

CHAPTER 7

WATER USE EFFICIENCY PROGRAM

OBJECTIVE

The objectives of this Chapter are to identify the conservation and water use efficiency requirements pertaining to the District, evaluate past conservation efforts, and describe the District's water use efficiency program for the next 6 years.

WATER USE EFFICIENCY RULE BACKGROUND

The Washington Legislature passed the Water Use Efficiency Act of 1989 (43.20.230 RCW), which directs Department of Health (DOH) to develop procedures and guidelines relating to water use efficiency. In response to this mandate, Department of Ecology (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 (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 and efficiency programs for public water systems. Conservation and efficiency programs developed in compliance with these documents 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.

As an extension to the *Conservation Planning Requirements*, the WUE Rule sets more stringent requirements for public water purveyors. The WUE Rule is comprised of eight chapters:

1. Introduction to Water Use Efficiency Requirements
2. Water Meters
3. Data Collection
4. Demand Forecasting
5. Water Use Efficiency Program
6. Distribution System Leakage
7. Goal Setting and the Public Forum
8. Annual Performance Report

The following sections provide a discussion of chapters, requirements, and the impact the WUE Rule has on the District.

WATER USE EFFICIENCY REQUIREMENTS

The *Water Use Efficiency Guidebook* establishes varying implementation and evaluation requirements for municipal water suppliers (MWS). The new requirements focus on the importance of measuring water usage and evaluating the effectiveness of the WUE program. There are three fundamental elements to the Rule, including planning, distribution leakage standards, and goal setting and performance reporting.

Table 7-1 provides a summary of the WUE Rule deadlines applicable to the District.

TABLE 7-1

Summary of WUE Rule Deadlines

Requirement	Deadline for MWS with 1,000 or more connections
Meet distribution leakage standard (based on 3-year rolling average)	July 1, 2010, or 3 years after installing all service meters
Complete installation of all service meters	January 22, 2017

WATER METERS

Metering all water production and consumption is critical for determining system wide and individual water use efficiency. The WUE Rule sets deadlines for meter installation and data collection. As Table 7-1 indicates, the WUE Rule requires production meters on all existing and new water sources, and requires consumption meters on all customer connections by 2017. The District meters all existing customer connections and will meter all new connections, and therefore is in full compliance with consumption metering requirements.

Currently, the District's entire supply is provided by the City of Everett (Everett). Flow is provided to the western part of the District through two master meters and two flow control meters. The District's 715 East Zone receives all its water from Everett through numerous interties, none of which are metered. Due to periodic service area transfers in the 715 East Zone and the number of interties, there are no plans to install master meters within that zone. Production and consumption in the 715 East Zone are totaled from customer service meter readings.

The District also has four emergency interties with the Alderwood Water & Wastewater District (AWWD). As described in WAC 246-290-132(4), emergency interties are exempt from metering requirements. A detailed description of the water system is provided in Chapter 1.

DATA COLLECTION

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 for the following:

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

The WUE Rule set requirements for collecting source and service data. Source meters must be read monthly and reported as monthly and annual totals. Service meter totals only have to be reported in annual amounts, although it is recommended to read all service meters every one to two months. The District reports monthly and annual water produced, annual water consumed, annual totals for each customer class, and customer class seasonal variations.

The District has established five customer classes: single-family residential, multi-family residential, commercial/industrial/institutions, schools, and irrigation. By separating customers into different categories, the District tracks the effects of their WUE program and conservation more accurately.

WATER SUPPLY CHARACTERISTICS

The District receives its water supply from the City of Everett. Supply is metered at the master meters on Casino Road and Mukilteo Boulevard and flow control meters on 100th Street and 112th Street. The 715 East Zone only has individual consumption meters due to the number of intertie connections to Everett.

DISTRIBUTION SYSTEM LEAKAGE

The *Conservation Planning Requirements* set the maximum allowable rate of lost and unaccounted for water at 20 percent of total source production. The WUE Rule requires that water distribution systems have a leakage rate of less than 10 percent of finished water production. Distribution system leakage (DSL) is defined as all unaccounted for water that entered the distribution system, including reservoirs. Known or credibly estimated losses can be excluded from the leakage calculation and may include uses such as construction, fire fighting, and flushing.

