CHAPTER 9

WATER USE EFFICIENCY PROGRAM

INTRODUCTION

The objectives of this chapter are to assess the development and implementation of the District's conservation program to promote efficient water use, in accordance with the conservation planning requirements.

CONSERVATION PLANNING REQUIREMENTS

The Washington Legislature passed the Water Use Efficiency Act of 1989 (43.20.230 RCW), which directed DOH to develop procedures and guidelines relating to water use efficiency. In response to this mandate, Ecology, the Washington Water Utilities Council, and DOH jointly published a document titled *Conservation Planning Requirements* (1994). In 2003, the Municipal Water Supply - Efficiency Requirements Act (Municipal Water Law) was passed and amended RCW 90.46 to require additional conservation measures. The Municipal Water Law, among other things, directed DOH to develop the Water Use Efficiency Rule (WUE Rule), which is outlined in the Water Use Efficiency Guidebook and became effective January 22, 2007. These documents provide guidelines and requirements regarding the development and implementation of conservation programs for public water systems. Conservation programs developed in compliance with this document are required by DOH and by Ecology as part of a public water system water right application. Conservation must be evaluated and implemented as an alternate source of supply before state agencies approve applications for new or expanded water rights. The third and most recent edition of the WUE Guidebook was released in January 2011.

The WUE Rule is an extension to the Conservation Planning Requirements and sets more stringent requirements for public water purveyors. The WUE Rule is comprised of four sections:

1. Planning requirements.
2. Distribution system leakage standard.
3. Customer goal setting.
4. Annual WUE reporting.

This rule requires additional conservation measures related to data collection and reporting, distribution leakage, metering, goal setting, and performance reporting.

PLANNING REQUIREMENTS

Under the WUE Rule, water systems are required to implement planning methods to forecast future demands and determine necessary measures to reduce usage and demand. Elements of the planning requirements include:

1. Data collection,
2. Demand forecasts, and
3. Selection and evaluation of WUE measures.

DATA COLLECTION AND REPORTING

The WUE Rule requires regular collection of production and consumption data. Data must be reported in the District's planning documents and annual performance report to DOH. Water use data will be used by the District for the following:

- Calculating leakage;
- Forecasting demand for future water needs;
- Identifying areas for more efficient water use;
- Evaluating the success of the District's WUE program;
- Describing water supply characteristics; and
- Aiding in decision-making about water management.

Both SPU and the District maintain meters at each of the normal delivery points from SPU. SPU bills the District based on SPU's meter readings.

For its own use, the District also keeps records of the amount of water delivered from SPU at the District Master Meters via the SCADA system. Per capita water use and peak day demand for the District is calculated using District Master Meter data. A summary of the District's water use data collection is presented in Table 9-1.

TABLE 9-1

Summary of Water Use Data Collection

Data Type	Unit of Measure	Collection Frequency	Comments
Water Service Connections	Number	Annual	Track by customer class.
Wholesale Water Purchased/ Source of Supply Meter Readings	CCF	Daily	SPU provides master meter readings monthly. District source meter readings are collected daily.
Wholesale Water Sold	Gallons	Daily	Bothell intertie tracked continuously.
Import/Export from Emergency Interties	Gallons	As Required	If un-metered, import/export is estimated.

TABLE 9-1 – (continued)

Summary of Water Use Data Collection

Data Type	Unit of Measure	Collection Frequency	Comments
Maximum Day Demand	Gallons	Monthly	Maximum day is determined from the SCADA system.
Maximum Month Demand	Gallons	Annual	Maximum month is determined annually from the SPU wholesale billing records.
Authorized Use	Gallons	Monthly	The sum of metered water sales, wholesale water, known unmetered water use (e.g., filling a 5,000-gallon water truck), and estimated unmetered water use (e.g., main flushing).
Distribution System Leakage	Gallons and Percent of Production	Monthly	The difference between master meter readings and accounted-for water.
Single-Family Service Meter Readings	Gallons	Monthly	Total water use by customer class for each billing period.
Multifamily Service Meter Readings	Gallons	Monthly	
Industrial/Commercial Service Meter Readings	Gallons	Monthly	
Population Served	Number of People	Update Annually	Estimated in Water System Plan
Economic Data	$	Annual	Review high, low, and average water bills and assure adequate utility revenues.
Conservation Data	Gallons per capita per day	Annual	Track per-capita water use and lost and unaccounted for water trends.

DEMAND FORECASTING

Demand forecasting is an essential element of planning. It provides a basis for comparison for growth and usage, and also helps in scheduling system improvements. For the purposes of the WUE Rule, forecasting is used in goal setting and measuring the success of the WUE program.

