Companies will be listed in alphabetical order (from A to Z) on the District's list. Once a company is removed from the list, they will no longer be eligible to be a part of the District's list. A company may be removed for failure to submit annual documentation of status, failure to submit test reports on time, failure to obtain permits, poor workmanship, customer complaints, or any other activities deemed harmful to the District or its customers.

Recommendation by the Cross Connection Control Coordinator to remove a tester/company due to customer complaints shall be reviewed by the District General Manager. He shall ask for a meeting with the company and the Cross Connection Control Program Coordinator. Depending on the outcome of that meeting, the District General Manager will then decide if a company is to be suspended for a period of time or permanently banned from the District's list. The District's list is a convenience/service to its customers and the certified testers/testing companies. The Lakewood Water District always reserves the right of refusal pertaining to this list.

For unresolved disputes between the Cross Connection Control Program Coordinator and the tester or testing company, the tester or company has the right to have the District General Manager evaluate and make a final decision on the dispute. A written explanation of the situation shall be submitted to the District General Manager within thirty (30) days of final decision by the Cross Connection Control Coordinator. This document shall be submitted by regular and certified mail.

The District General Manager will then schedule a meeting with the tester/company and the Cross Connection Control Coordinator. This meeting shall be scheduled not more than sixty (60) days from receipt date of the certified letter.

Any decision made by the General Manager may be appealed to the Board of Commissioners at the next open public meeting or on an otherwise agreed-upon date and time.

XIII. PERMITTING

Permits are required for all installations of backflow assemblies. This includes existing situations where a backflow assembly is removed and another is installed. In other words, any time a backflow assembly is installed in any situation, a permit is required. Inquire at the Lakewood Water District offices for permit pricing; they are subject to change. Permits can be obtained at the Lakewood Water District office in person, by mail, or by downloading a permit from the District's website. The District does not sell permits in the field.

Permit costs are \$65.00 for the first and second backflow assembly and \$32.50 for each additional assembly. There is no limitation on quantity.

XIV. INSPECTIONS

The term “inspection” means to visually look at the installation of a backflow assembly. The Lakewood Water District shall inspect all backflow installations. A forty-eight (48) hour notice is required. Inspections are by appointment only with the Cross Connection Control Coordinator. An inspection cannot be scheduled prior to obtaining a permit (if applicable). Lakewood Water District reserves the right to inspect all points of connection, even if it means delaying the backfilling of a ditch or the granting of occupancy permit approval until inspection is completed.

XV. “CUT AND CAPPED” (Severed and/or Disconnected) SYSTEMS

When an irrigation system is not in use, the backflow assembly will still be required to be tested annually. The only way to waive the requirement for a test is to physically sever the system. The Lakewood Water District will inspect the point where the system is severed and/or disconnected and photograph it. The District will periodically check on “cut and capped” (severed and/or disconnected) systems. If they are found to be in use, the customer will receive notice from the District. The District will then give the customer the option of installing a backflow assembly or severing the line again. The District reserves the right to discontinue water service if the problem cannot be resolved.

The same policy and procedures would apply to certain fixtures in a commercial/industrial situation. The fixture not in use would have to be severed and possibly removed from the premises if the District deems it might be connected and used. This would always be evaluated on the potential degree of hazard involved.

XVI. FINAL STATEMENT

The Lakewood Water District has developed this Program to be in compliance with State WAC 246-290-490, Resolution B-1432, and with the goal of reducing or eliminating Cross Connections, to the extent possible, to prevent contamination of and protect the public water system. This also includes protecting the District’s customers by reducing any chances of backflow, backpressure or back-siphonage which causes potable and non-potable water to form cross connections.

All final decisions regarding the implementation of this policy, the settling of unresolved disputes, and any other structural changes to this policy shall be at the discretion of the Lakewood Water District General Manager and/or the Board of Commissioners.

Adopted and approved by the Board of Commissioners at an open, public Regular Meeting on March 15, 2018.

RESOLUTION NO. B-1448

A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT ADOPTING AN OVERALL, WEIGHTED 8.0 PERCENT WATER RATE INCREASE AS OUTLINED IN THE 2019 BUDGET, EFFECTIVE JANUARY 1, 2019.