Distribution system leakage for the District equals the difference between the volumes measured at the District's master meters and flow control meters, and the volume

measured at customer meters. Production and consumption volumes for the 715 East Zone are taken as the volume measured by customer meters and added to the totals for the rest of the distribution system.

Table 7-2 provides annual data of distribution system leakage, including the 715 East Zone, from 1998 to 2008 and Figure 7-1 provides a graphical illustration of the data.

TABLE 7-2

District Distribution System Leakage Summary

Year	Production (gallon)	Consumption (gallon)	Distribution System Leakage		
			Gallons	Annual %	3-yr Rolling Average
1998	926,098,650	850,830,557	75,268,093	8.13%	-
1999	822,002,810	776,345,406	45,657,404	5.55%	-
2000	852,095,940	784,062,681	68,033,259	7.98%	7.2%
2001	785,278,730	713,924,445	71,354,285	9.09%	7.5%
2002	798,144,160	761,336,746	36,807,414	4.61%	7.2%
2003	943,271,710	823,409,774	119,861,936	12.71%	8.8%
2004 ⁽¹⁾	451,481,000	449,539,000	1,942,000	0.43%	5.9%
2005	767,203,000	754,932,701	12,270,299	1.60%	4.9%
2006	821,542,000	789,884,287	31,657,713	3.85%	2.0%
2007	782,480,356	777,955,132	4,525,224	0.58%	2.0%
2008	744,184,000	745,373,631	-1,189,631	-0.16% ⁽²⁾	1.4%

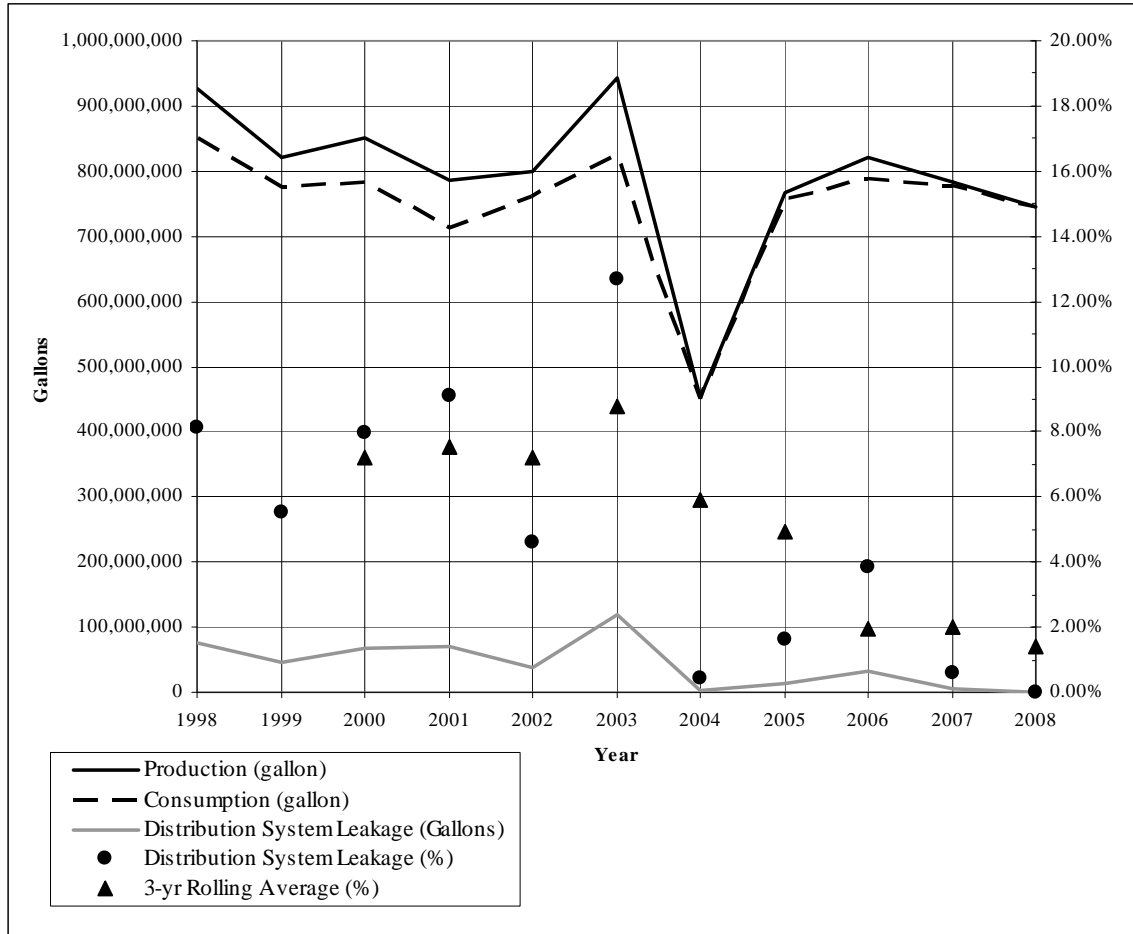
(1) Production and consumption data for July through December only, due to missing production data.