Complete demand forecasts are provided in Chapter 5 of this plan and these forecasts do not include anticipated reductions in use from conservation and efficient water use efforts.

WUE MEASURES

The WUE Rule requires the evaluation or implementation of water use efficiency measures to help meet the WUE goals. The WUE Guidebook states several measures that must be implemented or evaluated and provides a list of measures that can be counted as additional measures in the WUE program. WAC 246-290-810 identifies the minimum number of water use efficiency measures that must be evaluated based on system size. The District serves more than 50,000 customers and therefore must evaluate or implement twelve water use efficiency measures.

DISTRIBUTION SYSTEM LEAKAGE

The WUE Rule now requires that water distribution systems have a leakage rate less than 10 percent of finished water production. Distribution System Leakage (DSL) is all unauthorized uses, water system leakage, and any authorized uses the water system does not track (WAC 246-290-820(2)). Typical DSL sources include any water loss due to leaks, unauthorized uses such as illegal service connections, accounting errors, inaccurate source and customer meters, water leaving the system for unmetered and/or unestimated usage such as fire flows, and use by unmetered services. Unbilled consumption includes flushing water mains, fire flows, fire flow testing, or any other use by the District that is metered or can accurately be estimated.

The District's 3-year rolling average of DSL is low compared to many other water systems and is shown in Table 9-2. During the previous 8 years the District has put efforts into reducing DSL by fixing known leaks and replacing old water mains. The District also replaced all water meters from March 2010 to July 2011, which provides more accurate metering and could be the reason for the decrease in DSL from 2011 to 2012. It is the District's goal to continue to maintain a DSL of less than 5 percent for the 3-year rolling average.

TABLE 9-2

Distribution System Leakage

Year	Total Master Meter Flow[(1)] (MG)	Total Metered Consumption[(2)] (MG)	DSL		
			(MG)	Annual (%)	3-Year Average (%)
2006	1,935	1,943	-7.27	0	-
2007	1,912	1,879	32.8	1.7%	-
2008	1,826	1,824	2.08	0.1%	0.6%
2009	1,926	1,913	12.5	0.7%	0.8%
2010	1,791	1,755	35.9	2.0%	0.9%
2011	1,843	1,695	148.4	8.1%	3.6%
2012	1,833	1,767	66.6	3.6%	4.6%
2013	1,860	1,824	35.8	1.9%	4.5%

(1) Total Master Meter Flow from Table 5-3.
(2) Total Metered Consumption from Table 5-8.

SOURCE AND SERVICE METERING

The WUE Rule requires all sources and customer service connections be metered by 2017. The District currently meters all sources and customers and is; therefore, in full compliance with this requirement. All new sources and customers will also be metered.

GOAL SETTING AND PERFORMANCE REPORTING

The District must set water use efficiency goals and report progress annually. The annual report must include:

- Total source production.
- Distribution system leakage in percentage and volume.
- Goal description, schedule, and progress toward meeting goals.

Goals must include a measurable outcome, address water supply or demand characteristics, and include an implementation schedule. The goal setting process must be held through a public forum and be reevaluated every 6 years. Annual reports must be available to the public and submitted to customers and DOH. Annual reports were first due July 1, 2008, and have been due each year thereafter.

WATER USE EFFICIENCY PROGRAM DEVELOPMENT AND LEVEL OF IMPLEMENTATION

The following sections describe the District's water use efficiency goals, a description of the conservation measures, and the resulting water use projections.

WATER USE EFFICIENCY GOALS

The District plans to promote water use efficiency by the following supply side and demand side goals.

The first goal of the water use efficiency program is to maintain the DSL below 5 percent for the 6-year period. The District currently has a 3 year rolling average DSL of 4.5 percent of the water produced and is below the requirement set by DOH in the WUE Rule. The District will continue to minimize the amount of DSL and accurately track all water used including estimating the amount of water used for distribution system flushing.

The second goal of the water use efficiency program is to promote wise customer water use to achieve the collective water savings goal put forward by the Saving Water Partnership (SWP). The District is a member of the SWP which is a group of 19 local water utilities who collaborate together with the common goal of saving water. The SWP

has many education programs and rebates to promote conservation to their customers. The regional water use efficiency goal of the SWP is to reduce the per capita use from current levels so that the average annual retail water use of the members of the SWP is less than 105 mgd from 2013 to 2018, despite the forecasted population growth. The District held a public meeting and adopted this as their WUE goal with Resolution No. 2013-08-02. In 2013, the SWP had an implementation cost of 2.2 million dollars and met the goal by using a total of 93.1 mgd among the SWP entities. It is the District's goal to maintain current levels of per capita usage and DSL to meet the goals of the SWP and to continue to be a good steward in the region.