WHEREAS, the Commissioners of the District, in accordance with RCW 57.08.081, have the authority and responsibility to establish rates and charges for the District; and

WHEREAS, the Commissioners of the District have caused to be completed an analysis of the District's fiscal needs for the future; and

WHEREAS, the five-year capital budget was considered; and

WHEREAS, the District's rate model analysis showed that revenues are inadequate to properly provide for increased operation and maintenance costs, system replacements, additions and betterment, and to allow for sufficient reserves consistent with the District's adopted financial policies, unless a recommended overall, weighted 8.0 percent rate increase as outlined in the 2019 Budget is made effective January 1, 2019, with the first billings reflecting the increase to be on or after March 1, 2019. This overall, weighted increase consists of a 6.0 percent increase in the R&R fixed fee based on meter size to fund the District's 50-year R&R (Replacement and Rehabilitation) Program as well as a rate increase of 8.92 percent for both the volume charge and the base charge to fund general operation, maintenance, and other capital projects. This rate increase is higher by 3.29 percent compared to the rate forecasted for 2019 of 4.71 percent in the Five-year Rate Forecast adopted in the 2018 Budget and normalized for the next five years in the Five-year Rate Forecast in the 2019 Budget.

NOW, THEREFORE BE IT HEREBY RESOLVED AS FOLLOWS:

SECTION 1. The Board of Commissioners of Lakewood Water District hereby adopts and approves by resolution a rate increase as outlined in the 2019 Budget and above for all active accounts; it further hereby adopts and approves the following revised rate structure:

Effective January 1, 2019, rates shall include an increase by an overall, weighted 8.0 percent for most residential ratepayers; the actual rate increase percentage will vary according to customer meter size. The first billings reflecting the increase will be received on or after March 1, 2019.

Lakewood Water District Rates for Active Accounts

Base Charge and Water Consumption	Current Rates (2018)	New Rates (2019)
Base Charge	\$7.62 (incl's 800 cu ft)	\$8.30 (incl's 800 cu ft)
0-800 cubic feet	\$0 (included in Base Charge)	\$0 (included in Base Charge)
801-2000 cubic feet	\$1.62/ccf	\$1.76/ccf
2001 and over	\$2.20/ccf	\$2.39/ccf

R&R Fixed Fee Per Meter Size	Current Rates	New Rates
Meter Size	Fixed Fee	Fixed Fee
5/8"	\$ 27.77	\$ 29.44
1"	\$ 30.55	\$ 32.38
1.5"	\$ 38.88	\$ 41.21
2"	\$ 49.99	\$ 52.99
3"	\$ 80.55	\$ 85.38
4"	\$ 305.52	\$ 323.85
6"	\$ 388.84	\$ 412.17
8"	\$ 805.46	\$ 853.79
10"	\$1,055.43	\$1,118.76
12"	\$1,249.85	\$1,324.84

SECTION 2. According to standard District practice, the District will use all means necessary and appropriate to inform all ratepayers of this resolution and water rate increase. Be it known, a letter will sent to all rate payers the first week of January 2019; this letter will be posted to the District's website at www.lakewoodwater.org.

SIGNED the 20th day of December 2018.

LAKWOOD WATER DISTRICT

President

Commissioner

Attest:

Commissioner

District Secretary



Don Anderson
Mayor

Jason Whalen
Deputy Mayor

Mary Moss
Councilmember

Michael D. Brandstetter
Councilmember

John Simpson
Councilmember

Marie Barth
Councilmember

Paul Bocchi
Councilmember

John J. Caulfield
City Manager

November 15, 2019

Stephanie Ard, PE
Civil Engineer | Licensed in WA
1145 Broadway Plaza, Suite 1010
Tacoma, WA 98402

RE: Lakewood Water District Comprehensive Water Plan

Dear Ms. Ard:

The City of Lakewood adopted a subarea plan for the Downtown in 2018. It has received funding to adopt a subarea plan for the Lakewood Station District by mid-2021.

Included below is information about the population and employment projections in those areas for the District to consider as part of its long range planning.

OPPORTUNITIES TO INCREASE LAKEWOOD RESIDENTIAL BUILDING CAPACITY:

Per Pierce County Ordinance 2017-24s, Lakewood's 2030 Population Target is 72,000. As of 2018, the US Census estimated Lakewood's population at 60,538, or a 5.2% increase between April 1, 2010 and July 1, 2018, an 8 year period. Lakewood therefore is planning for an additional 11,462 residents by 2030; this is a 16% increase over a 12 year period, a significantly higher rate than that seen between 2010 and 2018.