(2) AWWA Meter Standards/District to calibrate source meters

As shown in Table 7-2 and Figure 7-1, the District has historically been well below the 10 percent distribution system leakage requirement. This is primarily due to monitoring customer accounts for unusual usage, which may indicate leaks, and conducting annual leak detection surveys throughout the distribution system. With a current three-year rolling average of 1.4 percent, the District is in full compliance with DOH requirements. Low production and consumption values for 2004 were the result of the loss of several months of production data due to a change in billing software. Due to the negative DSL result in 2008, the District plans to test production meters in 2009 to ensure accuracy.

FIGURE 7-1

Distribution System Leakage Summary



WATER USE EFFICIENCY PROGRAM

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

REGIONAL CONSERVATION PROGRAM

As a purveyor to over 30 water systems, both large and small, the City of Everett has established the Everett Water Utilities Committee (EWUC) to help advise the City Council regarding the planning, financing and implementation for future major capital improvements to the Everett’s water system, which affects water service to regional customers outside the City, including but not limited to determination of service areas, location, sizing, and other technical input regarding filtration facilities.

EWUC strives to coordinate the interests and efforts of the wholesale customers and Everett. One way of doing so is by developing and implementing a conservation program that wholesale customers can participate in.

As a member of the EWUC, the District has historically participated in the regional conservation program developed by Everett in order to cooperate with regional conservation efforts.

PAST AND PRESENT PROGRAMS

The District chose to adopt Everett's regional conservation plan in the District's *Water System Comprehensive Plan (2003)*. The plan included several goals, which are summarized in Table 7-3.

TABLE 7-3

EWUC Conservation Plan Goals

Goal	Objective
Minimizing the Cost of Water	<ul style="list-style-type: none">• Reduce peak day demand• Defer capital costs• Capture low-cost savings
Meeting Regulatory Requirements	<ul style="list-style-type: none">• Address current regulations• Anticipate future regulations• Demonstrate good management
Reduce Stream Impacts	<ul style="list-style-type: none">• Promote efficiency• Increase water for fish• Benefit ESA and other issues
Preserving Water Rights	<ul style="list-style-type: none">• Promote efficiency• Benefit the environment• Demonstrate good stewardship

The District utilizes resources provided by Everett to help meet these goals. Several are additional measures that the District implements on their own, and several of the measures implemented by the District are supported by Everett through the EWUC program. The following sections detail these measures.

DISTRICT MEASURES

CUSTOMER LEAK SURVEYS

The District monitors customer accounts in an effort to identify leaks. There are several methods used for identifying potential leaks:

- If District staff observe a high read during meter readings, they check if the meter is running at the time, which indicates a possible leak.
- Billing software flags accounts using variance percentages compared to the previous year's bill.
- District staff reviews accounts flagged by the billing software and has some accounts rechecked.