EVALUATION AND SELECTION OF WATER USE EFFICIENCY MEASURES

Mandatory Measures

Source and Service Metering

All sources (master meters) are metered by SPU. In addition, all but one of the source connections are also metered by the District. The connection to SPU's Maple Leaf Pipeline is not metered by the District because it is only used as an emergency source. All existing customer service connections are metered, and all future service connections will be metered. The District's meter maintenance program replaces older meters as necessary and repairs larger meters periodically.

Leak Detection and Water Accounting

The District conducts leak detection annually that focuses on areas of the water system with older piping or suspected leaks. Only a few leaks tend to be discovered, and those are corrected by maintenance staff.

Customer Education

The District promotes the conservation program in several ways. Customer's bills include a newsletter that addresses conservation issues. The annual consumer confidence report includes conservation tips and ways for customers to find additional information. The District's website (www.nud.net) includes a discussion on the virtues of conservation and provides links to other websites that promote conservation. The website provides advice about indoor and outdoor conservation, composting, purchasing and use of rain barrels, and how to use many free water saving devices. The SWP website is also a thorough resource for customer education.

In 2013, the SWP piloted classroom presentations in schools, and NUD sponsored five classroom presentations, reaching 125 students. In 2014, NUD sponsored 39 classroom presentations, reaching 1,062 students. At the local level, the District sponsors various local conservation and environmental events, like the Kirkland Summerfest, Evergreen Hospital Earth Day, Green Home Tar – Sustainability Stop, Finn Hill Neighborhood

Association Dennyfest, and Kenmore Music in the Park. At these events, the District provides conservation information and conservation equipment like faucet aerators and reduced flow showerheads. The District's monthly newsletter also carries articles about various conservation practices.

Conservation Pricing

The District sets its service rates to promote water conservation. Besides the inclining block rates for water, the District began charging for sewer services based on water consumption in 2004. The service rates in Table 9-3 below are based on consumption and the description of each customer class can be found in Chapter 11.

TABLE 9-3

Inclining Water Service Rates

	Tier 1		Tier 2		Tier 3	
Class	**CCF**	**$/CCF**	**CCF**	**$/CCF**	**CCF**	**$/CCF**
8	0 to 10	$3.00	10 to 20	$4.00	Above 20	$5.00
9	0 to 10	$3.00	10 to 20	$4.00	Above 20	$5.00
10	0 to 10	$3.00	10 to 20	$4.00	Above 20	$5.00
11	0 to 10	$3.00	10 to 20	$4.00	Above 20	$5.00
12	0 to 10	$3.00	10 to 20	$4.00	Above 20	$5.00
13	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
14	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
15	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
16	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
17	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
18	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00
19	0 to 10	$3.50	10 to 20	$3.75	Above 20	$4.00

Reclaimed Water

The Brightwater Treatment system began operations in 2012 and is capable of producing 21 mgd of Class A reclaimed water. The backbone of a reclaimed water transmission system could provide the District a point of withdrawal for reclaimed water. Due to the high cost of building infrastructure for reclaimed water, the District found it is not cost effective to create a water reuse utility and construct the necessary transmission, distribution, storage, and metering facilities necessary to operate a water reuse utility. A detailed analysis is provided later in this Chapter.

Supplemental Measures

Water Saving Devices

The District provides many free water savings devices to all customers upon request. These devices include toilet leak detection tablets, toilet tank displacement bags, faucet aerators, shower timers, low flow shower heads, and rain gauges.

Bill Showing Consumption History

Each customer bill provides a bar chart identifying the customer's previous two years of water usage. This feature allows the customer to compare usage to the same billing period from the previous year. If a leak is suspected, the bill will include a comment stating that the customer should check for a possible leak. Customer account information, including historical use, is also available via the District's website.

Summary

Based on the District's number of connections, they must implement or evaluate 12 measures. Table 9-4 provides a summary of measures that NUD is implementing and showing that NUD exceeds the number of measures required. Customer classes affected were determined based on the 12 District customer classes that are metered residential and non-residential. Customer classes affected exclude the emergency use, wholesale water, and fire protection customer classes.