Downtown Subarea

Based on historical, pre-incorporation development patterns in Lakewood, the City identified the 2018 Downtown Subarea as a key location for higher residential densities and population growth, in part because of the presence of the Pierce Transit station within the Downtown and the proximity to the Sound Transit station. The Downtown subarea is targeted for locating 2,257 residential units over a 20+ year period (i.e., by 2038.) This equates to locating 20% of the City's overall 2030 population target in the Downtown at planned build-out.

Lakewood Station District Subarea

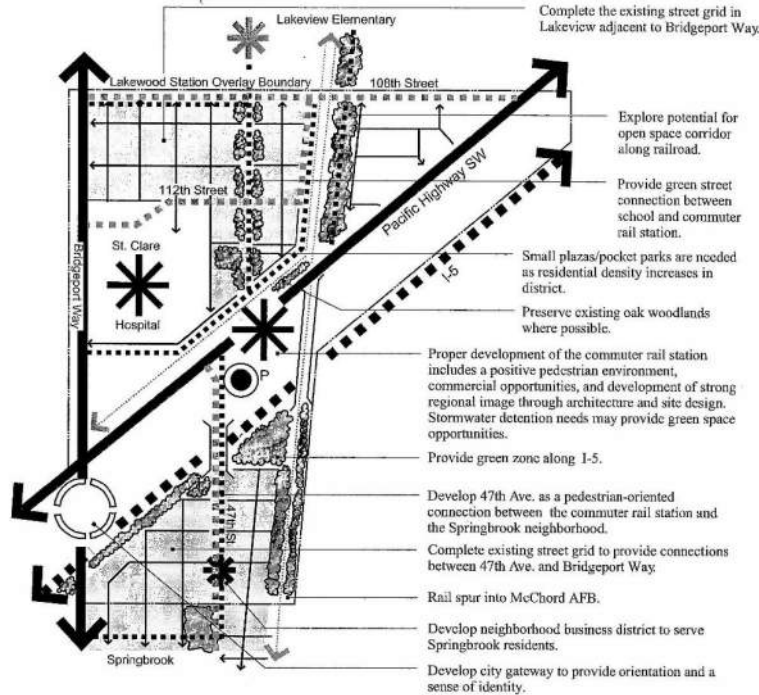
Lakewood has been awarded funds by the Department of Commerce to develop a Lakewood Station District Subarea Plan, as called for by the City's Comprehensive Plan.

When the 2000 Lakewood Station District subarea boundaries are amended to extend north to 100th St SW, east to the SR 512 interchange, south to I-5, and west to approximately 55th Ave. SW, the Lakewood Station District has several existing low-income neighborhoods ready for redevelopment at higher densities along a high capacity transit corridor and within ½ mile of the Lakewood Station. The Lakewood District also

does not have the same environmental and infrastructure constraints (i.e., lakes and associated wetlands, and existing road widths and routes) as much of the western area of the City that makes residential redevelopment at higher densities unlikely there.

A subarea plan incorporating residential densification could: maximize access to public transit; provide housing affordable to the City’s current residents; help prevent current resident displacement as well as provide additional mixed income housing units for future targeted growth; and serve as an excellent complementary planning area to the Downtown. As a result, higher residential densities are more practically feasible in the Lakewood Station District than in western Lakewood.

2000 Lakewood Station District Map



Potential 2020 Lakewood Station District Subarea Boundaries: 100th St SW, I-5, SR 512, 55th Ave. SW