If a potential leak is identified, a letter from the District is sent to the customer in an effort to alert the customer to the condition and repair the leak. In the first four years of this program, the District found 246 customer leaks. Letters were sent to the customers notifying them of their possible leak. A follow up with these customers revealed that 152 of the leaks were fixed, saving an estimated 18 million gallons (MG) per year. In the first half of 2007, the District monitored 70 accounts with high consumption and found 25 leaks. Assuming all 25 leaks were repaired, the resulting savings were 3 MG per year, based on the average savings per leak from the leaks found between 1998 and 2002. Table 7-4 summarizes results of customer account leak detection.

TABLE 7-4

Customer Leak Detection Results

Year	Accounts Monitored	Leaks Detected	Leaks Repaired	Savings (MG)	Savings per Leak	
					gpd ⁽¹⁾	MG/yr
1998-2003	465	246	152	18	324	0.12
2004	112	53	22	3	324	0.12
2005	112	74	21	3	324	0.12
2006	113	69	25	3	324	0.12
2007	70	54	25	3	324	0.12
2008	141	82	30	3.55	324	0.12

(1) gpd = gallons per day

DISTRIBUTION SYSTEM LEAK SURVEYS

The District has contracted with a leak detection firm to perform leak detection surveys on over 130 miles of water mains since 1997. The contractor provides estimates of the magnitude of leaks. Water loss estimated is typically 25 to 50 percent greater than what District personnel estimated leaks at during repair. Nineteen leaks have been detected to date, resulting in a savings of over 27 MG per year by District estimates. Table 7-5 summarizes results of these surveys.

TABLE 7-5

Distribution System Leak Detection Survey Results

Year	Miles surveyed	Leaks repaired	Savings	
			gpm	MG/yr
1997-2002	30	6	25	13.1
2003	15.9	2	4	2.1
2004	17.5	4	20	10.5
2005	16.4	4	2.4	1.2
2006	24.2	1	0.4	0.2
2007	16.4	1	0.5	0.3
2008	12.9	1	0.5	0.3
Total	133.3	19	52.8	27.8

BLOWOFF REPLACEMENT PROGRAM

From 2006 to 2008, the District worked to replace over 25 blowoff assemblies identified as leaking. The District estimates that replacement stopped 17 gpm in leaks per blowoff, or a total of 8.9 MG per year. The District will continue to identify and replace leaking blow-offs as part of its normal maintenance program.

BILLS SHOWING CONSUMPTION HISTORY

Water utility bills for each customer class include information on consumption history for the past 14 months. This allows the customer to track their water use and compare usage to previous billing periods.

DISTRICT MEASURES SUPPORTED BY EWUC

CONSERVATION KITS

In cooperation with EWUC, the District makes indoor and outdoor water conservation kits available to customers free of charge. Indoor water kits include a toilet tank displacement bag, low-flow showerhead, faucet aerators, and toilet leak detection dye. Outdoor water kits include a water-saving garden hose nozzle, automatic timer, sprinkler rain gauge, and soil moisture meter. Table 7-6 shows the number of indoor and outdoor conservation kits allocated to the District by EWUC over the past eight years. The District does not keep track of how many kits are distributed per month, but they typically distribute their full allocation per year.

TABLE 7-6

Water Conservation Kits Allocated by EWUC

Year	Indoor Kits	Outdoor Kits
2001	220	220
2002	480	400
2003	700	700
2004	720	800
2005	520	700
2006	520	700
2007	520	700
2008	270	370

CUSTOMER EDUCATION

The District provides information and tips for efficient water use for customers in their semi-annual newsletter. Information on efficient use is also available for customers at the District office.

PROGRAM PROMOTION

The District also provides a number of water conservation brochures to customers at the customer service desk at the District office. Brochure subjects have included summer lawn and watering calendars and guides, home water conservation guides, leaky faucet repair and landscaping tips.

IRRIGATION MANAGEMENT

In conjunction with EWUC, the District has adopted a water calendar for summer months to discourage frequent and over watering. The calendar allows for outdoor watering every third day. Watering days are assigned based on the last two digits of house numbers. In the event of a water shortage, irrigation management would be mandated.