TABLE 9-4

Water Conservation Measures

Measure for Implementation	Customer Classes Affected
Water Saving Devices	12
Inclining Block Rates	12
Bills Showing Consumption History	12
Leak Detection	12
Education	12
Total	**60**

TARGET WATER USE

Table 9-5 provides the projected annual water demand and expected water savings with the conservation measures in place. The District is committed to the goals of the Saving Water Partnership. The SWP has a 6-year goal of reducing the usage from current levels to a region wide 105 mgd for all 19 participating utilities. The SWP program implementation cost in 2013 was $2.2 million and through the programs efforts, the water consumption between these 19 utilities was reduced to 93.1 mgd in 2013, which already

exceeds the goal. In 2014, the SWP had an implementation cost of $1.6 million and met the goal by using a total of 93.8 mgd among the SWP entities. The projected water demand in Table 9-5 is the same as Chapter 5. The amount of unused purchased water is projected to be 2.10 mgd in 2024, or 24.5 percent of the purchased flow.

TABLE 9-5

Projected Water Use with Conservation

Year	Water Purchased	Water Demand	Unused Purchased Water
2014	8.55	5.58	2.97
2015	8.55	5.66	2.89
2016	8.55	5.75	2.80
2017	8.55	5.84	2.71
2018	8.55	5.93	2.62
2019	8.55	6.02	2.54
2020	8.55	6.10	2.45
2021	8.55	6.19	2.36
2022	8.55	6.28	2.27
2023	8.55	6.37	2.18
2024	8.55	6.45	2.10

(1) Projected Average Day Demand from Table 5-15.

SOURCE OF SUPPLY ANALYSIS

OPTIMIZING USE OF CURRENT SUPPLIES

The District has increased the efficiency of its water system in the past 10 years by reducing the average water consumption and reducing the rate of DSL. The District plans to continue these efforts to further optimize the current water supply. Without any improvement in water use efficiency, the District has sufficient water to supply its customers beyond 2034 as shown in Chapter 5.

ENHANCED CONSERVATION MEASURES

As technology for water leak detection and repair advances and as more water efficient building fixtures and appliances become more standard, water conservation will be enhanced by implementation of standard building codes and replacement of aging fixture and appliances with newer, more water efficient units. The SWP offers rebates to customers of the District for replacing some fixtures with more efficient units

POTENTIAL FOR WATER REUSE

INTRODUCTION

This section presents a brief analysis of the potential for reuse within the District boundary. Use of reclaimed water is an alternative to wastewater treatment plant effluent disposal. The production and beneficial use of reclaimed water is the development of a new usable water supply. In addition to minimizing the environmental impacts of wastewater disposal, water reuse can address problems associated with diminishing potable water supplies and acquiring new water rights. In the state of Washington, any type of direct beneficial reuse of municipal wastewater is defined as water reuse or reclamation. *Water Reuse and Reclamation Standards* have been issued jointly by the Departments of Health and Ecology.

KCDNR produces Class A reclaimed water at the Brightwater Treatment Plant (Brightwater). Class A reclaimed water treatment is a side stream off the membrane bioreactor and disinfection; the reclaimed water is treated separately from the Brightwater effluent to be disposed of via the outfall to Puget Sound. A dedicated 27-inch pipeline from the Brightwater site in Snohomish County will be able to convey up to 21 mgd of reclaimed water (*Brightwater Facility Plan*, May 2005) when fully operation. The reclaimed water is conveyed to three main distribution points via:

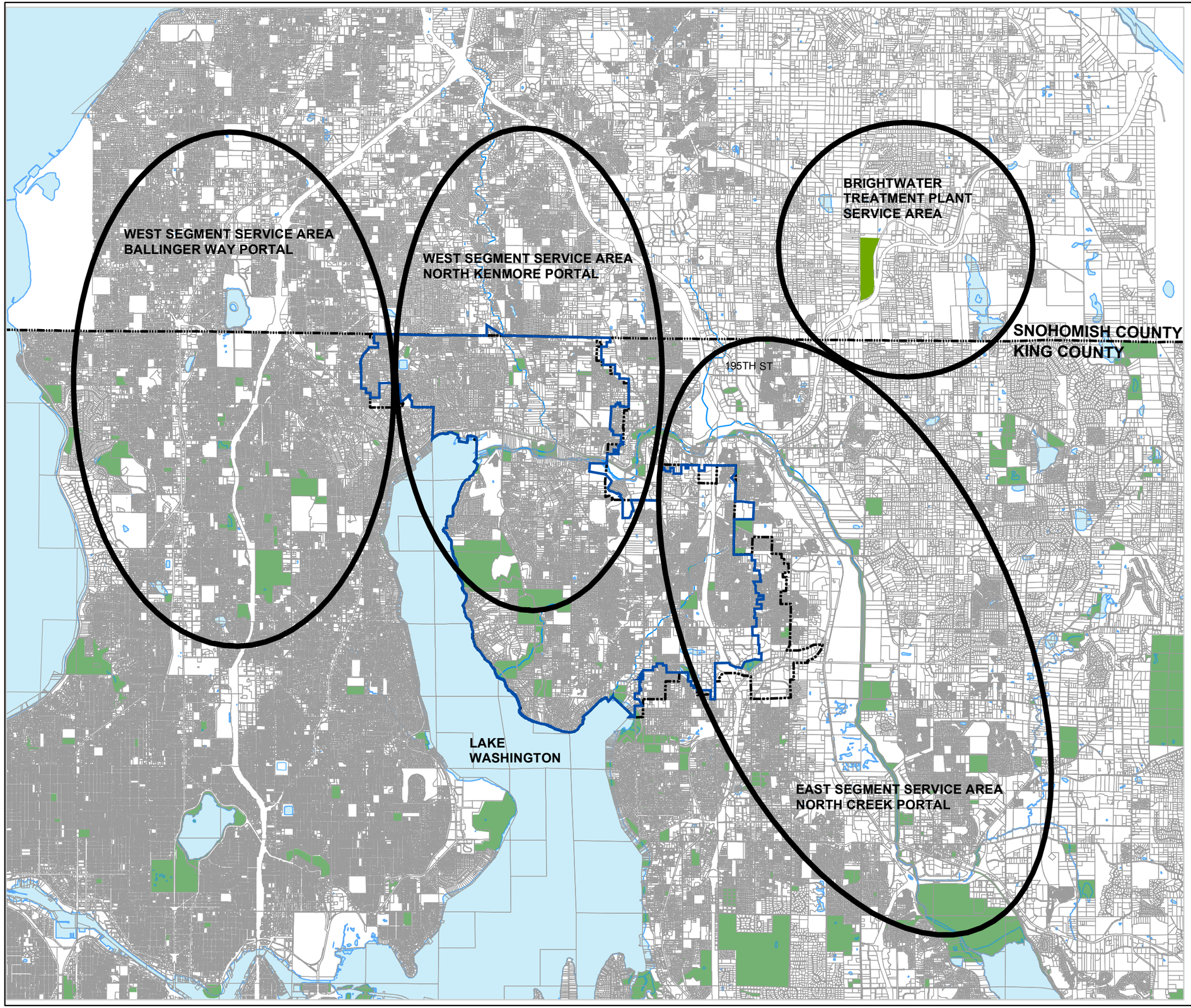
- A 27-inch pipeline from the Brightwater site to the North Creek Portal.
- A 20-inch pipeline from the Northcreek Portal to the North Kenmore Portal.
- Two 14-inch pipelines from the North Kenmore Portal to the Ballinger Way Portal.

The reclaimed water service areas are displayed on Figure 9-1; the pipeline alignment and distribution portals are displayed on Figure 9-2. At each of these portals, the reclaimed water is brought to the surface for distribution. When reclaimed water comes online, Brightwater will initially be capable of 7 mgd.

PERMITTED USES OF RECLAIMED MUNICIPAL WASTEWATER

Allowable water reuse methods of Class A reclaimed water include:

- Irrigation of Non-Food Crops
- Spray Irrigation of Food Crops
- Surface Irrigation
  - Food crops where there is no reclaimed water contact with edible portion of crop
  - Root crops



N

0 3,500 7,000 14,000
Feet

LEGEND:

- CORPORATE BOUNDARY
- COUNTY LINE
- RETAIL SERVICE AREA (INCLUDING RETAIL SERVICE AREA BY AGREEMENT)
- POTENTIAL REUSE SITES

SOURCE: KING COUNTY GIS

NORTHSHORE UTILITY DISTRICT
WATER SEWER

WATER SYSTEM PLAN

FIGURE 9-1
BRIGHTWATER RECLAIMED WATER
SERVICE AREAS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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BRIGHTWATER TREATMENT PLANT

NORTH KENMORE PORTAL

BALLINGER PORTAL

SNOHOMISH COUNTY
KING COUNTY

2-14" DIA. RW

20" DIA. RW

27" DIA. RW

NORTH CREEK PORTAL

NORTH CREEK PUMP STATION

Kenmore Junior High

Wallace Swamp Creek Park

Kenmore Elementary School

Kenmore Elementary School

NE 190TH ST.

NE 202ND ST

SWAMP CREEK

80TH AVE NE

88TH AVE NE

195TH ST

68TH AVE

Glacier Northwest Concrete Plant

BOTHELL WAY

Bothell Senior High School

King County Parks

SAMMAMISH RIVER

NE 170TH ST.