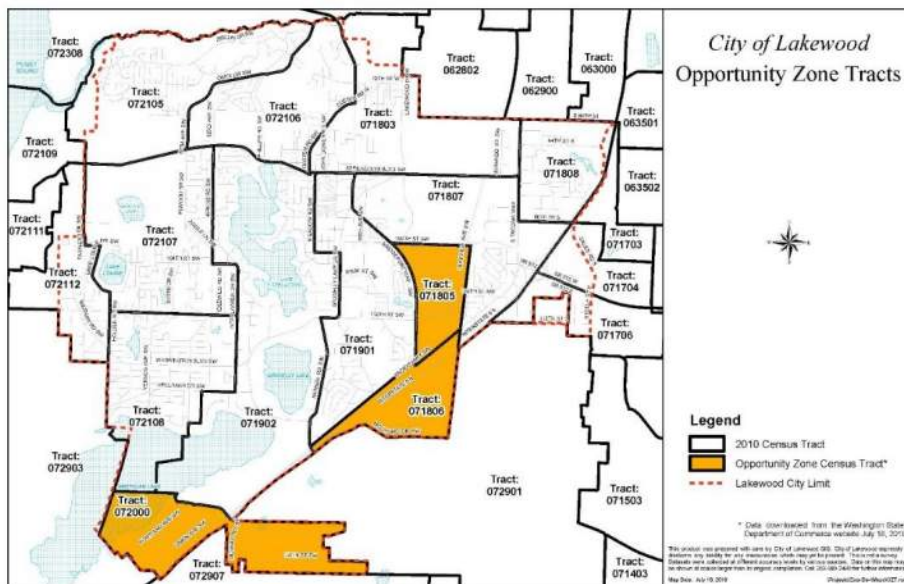


The residential zones within the proposed 2020 Lakewood Station District subarea boundaries currently include approximately: 255 acres of Residential 3 (R3); 16 acres of Residential 4 (R4); 90 acres of Mixed Residential 1 (MR1); 50 acres of Multi-Family 1 (MF1); and 60 acres of Multi-Family 3 (MF3.) Based on a 2019 citywide analysis of residential development, these zones are not built out to maximum capacity:

Designation	Zone	Max Allowed DUs/Acre	Actual Density (DUs/Acre)	% of Max Density
Single Family	R3	4.8	3.31	69%
	R4	6.4	4.37	68%
Mixed Residential	MR1	8.7	4.76	55%
	MR2	14.6	8.05	55%
MultiFamily	MF1	22	11.27	51%
High Density Multi-Family	MF2	35	11.47	33%
	MF3	54	17.17	33%

Focusing redevelopment and densification efforts in the subarea could, even without rezoning properties, therefore result in an estimated additional 3,514 units: 380 units in the R3 zone; 32 units in the R4 zone; 355 units in the MR1 zone; 537 units in the MF1 zone; and 2210 units in the MF 3 zone. The 3,514 units would comprise almost 31% of the 11,462 new units Lakewood is planning for by 2030. If areas were partially or fully rezoned to R4, MR2 and MF3, significantly more units could be achieved within the subarea.

Two existing economic tools coincide with and would buoy the benefits of developing a Lakewood Station District Subarea Plan (LSDS.) The LSDS boundaries overlap with the federally established Lakeview/Kendrick Street Opportunity Zone (Tract 071805):



In addition, Lakewood has established areas where Multi-Family Tax Exemptions are available, including the Lakewood Station residential target area (RTA):



Thank you for your consideration of these comments,

/s/

Tiffany Speir, Esq., CPM®

Planning Manager, Special Projects

tspeir@cityoflakewood.us | 253.983.7702

Stephanie Ard

From: Courtney Brunell <CBrunell@cityoflakewood.us>
Sent: Friday, November 15, 2019 11:50 AM
To: Stephanie Ard
Cc: David Bugher
Subject: City of Lakewood comments on LWD CWSP
Attachments: 20191115_114628.pdf

Dear Stephanie,

Thank you for providing the City with a copy of the LWD update to their Comprehensive Water System Plan. The following comments are from the city of Lakewood's CED department, I forwarded a copy of the plan to West Pierce Fire and Rescue, they may have comments regarding fire flow levels discussed through the document. I would recommend following up with them directly by contacting Michael Dobbs at Michael.Dobbs@westpierce.org.

One revision:

Page 3-1, It states that the City's last revision to the comprehensive plan was completed in 2017. The City's comprehensive plan was most recently revised in October 2019. Prior to that July 2019, and prior to that November 2018. We typically revise once annually.

Other notes:

The population summary in table 3-5 is well thought out, the Director and I met and appreciate the analysis to get to the 20 year number. There are some estimates that show 72,000 by 2040, but given our stagnant population growth, the provided projection in the plan is realistic.

The City wants to encourage the district to prioritize preventative maintenance and upgrades to existing outdated infrastructure in order to support increased population growth.

I have signed the consistency determination form. Please update the information regarding the comprehensive plan revision dates.

Thank you,

Courtney

Courtney Brunell, MPA

Planning Manager

[City of Lakewood, WA](#)

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October 15, 2019

Ian Black
Lakewood Water District
11900 Gravelly Lake Dr. SW
Lakewood, WA 98499

Subject: **Lakewood Water District Water Plan**

Dear Mr. Black:

Pierce County has reviewed the draft Lakewood Water District Comprehensive Water Plan dated August 2019. In reviewing your submittal, the following items need clarification prior to the County issuing a signed local Government Consistency Statement to the Washington State Department of Health (DOH).