EWUC MEASURES IMPLEMENTED WITHIN DISTRICT SERVICE AREA

School Programs

EWUC’s classroom education program on water conservation is presented periodically in schools within the District since the 2003-2004 school year. EWUC estimates that presentations were given in about 40 classrooms each school year from 2003-2005. During the 2005-2006 school year, EWUC staff visited 61 classrooms within the District, reaching an estimated 1,580 students.

EFFECTS OF PAST MEASURES

Since the District adopted their current conservation plan in June 2003 with their previous *Water System Comprehensive Plan*, there has been significant reduction in customer water use, as illustrated in Table 7-7.

TABLE 7-7

District Water Savings

	2003	2004	2005	2006	2007	2008
Annual Consumption ⁽¹⁾ (MG)	823.4	790.6	754.9	789.9	778.0	745.4
Estimated Service Area Residential Population	23,980	24,524	25,080	25,649	26,231	26,827
Per capita use (gpcd) ⁽²⁾⁽³⁾	94	88	82	84	81	76
Annual savings (%)	NA	6.4%	6.8%	-2.4%	3.6%	6.2%
Average annual savings (%)	4.1%					

(1) Includes Single Family, Multifamily and Commercial/Industrial consumption.

(2) Gallons per capita per day.

(3) Represents a per capita consumption.

The current conservation plan has resulted in average annual savings of 4.2 percent of per capita demand since the plan was adopted in 2003. This corresponds to a total savings of approximately 200 million gallons of water compared with 2003 per capita use. Since their current plan has proven to be quite effective, the District will continue implementing all of these measures.

NEW WATER USE EFFICIENCY PROGRAM

Under the WUE Rule, the District must set water use efficiency goals and measure progress each year toward meeting these goals. Goals must include a measurable outcome, address water supply or demand characteristics, and include an implementation schedule. The District must also evaluate or implement conservation measures to help meet these goals.

Goals

The District plans to reduce its water use in several ways. First, the District will cooperate with the regional plan presented by EWUC to promote conservation by its customers and reduce overall water demand. Second, the District will meet the WUE Rule distribution system leakage requirements and plans to work diligently to try and maintain their current rate of distribution system leakage.

The City of Everett's current goal is to save approximately 0.85 mgd per year through the year 2012, with a total savings of approximately 1.95 mgd at the end of the 6-year

planning period. The City has developed a conservation program through EWUC that includes education, conservation kits, leak repair, rebates, and audits, with expected savings from each measure.

To cooperate with the regional conservation effort, the District's first goal is to save approximately 0.025 mgd, or 9.3 MG per year through the year 2012, with a total savings of approximately 21 million gallons at the end of the 6-year planning period. The District's water use accounts for about 3 percent of the Everett's total production and this goal represent 3 percent of the City's total goal.

The District's second goal is to maintain a distribution leakage rate of less than 10 percent per the WUE Rule requirements. As Table 7-2 shows, the District currently has a three-year rolling average of 1.4 percent distribution system leakage. The District will continue to monitor customer accounts for leaks and conduct annual leak detection surveys.

Since the District began distribution system leak detection surveys, they have repaired 19 leaks, saving a total of over 27 MG per year. Nearly 50 percent of those savings are from leaks found between 1997 and 2002. Since 2002, annual savings have ranged from 0.2 MG to 10.5 MG. Excluding the 20 gpm leak found in 2004, the average savings since 2002 is 1.0 MG per year.

The District also monitors customer accounts for high usage that may indicate leaks. Based on past savings, the District anticipates saving 1-2 MG per year. Compounded with savings from system leak detection surveys, the District expects to save approximately 2 MG annually through 2012. Although the District expects to continue to see savings from the leak detection programs, the District does not anticipate these savings to change their average DSL rate significantly. These program goals will be re-evaluated annually.

Water Use Efficiency Measures

The WUE Rule states several measures that must be implemented or evaluated and provides a list of measures that are 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 the 2,500 and 9,999 connections category and therefore must evaluate or implement six supplementary water use efficiency measures in addition to the mandatory measures. The following sections describe both the mandatory and supplementary water use efficiency measures evaluated and indicate which have been or will be implemented by the District.

