Volume I

City of Everett
2007 Comprehensive Water Plan

Source to TAP

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STATE OF WASHINGTON
DEPARTMENT OF HEALTH
20435 72nd Ave. S., Suite 200, K17-12• Kent, Washington 98032 -2358

January 8, 2008

TOM THETFORD
EVERETT PUBLIC WORKS DEPT. CITY OF
3200 CEDAR STREET
EVERETT WA 98201

RE: Everett Public Works Dept. City of, ID#24050
Snohomish County
Water System Plan – 2007, APPROVAL
Submittal # 07-0309

Dear Mr. Thetford:

The City of Everett water system plan (WSP), received in this office on March 20, 2007, with subsequent submittals on October 4, 2007, has been reviewed and in accordance with the provisions of WAC 246-290-100, is hereby APPROVED.

Your water system plan includes capacity information that relates the physical ability of your system to provide water with any water right limitations that might occur during the 6-year period for which the approval of this WSP is valid.

Based upon information you have supplied, it has been determined that the City of Everett water system can support an **"unspecified"** designation for its approved number of connections. A specific number of approved connections will not be applied to your system at this time. Development within your system may occur in compliance with the schedule and information provided within your WSP. This designation may be rescinded (and replaced with a specified number of approved connections) if it is determined that the WSP is no longer representative of system activities.

Submittal of the WSP included local government consistency determinations from the City of Everett and Snohomish County Planning and Development Services. This WSP meets local government consistency requirements for WSP approval pursuant to RCW 90.03.386, RCW 43.20.

Passage of the Municipal Water Law in 2003 created a new significance to your service area through two avenues: connection of the service area to your system's water rights and a duty to serve responsibility. Per RCW 90.03.386 (2), the service area identified in your WSP now represents your water right "place of use." Changes in your service area should be made through WSP amendment.

Per RCW 43.20.260, your system now has a duty to serve retail connections within its retail service area. This WSP has incorporated information that identifies the procedures and processes you have put into place to ensure that your system can provide timely and reasonable service within your retail service area.

Standard Construction Specifications for distribution main extensions have been approved as part of this water system plan. With this approval and consistent with WAC 246-290-125(2) the City of Everett may elect to proceed with the installation of distribution main extensions provided:

> That the City of Everett maintains on file completed construction completion reports (a copy of which is attached) in accordance with WAC 246-290-125 (2) and WAC 246-290-120 (5) and makes it available for review upon request by the department.

Approval of the update of this water system plan is required on or before **January 6, 2014** unless the Department of Health (DOH) requests an update or plan amendment pursuant to WAC 246-290-100(9). Approval of this plan is valid as it relates to current standards outlined in Chapter 246-290 WAC, revised July 2004, Chapter 246-293 WAC, revised September 1997, Chapter 70.116 RCW, and the requirements of the Municipal Water Law (SESSHB 1338), effective September 9, 2003, and is subject to the qualifications herein. Future revisions in the rules and statutes may be more stringent and require facility modification or corrective action.

Below is the general regulatory language that applies to all water system approvals.

This approval does not provide any guarantee and should not be considered to provide any guarantee concerning legal use of water or subsequent water rights decisions by the Department of Ecology. This Department of Health approval of your WSP does not affect any uncertainties or deficiencies regarding your water rights or the resolution of those uncertainties or deficiencies. Depending on Ecology's future actions on your water rights, additional planning or other submittals may be required by the Department of Health. Questions concerning water rights should be directed to the Department of Ecology.

DOH recognizes the significant effort and resource commitment involved in the preparation of your WSP document. Thank you for your cooperation. If you have any questions or wish to check our records, please contact either of us at the numbers listed below.

Sincerely,

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Jolyn Leslie, PE
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cc: Ed Caine, Snohomish County Planning
Snohomish Health District
Paul Fabiniak, Department of Ecology, NWRO
Jim Peterson, HDR Engineering

City of Everett
2007 Comprehensive Water Plan

Adopted by Resolution No. 5965
on November 21, 2007

Mayor
Ray Stephanson

Everett City Council
Brenda Stonecipher, President
Mark Olson
Ron Gipson
Arlan Hatloe
Drew Nielsen
Bob Overstreet
Paul Roberts

Thanks to the following participants involved in the development of this plan:

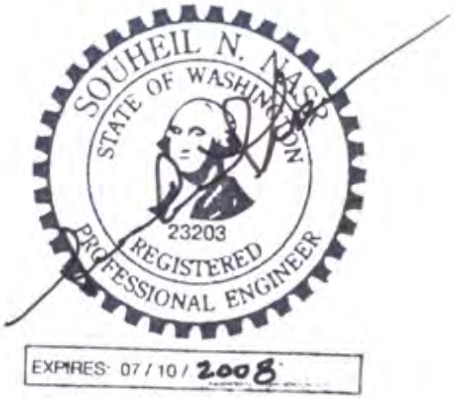
- Everett Public Works Staff
- Everett Water Utility Committee
- Washington State Department of Health
- HDR Engineering, Inc.
- FCS Group, Inc.