Basic Planning Data

- Pierce County Water System Plan review requires existing Franchise Agreements to be discussed and included in the subject Water System Plan.
- Lakewood Water District established a Franchise Agreement with Pierce County in August 2019. Please include discussion of this in the WSP.

Thank you for submitting the draft Lakewood Water District Plan. Pierce County can consider issuing a signed Government Consistency Statement once the above requests are addressed. To expedite review of your revised submittal, please include a cover letter summarizing how each of the above comments are addressed in the revised WSP amendment, and the page/section that each response is located. To save costs and resources, I am only looking for copies of the revised pages/maps.

If you have any questions feel free to reach me at vaughan.cary@piercecountywa.gov or (253) 798-7163.

Sincerely,

A handwritten signature in black ink, appearing to read 'Vaughan Cary'.

Vaughan Cary
Assistant Planner

VC:dw

cc: Debbie Bailey, Pierce County Department of Emergency Management
Chrissy Cooley, Tacoma-Pierce County Health Department
Warner Webb, Pierce County Fire Marshal
Jennifer Kropack, Washington State DOH

**RESOLUTION NO. B-1459
LAKEWOOD WATER DISTRICT**

**A RESOLUTION OF THE COMMISSIONERS OF LAKEWOOD WATER DISTRICT TO
ADOPT THE CURRENT APPROVED COMPREHENSIVE WATER SYSTEM PLAN**

WHEREAS, Murraysmith, in association with the staff of Lakewood Water District, has prepared and submitted to the Washington State Department of Health, a Comprehensive Water System Plan (DOH Submittal #19-0803) as outlined in WAC 246-290, revised August 2019; and

WHEREAS, the Municipal Water Law went into effect in 2008, and as identified in RCW 296-290-100 (8)(b), the governing body must adopt the plan prior to DOH approval.

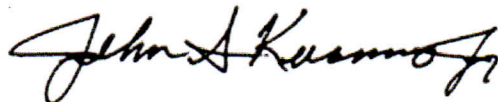
NOW, THEREFORE BE IT HEREBY RESOLVED AS FOLLOWS:

The Board of Commissioners of Lakewood Water District hereby adopts the Comprehensive Water System Plan which shall be in effect through 2029, and is hereby incorporated herein by reference, and which is filed in the books and records of the District as the current adopted Comprehensive Water System Plan.

Adopted this 16th day of April 2020.

LAKEWOOD WATER DISTRICT

BY:



J. S. Korsmo, Jr.

Its: President

ATTEST:



District Secretary

**LAKWOOD WATER DISTRICT
BOARD OF COMMISSIONERS
Minutes of Special Meeting
Monday, March 9, 2020**

The Special Meeting was called to order at 3:30 p.m. at the District office. Present at the meeting: Commissioners J. S. Korsmo, Jr., G. J. Rediske (via phone), and G. J. Barton; General Manager R. Black; Superintendent I. Black; Finance Director D. Logan; District Secretary C. Butler; Assistant Office Supervisor T. MacDougall; Senior Accounting Lead P. Mendoza; District engineering consultants M. Meyer and S. Ard from Murraysmith; and District legal counsel J. Kray and associate J. Ferrell.

PUBLIC COMMENT:

No members of the public were present.

APPROVAL OF MEETING MINUTES:

Commissioner Barton moved to approve the minutes of the February 20 Regular Meeting. Commissioner Rediske seconded the motion which carried unanimously.

FINANCIAL INFORMATION:

The Finance Director presented revised January financials to the Board, specifically, as it related to January wholesale revenues.

The Senior Accounting Lead presented the February financials to the Board.

Disbursements made from the General Ledger Fund for check number 41646 through 41736 totaling \$1,598,369.79, salary direct deposits totaling \$168,878.74, payroll taxes totaling \$65,536.57, and other electronic payments totaling \$133,837.71, for a grand total of \$1,966,622.81 were presented to the Board for approval. After review, Commissioner Barton moved to approve the payables as listed. Commissioner Rediske seconded the motion, which carried unanimously.