Mandatory Implementation – Source and Service Metering and Meter Calibration

The District currently meters all customers and has four master or flow control meters that account for water entering the District from Everett. The District will continue to

meter all new customers and sources. Source meters are calibrated periodically. The District's service meter replacement program replaces old customer water meters with electronic touch read meters, which help decrease read errors.

Mandatory Implementation – Leak Detection and Water Accounting

Although the District has low historical distribution system leakage, the District will continue to pursue leak detection and repair for its distribution systems.

The District will continue to monitor customer accounts in an effort to identify leaks and will conduct additional leak detection surveys throughout the system. Additionally, the District plans to investigate the installation of meters on hydrants used for fire fighting training as another means of accounting for lost water. The District has purchased a meter to use when flushing pipes.

Mandatory Implementation – Customer Education

The District will continue to provide customer education by including efficient water use tips in their semi-annual newsletter and by making information available at the District office.

Mandatory Evaluation – Rates that Encourage Efficiency

The District currently has a uniform rate structure. Customers are charged a monthly base rate, which is based on customer class and meter size. There is also an additional charge for each thousand gallons of water used. Table 7-8 summarizes the water rates.

TABLE 7-8

District Water Rate Summary⁽¹⁾

Customer Category	Bimonthly Basic Charge	Volume charge \$/1,000 gallons	Additional Multi-family Unit Rate \$/Unit
Single-Family, size range from 5/8" x 3/4" to 2"	\$14.50 – \$82.50	\$2.41	NA
Multi-family, size range from 5/8" x 3/4" to 10"	\$14.50 – \$1,300.50	\$2.49	\$8.70
Commercial/ Industrial, size range from 5/8" x 3/4" to 24"	\$14.50 – \$3,316.54	\$2.59	NA

(1) As of January 2009.

The District evaluated inclining block and seasonal rate structures during their last rate study in 2006. After evaluating the financial impacts, the District elected to establish the rate structure shown in Table 7-8. As illustrated in Table 7-7, the District has an average per capita usage of 74 gpcd, which is very low when compared with other utilities in the

region. The District’s position is that the uniform volume charge it has in place is sufficient to encourage conservation across all rate classes and provide the financial stability to operate and maintain the water system at a high level of service to its customers. The District will re-evaluate inclined block and seasonal rate structures as part of its next rate study.

Mandatory Evaluation – Reclaimed Water Opportunities

Prior to November 2007, the District did not own or operate a wastewater treatment facility. The District operated a small collection system that conveyed all of its wastewater to the City of Everett for treatment. In November 2007, the District merged with the Olympus Terrace Sewer District which operates a wastewater treatment facility. The District’s wastewater treatment facility does not currently have the capability to treat wastewater to reclaimed water standards.

At the present time, the City of Everett has not discussed plans for reclaimed water with the District, but the District will work with Everett in identifying reclaimed water opportunities if Everett approaches the District. Potential uses of reclaimed water are discussed later on in this Chapter.

Supplementary Measures

The District will continue implementing all of their current measures described above as part of their new Water Use Efficiency Program. Table 7-9 summarizes these measures.

TABLE 7-9

District WUE Program Measures

Implemented Measures	Comment	Applicable Customer Classes
Program Promotion	District measure supported by EWUC	5
School Outreach	District measure supported by EWUC	1
Bills Showing Consumption History	District measure	5
Conservation Kits	District measure supported by EWUC	2
Irrigation Management	District measure supported by EWUC	1
Washer Rebates	EWUC measure	2
Toilet Rebates	EWUC measure	2
Water Audits	EWUC measure	2
Total Measures Counted		20

Evaluation of measures

As a purveyor of the City, the District's membership in EWUC is paid out of the wholesale water rate. As a result, the District can take advantage of the programs and resources provided by EWUC at no additional cost. Since many of the District's measures are supported by EWUC, the primary evaluation method of measures will be tracking reductions in water use instead of cost-effectiveness.

PUBLIC FORUM

The District will engage customers and other interested members of the public in a public forum when establishing WUE goals. The public forum not only allows the public to provide input on the decisions to be made by the governing body, but it also helps them understand the purpose of establishing goals. The District's WUE goals will be publically discussed at the Commissioner Meeting presenting the Plan for approval, as required by WAC 246-290.