City of Kenmore Park

Inglewood Golf Club

SIMONDS RD

Inglemoor High School

I-405

104TH AVE NE

NE 145TH ST.

St. Edwards State Park

Bastyr University

LAKE WASHINGTON

JUANITA DR

84TH AVE NE

100TH AVE NE

124TH AVE NE

Big Finn Hill Park

Finn Hill Junior High

JUANITA CREEK

NE 132ND ST

HOLMES PT DR

DENNY CREEK

Denny Park

NE 116TH ST

JUANITA BAY

N

0 2,000 4,000 8,000 Feet

LEGEND:

- CORPORATE BOUNDARY
- COUNTY LINE
- POTENTIAL REUSE SITES
- RECLAIMED WATER DISTRIBUTION SYSTEM
- TUNNEL WITH RECLAIMED WATER (RW) PIPELINE

SOURCE: KING COUNTY GIS

NORTHSHORE UTILITY DISTRICT
WATER SEWER

WATER SYSTEM PLAN

FIGURE 9-2
POTENTIAL SITES FOR WATER REUSE

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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  - Orchards and vineyards
  - Food crops that undergo physical or chemical processing sufficient to destroy all pathogenic agents
- Landscape Irrigation
  - Restricted access areas (e.g., cemeteries, freeway landscaping)
  - Open access areas (e.g., golf courses, parks, playgrounds, etc.)
- Impoundments
  - Landscape impoundments
  - Restricted recreational impoundments
  - Non-restricted recreational impoundments
- Fish Hatchery Basins
- Decorative Fountains
- Flushing of Sanitary Sewers
- Street Cleaning
  - Street sweeping, brush dampening
  - Street washing, spray
  - Washing of corporation yards, lots, and sidewalks
- Dust Control (Dampening Unpaved Roads, Other Surfaces)
- Dampening of Soil for Compaction (Construction, Landfills, etc.)
- Water Jetting for Consolidation of Backfill Around Pipelines
- Fire Fighting and Protection
  - Dumping from aircraft
  - Hydrants or sprinkler systems in buildings
- Toilet and Urinal Flushing
- Washing Aggregate and Making Concrete
- Industrial Boiler Feed
- Industrial Cooling
- Industrial Process

Most of these methods provide limited potential for use in the District due to the relatively small quantities and seasonal nature of the reuse method. Two reuse methods that offer the potential for 100 percent reuse on a year-round basis are groundwater recharge and stream flow augmentation. A more detailed discussion of groundwater recharge and stream flow augmentation is provided.

Groundwater Recharge

Groundwater recharge using reclaimed water is permitted under the water reuse standards. Three categories of groundwater recharge are covered in the water reuse standards:

- Direct injection to a drinking water aquifer

- Direct injection to a non-drinking water aquifer

- Surface percolation

Since the District does not rely on groundwater as a source of supply, direct injection of reclaimed water to a drinking water aquifer is not discussed in detail. Direct injection of reclaimed water to a non-drinking water aquifer must be Class A reclaimed water treatment standards as well as the following additional criteria:

$BOD_5 \leq 5$ mg/L
TSS $\leq$ 5 mg/L
Any additional criteria deemed necessary by DOH or Ecology

Groundwater recharge using surface percolation must be at least Class A reclaimed water. In addition to secondary treatment to provide oxidized wastewater, the process must include a "step to reduce nitrogen prior to final discharge to groundwater." Treatment of the Class A reclaimed water is done at the Brightwater site in Snohomish County. Reclaimed water treatment consists of advanced secondary treatment with a membrane bioreactor, which combines activated sludge secondary treatment and a microfiltration membrane. The MBR system is designed for complete nitrification.

Streamflow Augmentation

For small streams where fish habitat has been degraded due to low instream flows, stream flow augmentation is an alternative that is allowed under the water reuse regulations and standards. This reuse method still requires an NPDES permit and adherence to the surface water quality standards (WAC 173-201A). However, the key difference between stream flow augmentation and surface water disposal is that a determination of beneficial use has been established based on a need to increase flows to the stream. To make this determination requires concurrence from WDFW that the need exists for additional instream flows.

Other Uses

The water reuse standards allow for a number of other uses that are not discussed in detail here. However, the general basis for the reuse criteria is that when unlimited public access to the reclaimed water is involved, the criteria requires Class A reclaimed water. The use of reclaimed water for agricultural purposes is allowed under the water reuse standards, including food crops, as proper setback distances are employed. These setback distances are discussed in the next section.