BOARD REVIEW OF 2019 COMPREHENSIVE WATER SYSTEM PLAN AND PROPOSED RESOLUTION NO. B-1459:

The General Manager introduced District engineering consultants M. Meyer and S. Ard of Murraysmith to present the District's proposed 2019 Comprehensive Water System Plan (Comp Plan) to the Board. Murraysmith has worked with the District to produce its last two Comp Plans, and it is very advantageous to the District to have the work accomplished by someone that knowledgeable of the District's system, assets, and operations. In the 2017, the State Department of Health (DOH) passed legislation to allow water utilities to choose either a six-year or 10-year plan where the previous requirement had been to submit six-year plans. This is the District's first 10-year plan and includes a 20-year planning horizon.

Mr. Meyer and Ms. Ard presented and discussed with the Board a PowerPoint report and review of the proposed, updated plan. The District Finance Director and the Senior Accounting Lead presented the financial component of the report.

Board of Commissioners' Meeting Minutes

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After review, Commissioner Rediske moved to approve the 2019 Comprehensive Water System Plan as presented. Commissioner Barton requested to table the matter until the April meeting to allow himself as a new Commissioner and new to this process the opportunity to review the plan in its entirety before being involved with its approval.

President Korsmo asked the General Manager if this delay would cause a challenge for the District. The General Manager replied the draft plan was already in the hands of the State Department of Health for review and that an April approval would not be a detriment to the District. Therefore, with no second, the motion failed, and this matter will be completed at the April meeting.

The General Manager and the Board thanked Mr. Meyer and Ms. Ard for all their good work and clear presentation, and they excused themselves from the meeting at that time.

EXECUTIVE SESSION per RCW 42.20.110(1)(I) TO DISCUSS WITH LEGAL COUNSEL LITIGATION OR POTENTIAL LITIGATION:

President Korsmo called for a 20-minute Executive Session at 4:37 p.m. to discuss with District legal counsel pending litigation. At 4:57 p.m., the Executive Session concluded and President Korsmo called for an additional 5-minute session. That Executive Session concluded at 5:02 p.m., and the open public Special Meeting resumed. The General Manager and the Board thanked Legal counsel J. Kray and J. Ferrell who excused themselves from the meeting at that time.

BOARD AWARD OF THE 32ND AVENUE R&R PROJECT:

The District received 11 bids for this project at the bid opening held March 3, 2020 at 10 a.m. The low bidder was Scarsella Bros., Inc. with a bid of \$798,803.20 including 9.9 percent Washington State Sales Tax. The second lowest bidder was Northwest Cascade, Inc. with a bid of \$877,879.02 including tax. The third lowest bidder was R.W. Scott Construction Co. with a bid of \$913,994.34 including tax. The Engineer's Estimate was \$1.2M including tax.

This project was listed in the 2020 Budget at \$640,090. The variance between the final Engineer's Estimate and the budget was in part due to a 30 percent increase in pipe, going from 12-inch to 16-inch pipe. Another factor was an increase in the number of connections by four or five at approximately \$10K each. Scarsella's bid coming in at \$402K under the Engineer's Estimate will help mitigate that variance, and the General Manager discussed with the Board additional options to help offset the difference.

District legal counsel A. Tramountanas vetted Scarsella's litigation and reference backgrounds and recommended the Board award to Scarsella Bros., Inc. The General Manager also recommended the Board award this project to Scarsella. Commissioner Korsmo moved to award the 32nd Avenue R&R Project to Scarsella Bros., Inc. Commissioner Barton seconded the motion which carried unanimously.

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BOARD AWARD OF THE 2020-2021 DISTRICT BACKFLOW TESTING PROGRAM:

The District received three bids for the District's 2020-2021 Backflow Testing Program. The low bidder was from Blake's Backflow Service LLC, the same tester that was the low bid for the 2019-2020 program. Even with a slight increase in price, the District will still be able to offer the testing to its customers in the present year at \$27 per device as it has been since the program's inception in 2016.

SUCCESSION PLAN UPDATE:

The Board acknowledged the District's updated 2020 Succession Plan with no unexpected components from the previous year's plan.

GENERAL MANAGER PROJECT UPDATES:

Wholesale Transmission Main Extension—The General Manager reported January wholesale water billings had been mailed to the Wholesale Partners including the shift of going from cash to utility basis from the 21st through the end of the month. The utility basis is approximately three times what the cash basis has been in regards to trying to entice new customers.