TARGET WATER SAVINGS PROJECTIONS

If the District's water use efficiency goals are realized, the District will see significant savings in water use. Table 7-10 shows projected savings from the presented goals.

TABLE 7-10

Projected Water Use Efficiency Savings

Measure	Expected Savings (MG per year)				
	2009	2010	2011	2012	Total
Leak Detection & Water Accounting ⁽¹⁾	2	2	2	2	8
Education ⁽²⁾	6.9	7	7.2	7.3	7.3 ⁽³⁾
Conservation Kits ⁽⁴⁾	1.4	1	1	1	4.4
Leak Repair ⁽⁵⁾	0.2	0.1	0.1	0.1	0.5
Toilet Rebates ⁽⁵⁾	0.19	0.19	0.19	0.19	0.76
Washer Rebates ⁽⁵⁾	0.26	0.26	0.26	0.27	1.05
Audits (ICI) ⁽⁵⁾	0.11	0.11	0.11	0.12	0.45
Audits (Schools) ⁽⁵⁾	0.05	0.05	0.05	0.03	0.18
Total Savings	10.5	10.2	10.4	10.5	22.64

- (1) District program.
- (2) Education includes customer education, program promotion, bills showing consumption history, school outreach and irrigation management. Most of these are supported by EWUC.
- (3) Education savings are not compounded annually due to the need to re-educate customers each year to maintain constant savings.
- (4) District measure supported by EWUC.
- (5) EWUC measure. Leak Repair is an EWUC measure that should not be confused with the District's separate leak program.

DEMAND FORECASTING

The WUE Rule has added new criteria to consider when preparing demand forecasts. It is now required to project demands both with and without anticipated savings from the water use efficiency program. This additional forecast can help determine whether capital improvements can be delayed or eliminated, and how much additional growth may be permitted. It also provides a basis to measure actual water use data against to monitor conservation success.

A demand forecast with and without anticipated savings from both goals is shown in Table 7-11.

TABLE 7-11

Demand Forecast With and Without Conservation Savings

Year	Projected Population ⁽¹⁾	Without Conservation		With Conservation	
		Average Day Demand (mgd)	Peak Day Demand (mgd)	Average Day Demand (mgd)	Peak Day Demand (mgd)
2009	28,559	2.28	4.57	2.25	4.51
2010	28,840	2.30	4.61	2.28	4.55
2011	23,271	1.95	3.87	1.92	3.84
2012	23,364	1.96	3.90	1.93	3.87
2013 ⁽²⁾	23,458	1.97	3.92	1.95	3.89
2014 ⁽²⁾	23,553	1.99	3.95	1.96	3.92

(1) Assumes service transfer.

(2) Assumes annual water use efficiency savings are maintained at 2012 rate.

ANNUAL PERFORMANCE REPORTING

The District is required to submit a performance report to the Department of Health annually. This report must include:

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

DOH has developed a report form that must be submitted for annual reporting. The District has also developed a spreadsheet to track monthly production and consumption volumes and calculated DSL volume and percentage. These reports are available to the public.

POTENTIAL FOR WATER REUSE

This section presents a brief analysis of the potential for water reuse within the District service area. 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.

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
 - 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:

$$\text{BOD}_5 \leq 5 \text{ mg/L}$$

$$\text{TSS} \leq 5 \text{ mg/L}$$

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.”

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 a National Pollutant Discharge Elimination System (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 the Washington Department of Fish and Wildlife (WDFW) that the need exists for additional instream flows.

Instream flow augmentation can be used to mitigate for future surface water supply or ground water withdrawal. However, since the District purchases its supply and does not anticipate any long-term development of its own supply, streamflow augmentation is not an appropriate application for the District.

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.