REUSE AREA REQUIREMENTS

The water reuse standards establish criteria for siting and identifying water reclamation projects and their facilities. Water reclamation storage facilities, valves, and piping must be clearly labeled, and no cross-connections between potable water and reclaimed water

lines are allowed. A key area requirement for a water reclamation project is setback distance. Table 9-6 summarizes setback requirements for water reclamation facilities.

TABLE 9-6

Setback Distances for Class A Reclaimed Water in the State of Washington

Reclaimed Water Use/Facility	Distance (Feet)
Minimum Distance to Potable Water Well:	
Spray or Surface Irrigation	50
Unlined Storage Pond or Impoundment	500
Lined Storage Pond or Impoundment	100
Pipeline	50
Minimum Distance between Irrigation Area and Public Areas	0

KCDNR BRIGHTWATER TREATMENT PLANT AND RECLAIMED WATER PLAN

King County Department of Natural Resources (KCDNR) has identified general areas in King County for the potential use of reclaimed water. KCDNR has primarily identified areas with high irrigation needs that could potentially use reclaimed water to substitute for potable quality water supply, including schools, athletic fields, public parks, and golf courses. The District has identified potential users within the District consistent with the areas KCDNR has identified; identified areas within the District are labeled on Figure 9-2, and the proximity of the distribution portals can be seen on the figure. KCDNR has divided the potential reclaimed water service area into an East Segment and two West Segments served by the different distribution portals. The potential reclaimed water service areas are identified on Figure 9-1. The District primarily lies within the West Segment and would be served by the North Kenmore Portal.

The peak day reclaimed water demand for the total potential reclaimed water service area within King County is projected to be 21 mgd. Table 9-7 presents the projected peak day reclaimed water demand for the east and west segments and corresponding portal service areas.

TABLE 9-7

KCDNR Projected Peak Day Reclaimed Water Demand

East Segment	
Influent Pump Station	0.8 mgd
North Creek Portal Service Area	8.2 mgd
West Segment	
North Kenmore Portal Service Area	4.5 mgd
Ballinger Way Portal Service Area	7.5 mgd
Total East and West Segment	**21 mgd**

Source: *Brightwater Facility Plan*, Appendix J, May 2005.

The potential peak day demand for the North Kenmore Portal Service Area identified by KCDNR is 4.5 mgd. The North Kenmore Portal Service Area is planned to be served by a reclaimed water pump station at Brightwater; the reclaimed water pump station is scheduled for implementation in Phase 2. Initial demands for the East Segment is met by gravity flow from Brightwater to the customers. The phased gravity and pump flow approach outlined by KCDNR in the *Brightwater Facilities Plan* (May 2005) is presented in Table 9-8.

TABLE 9-8

Reclaimed Water System Capacity

	Service Area	Capacity (mgd)
Gravity Flow	Initial East Segment	7.0
Phase 1	Future East Segment	9.0
Phase 2	Future East Segment, and North Kenmore Portal Service Area	13.5
Phase 3	Future East Segment, North Kenmore, and Ballinger Way Portal Service Areas	21.5

Source: *Brightwater Facility Plan*, Appendix J, May 2005.

POTENTIAL FOR IRRIGATION WATER REUSE

Reclaimed water could be used for irrigation and landscape purposes. The District has an annual average rainfall of approximately 38 inches. Due to the significant amount of rainfall during winter months, reclaimed water could be used for irrigation only during the summer. Many of the parks within the District are heavily treed and are not irrigated; however, there are several athletic and play fields at schools and the public parks. The public areas that irrigate and could potentially use reclaimed water identified by the District are indicated on Figure 9-2. Privately owned business that potentially could use reclaimed water have also been identified based on photos. Bastyr University and the Inglewood Golf Club are identified as areas that could potentially use reclaimed water for

irrigation purposes. However, Inglewood Golf Club currently has the right to draw water from Lake Washington to meet irrigation demands, and have expressed no interest at this time in purchasing reclaimed water. GMN Farms, located west of Bothell High School, has also been identified from photos; although, based on water billing records, GMN Farms is not a significant commercial water user. The peak day reclaimed water usage rates for irrigation demands are presented in Table 9-9. The peak day reclaimed water usage rate for irrigation purposes assumes a typical irrigation rate of 14 inches per year, irrigation for four months per year, and a peak day factor of two.