The General Manager received a call from Spanaway Water Company General Manager J. Johnson asking for a meeting with him and the Finance Director about some cost-related matters. At that meeting, Mr. Johnson discussed the matter of his water utility not needing water until 2024. He stated that, coupled with having no infrastructure to connect to the WTME at this time but still being charged at the new, significantly higher utility basis, could be perceived by his board as the District not wanting their business. He asked if Spanaway could continue to pay the cash basis rate. The General Manager stated the only way he could remotely see the Board considering this would be if Spanaway committed to taking water.

Spanaway had thought their water needs could be met via the Foster case and/or have been considering the possibility of receiving wholesale water from Tacoma, but neither has been decided on by Spanaway. It would take an estimated 18-24 months to get the pipe and infrastructure in place to be able to receive water from the District. Mr. Johnson asked that if he got his board to sign a new, amended, and extended wholesale water contract with the District to include the commitment to take water, could Spanaway be allowed to pay the cash basis rates until such time they would begin taking water as outlined in the contract. The General Manager stated he would only take that matter to the Board for decision if this was signed, sealed, and delivered prior to Mr. Johnson's retirement date, May 15, 2020. If approved, it would mean the District would accept the cash basis amount through May 15 or earlier depending on when a new contract would be signed/approved by the Board. The terms of the new contract would outline the rates and schedule of water taken going forward, including the time Spanaway's pipeline and infrastructure is built/installed.

The Board concurred with moving forward with this possibility. If Mr. Johnson is successful in his endeavors and his board agrees to sign a new contract, the General Manager will bring a draft of said contract to the District's Board for approval.

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The General Manager stated he had nothing more beyond his memo report to share on projects at this time.

SUPERINTENDENT'S REPORT:

The Superintendent's full, written report was provided to the Board in the pre-agenda packets. Subsequent to that report, he shared the following. The Veterans Drive R&R Project is wrapped up, and Arrowhead Phase 3 is in the process of wrapping up. The Sylvan Park Phase 4 R&R Project went out to bid on March 2; the walk-thru will be March 10. This project will connect in with the 32nd Avenue Project and will make it easier to bring water from the 88th and Pine Wellsite.

The surge tank is still to be installed at the existing Wholesale Transmission Main booster pump station and the transformer changed. The contractor is digging the foundation for the building the foundation for the building at the second, new booster pump station presently. Startup is scheduled for July 13.

The Superintendent received scopes of work and budgets from the City of Lakewood for two projects just prior to walking into this meeting. As for the upcoming Gravelly Lake Drive project between Washington and Nyanza, it was reported that the public like Lakewood Water District but are not in favor of the planned median that will go down the middle of Gravelly Lake Drive (and down Washington to Edgewood) or the planned roundabouts.

OFFICE SUPERVISOR'S REPORT:

The Office Supervisor invited Assistant Office Supervisor (AOS) T. MacDougall to give this report. Ms. MacDougall reported the District's newest hire, Luke Nishiko, started as the District's Primary Cashier/Receptionist on March 2 and is doing very well. The AOS also presented this year's CAP (Customer Assistance Program) report with \$1,606.09 in 2019 donations for a total of \$9,092.55 in total contributions since the program's inception in 2015.

OTHER BUSINESS:

Board Acknowledgement of Employee Wage Increases—The Board acknowledged annual wage increases for D. Fast and C. Pulk.

Governmental Relations Committee Report—Commissioner Barton had nothing to report since the monthly meeting would not occur until later in the week.

Financial Statement (F1's) Due Date Reminder—The General Manager offered another reminder of Commissioners F1's being due by April 15.

WASWD Spring Conference—The Washington Association of Sewer and Water Districts' Board will be determining whether or not to proceed with the Spring Conference. Staff will keep the Board informed accordingly.

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Wholesale Partner Operations Advisory Committee Meeting Report—The Wholesale Partner Operations Advisory Committee met on March 5. Rainier View, scheduled to take 1.5 million gallons a day (mgd) of water, has been using only 1 mgd for testing. They may sign an amendment to allow another Wholesale Partner(s) to buy the remaining 0.5 mgd on a temporary basis.

Commissioner Letter for Spring Newsletter—Commissioner Korsmo gave his approval of the draft Commissioner Letter for the Spring Edition of the District's quarterly newsletter, *The Pipeline*.

With no additional business to address, President Korsmo adjourned the meeting at 5:45 p.m.

**LAKESIDE WATER DISTRICT
BOARD OF COMMISSIONERS**

BY:

BY:

ITS PRESIDENT

ITS VICE PRESIDENT

BY:

ATTEST:

ITS SECRETARY

DISTRICT SECRETARY



murraysmith



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