SOURCES

There are no current sources of Class A reclaimed water to the District. The District owns and operates a wastewater treatment plant that provides secondary treatment and discharges to a marine outfall in Puget Sound. There is currently no provision for treatment of water to Class A reclaimed water standards at this facility. Additionally, there is no infrastructure for the distribution of reclaimed water. The City of Everett provides some reclaimed water in the form of treated secondary effluent to the Kimberly-Clark paper mill for cooling use. This water is not treated to Class A standards and is supplied from Everett's treated effluent conveyance line. The City of Everett 2007 Water Comprehensive Plan states that there are no plans to provide reclaimed water to other customers in the near future. Any development of reclaimed water will require expensive upgrades to the wastewater treatment facilities and significant infrastructure improvements for either the District or Everett.

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 7-12 summarizes setback requirements for water reclamation facilities.

TABLE 7-12

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

Reclaimed Water Use/Facility	Distance (Feet)
Minimum Distances 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

POTENTIAL FOR IRRIGATION WATER REUSE

Reclaimed water can be used for irrigation and landscape purposes. The District has an annual average rainfall of approximately 36 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 schools with athletic and play fields which are large irrigation water users. The peak day reclaimed water usage rates for irrigation demands are presented in Table 7-13. The peak day reclaimed water usage rate for irrigation purposes assumes a typical irrigation rate of 14 inches per year, and irrigation for four months per year.

POTENTIAL FOR INDUSTRIAL WATER REUSE

In addition to irrigation, industries within the District might have a use for reclaimed water. The majority of industrial activity within the District takes place on Paine Field. If reclaimed water was used in the Paine Field area it would need to be pumped up from the District’s wastewater treatment plant, which is located near sea level. Paine Field does not currently have the type of industrial activities that would benefit from large quantities of reclaimed water, and the District is unaware of any plans for this type of industrial activity. Industrial reuse is currently not cost effective due to the difficulty of transmission main construction, the energy required for the pumps, and the current lack of end-users.

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 currently has approximately 114 miles, 602,000 lineal feet, of gravity sewers. To completely flush the system every five years would require flushing 120,400 lineal feet of mains each year. At a typical flushing rate of 4,000 gallons per 1,000 lineal feet of sewers, a total of 0.48 million gallons of water per year is required for sanitary sewer flushing. This represents approximately 0.06 percent

of the District’s yearly water consumption. Without a reclaimed water distribution system in place throughout the District the significant costs required to develop such a distribution system for sewer flushing alone are not justifiable. The development of reclaimed water for this for sewer flushing does not appear cost-effective at this time.

TABLE 7-13

Potential Uses for Reclaimed Water

Irrigation/Landscaping Use⁽¹⁾	Area (acre)	Annual Usage (MG/year)	Peak Day (gpd)
Public Parks	43	16.35	272,429
Public Schools	149	56.6	943,998
Maintenance Activity	Length (lf)	Annual Usage (MG/year)	Peak Day (gpd)
Jetting of Sewer Lines	120,400	.48 ⁽²⁾	4,000 ⁽³⁾
Total Potential Reclaimed Water Usage		73.5	1,220,427

- (1) Assuming a typical irrigation rate of 14 inches per year over the period of 4 months (from mid May to mid September).
- (2) Assumes flushing interval of 5 years and a rate of 4,000 gallons of water used per 1,000 lineal feet of sewer flushed.
- (3) Assumes 125 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.

FEASIBILITY OF RECLAIMED WATER

Within the District service area are several potential applications for reclaimed water. Of these the only significant application appears to be for irrigation of school playfields and landscaping. However, the District would need to undertake numerous costly improvement projects in order to serve this demand. There is currently no source of the required Class A reclaimed water to the District. At this time development of water reuse within the District does not appear to be cost-effective.

SUMMARY

To comply with the new requirements set forth in the Water Use Efficiency Rule and to reduce overall water use, the District has set goals to save approximately 28,000 gallons per day through the year 2012, and to maintain a distribution system leakage rate of less than 10 percent.

The District will employ several measures to accomplish these goals, which are as follows:

- Leak detection surveys
- Monitoring customer accounts for leaks
- Customer education
- Program promotion
- Bills showing consumption history
- School outreach
- Water conservation kits
- Irrigation management
- Cooperation with the Regional Program established by EWUC

If their goals are realized, the District anticipates annual savings of approximately 10 MG.