TABLE 9-9

Potential Uses for Reclaimed Water

Irrigation/Landscaping Use[1]	**Area (acre)**	**Annual Usage (MG/year)**	**Peak Day (gpd)**
Public Parks	43	16.2	133,000
Public Schools	33	12.5	103,000
Private Businesses[2]	84	31.9	262,000
Industrial Use		**Annual Usage (MG/year)**	**Peak Day (gpd)**
Glacier Concrete Northwest[3]		0.08	715
Jetting of Sewer Lines	**Length (lf)**	**Annual Usage (MG/year)**	**Peak Day (gpd)**
	360,000	1.4[4]	5,700[5]
Total Potential Reclaimed Water Usage		**62**	**504,000**

(1) Based on a typical irrigation rate of 14 inches per year over the period of 4 months (from mid-May to mid-September).
(2) Includes Bastyr University and Inglewood Golf Club.
(3) Based on water billing records.
(4) Assumes 30 percent of the District's sewers (360,000 lineal feet) are flushed per year at a rate of 4,000 gallons per 1,000 lineal feet.
(5) Assumes 180 lineal feet per hour are flushed for eight hours a day using 4,000 gallons of reclaimed water per 1,000 lineal feet of sanitary sewer.

POTENTIAL FOR INDUSTRIAL WATER REUSE

In addition to irrigation, industries within the District that might have a use for reclaimed water have been investigated. These include the significant industrial water users of the District.

The Glacier Northwest Ready-Mix Concrete Plant in Kenmore is one of the few significant industrial water users within the District with the potential to use reclaimed water. The Glacier Northwest Kenmore facility currently reuses all the water they produce and collects and treats storm water to meet nearly all their water demands. However, during the summer months, when the demand for concrete is high, Glacier Northwest must purchase water from the District to augment the amount it collects from

storm water (minimal). In May and June of 2005, the Glacier Northwest Kenmore facility purchased an average of 711 gpd. In July and August of 2005, Glacier Northwest purchased an average water use of 664 gpd.

Water billing records report a total of approximately 85,000 gallons were billed to the Glacier Northwest Kenmore facility for the period from May through August. Notably, the summer water use for 2005 was a maximum for the years 1998 through 2005. Excluding May 2005 through October 2005 (when the water use rate was very large), the average water consumption rate over the remaining time period from January 2000 through March 2005 was approximately 6 gpd. Apparently, in 2005 there was a very large demand for concrete. If this demand continues to increase or remains similar to that in 2005, and the total costs of reuse water treatment and delivery are determined to be cost-effective and acceptable, then the Glacier Northwest Kenmore facility could be a future candidate for water reuse. A peak day reclaimed water demand is presented in Table 9-8. The value is based on the summer water use (May through August) for 2005.

JETTING OF SANITARY SEWER LINES

One possible application of reclaimed water by the District could be to jet (clean) the sanitary sewer lines. The District's current rate of sanitary sewer flushing is 180 lineal feet per hour. Assuming 250 working days per year and an 8-hour work day, the District could flush approximately 30 percent (360,000 lineal feet) of the total sanitary sewer system per year. At a typical flushing rate of 4,000 gallons per 1,000 lineal feet of sewers, a total of 1.4 million gallons of water per year is required for sanitary sewer flushing. The peak day reclaimed water demand for sanitary sewer flushing is 5,700 gpd. However, without a reclaimed water distribution system in place throughout the District, and the significant costs required to develop such a distribution system for sewer flushing alone, reclaimed water use for this use does not appear cost-effective at this time.

FEASIBILITY OF RECLAIMED WATER

Should the District decide to develop a reclaimed water distribution system derived from Brightwater, the reclaimed water could be accessed at the North Kenmore Portal. A distribution system from the North Kenmore Portal to the potential reclaimed water customers is displayed in Figure 9-2. The distribution system outlined in Figure 9-2 totals 43,700 lineal feet. Assuming all 8-inch piping, a reclaimed water distribution system would cost approximately $6,555,000 based on a unit cost of $150 per lineal foot ($90/lf piping + $40/lf surface restoration + $20/lf overhead). This cost does not include ancillary costs to the project such as permitting, easement acquisition, and environmental mitigation. Additional operation and maintenance costs would also be incurred.

The District has determined at this time that Brightwater reclaimed water is not a cost-effective alternate water source for its potable and non-potable water customers, nor is it a feasible option for District sewer flushing. The District's existing contract with SPU provides sufficient potable water supply to meeting existing and future demands, in

addition to constituting a significant financial investment by the District and its ratepayers. Consequently, the District does not currently have sufficient need or cost-justification to develop and manage a reclaimed water distribution system. The District will, however, continue to evaluate the feasibility of reclaimed water for its customers pursuant to its water system planning requirements, SPU's water supply situation, and as new information regarding its costs, demands, and potential customer uses evolves over time.