City of Everett

2007 Comprehensive Water Plan

CERTIFICATION

This 2007 Comprehensive Water Plan for the City of Everett has been prepared under the direction of the following Registered Professional Engineers.



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SEPA Documentation
County/Adjacent Utility Correspondence

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Executive Summary

Chapter 1 – System Authorization, History, and Existing System Description

In the last century, the Everett water system has grown from a simple localized system for the residents of Everett to a vital regional water provider. The Everett water system supplies water to the majority of Snohomish County residents through a network of 66 direct and indirect wholesale customers.

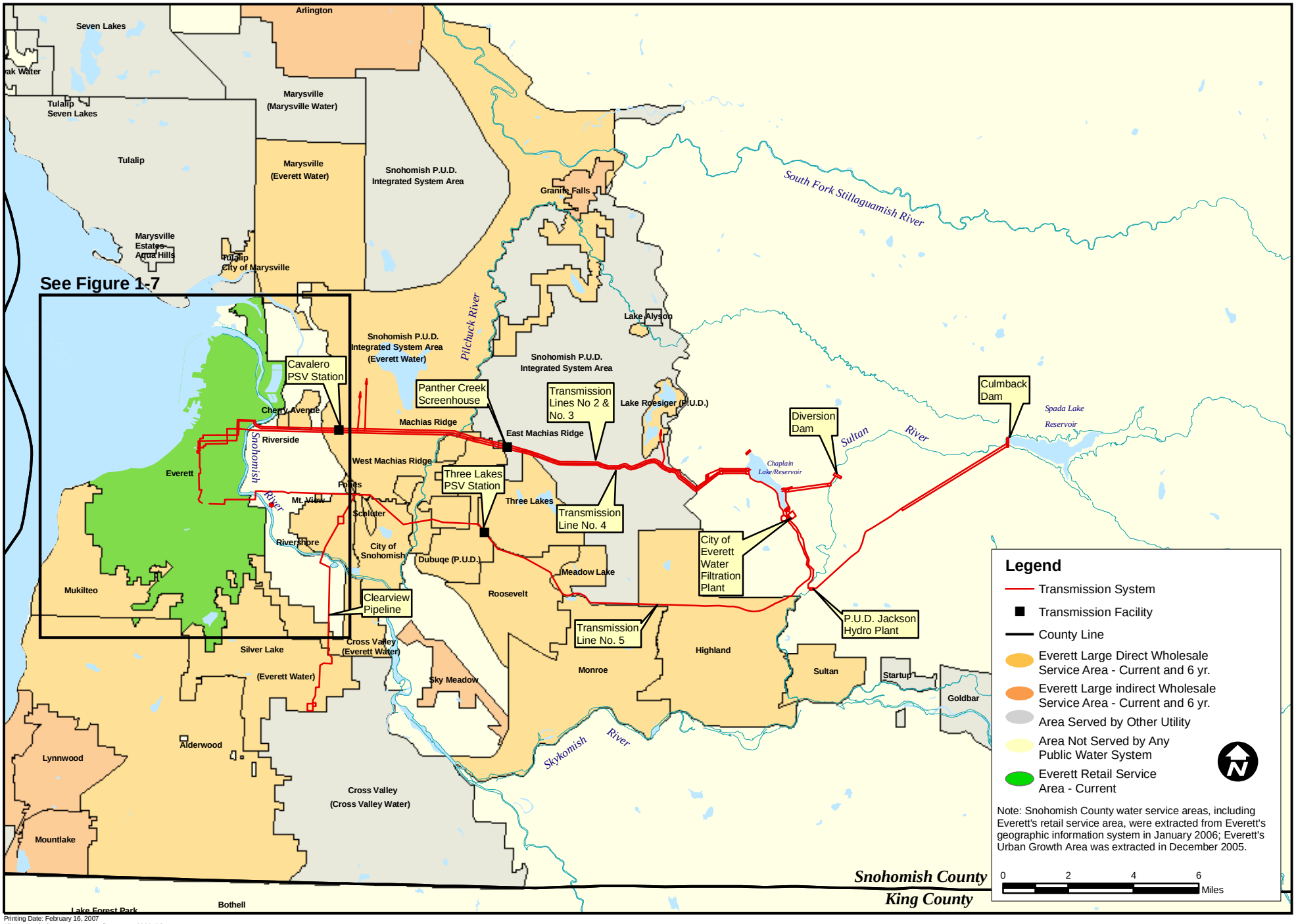
Major facilities and characteristics of the Everett water system include the following and many are shown on Figure ES-1:

- Jackson Hydroelectric Project on the Sultan River
- Spada Reservoir - 50 billion gallon capacity
- Chaplain Reservoir - 4.5 billion gallon capacity
- Water Filtration Plant at Chaplain Reservoir - 132 mgd DOH approved flow rate
- 4 main transmission lines - Ranging from 36 to 52 inch diameter
- 4 pump stations
- 18 pressure zones
- 49 pressure reducing valves
- 15 storage facilities - Ranging from 0.1 to 24 million gallons in capacity
- 370 miles of distribution pipeline
- 58 direct wholesale customers - 33 group A systems and 25 group B systems
- 8 indirect wholesale customers

Chapter 2 – Related Policies, Agreements, and Plans

Everett's water system operates within a network of policies, agreements, and plans that address water supply, land use, and natural resource management within Snohomish County. This chapter describes selected policies, agreements, and plans and demonstrates that this CWP is consistent with them.

The policies include the Everett Municipal Code which is a comprehensive set of policies related to the water system, as well as more specialized policies such as use of lower Snohomish River water, recreational use of Spada Reservoir, and a potential emergency intertie with Seattle. The agreements include supply and mutual aid agreements with wholesale customers, as well as the Snohomish River Regional Water Authority and water rights. The plans include wholesale customers' water system plans, the North Snohomish County Coordinated Water System Plan, and the City of Everett and Snohomish County's Comprehensive Plans.



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Major Facilities - Source and Transmission Lines

FIGURE ES-1

Chapter 3 – Planning Data and Demand

This chapter describes water use characteristics, demographics, and the demand forecast. The water use characteristics include summaries of production, sales, connections, peaking factors, and water use factors for Everett's potable, unfiltered, and reclaimed water. The demographic data include historical and projected demographics which are based on projections from the Puget Sound Regional Council that have been tailored to Everett's service area. The demand forecast combines the water use characteristics and the demographics to create a demand forecast, which is shown in Table ES-1.

Table ES-1 Demand Forecast

Demand	Average Day Demand (MGD)					Maximum Day Demand (MGD)				
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	2100[6]	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	2100[6]
Demand Without Conservation Savings or Reuse										
Potable Water Demand [1]	62.9	72.9	107.1	154.1	197.7	117.0	134.1	189.2	274.3	352.0
Kimberly-Clark Industrial Demand [2]	30.4	30.4	30.4	30.4	30.4	33.2	33.2	33.2	33.2	33.2
Subtotal Demand Without Conservation or Reuse	93.3	103.4	137.5	184.5	228.1	150.2	167.3	222.4	307.5	385.2
Conservation and Reuse										
Conservation Savings [3]	(1.1)	(2.0)	(2.9)	(4.3)	(5.6)	(2.0)	(3.7)	(5.4)	(7.9)	(10.3)
Code Savings [3]	(0.5)	(1.8)	(3.3)	(3.3)	(3.3)	(0.5)	(1.8)	(3.3)	(3.3)	(3.3)
Reclaimed Water Supplies [4]	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)	(3.5)	(3.5)	(3.5)	(3.5)	(3.5)
Subtotal Conservation and Reuse	(3.6)	(5.7)	(8.2)	(9.6)	(10.9)	(6.0)	(9.0)	(12.2)	(14.7)	(17.1)
Demand With Conservation Savings and Reuse										
Potable Water Demand [3]	61.3	69.2	100.9	146.4	188.8	114.5	128.6	180.5	263.1	338.5
Unfiltered Water Demand (Kimberly-Clark Industrial) [5]	28.4	28.4	28.4	28.4	28.4	29.7	29.7	29.7	29.7	29.7
Total Demand With Conservation and Reuse	89.8	97.6	129.3	174.9	217.2	144.2	158.3	210.2	292.8	368.2

Notes:
(1) Includes Everett retail, current and new wholesale customers, and non-revenue potable demand.
(2) Includes demand for unfiltered and reclaimed water.
(3) All conservation and code savings are applied to potable water demand.
(4) All reclaimed water supplies are supplied to Kimberly-Clark.
(5) Unfiltered demand is Kimberly-Clark's demand less reclaimed water supplies.
(6) The forecast between 2050 and 2100 is estimated based on a 0.5 percent increase per year in potable water demand. Industrial demand was held constant.

Chapter 4 – System Analysis

A hydraulic model of the City's water system was developed using current GIS data and H2OMAP, the City's preferred hydraulic modeling software. Demands for Everett's retail system and a select number of wholesale customers was developed for the existing system, six year and twenty year planning horizon and allocated within the hydraulic model. Field tests were conducted to calibrate the model for steady state conditions.

A hydraulic analysis was conducted using the model to evaluate the adequacy of existing facilities to provide current and future demand and fire flow under average and peak demand scenarios. The key conclusions of the hydraulic analysis are:

- For peak hour demand conditions, the Everett distribution system was determined to be adequate for the existing, six year and twenty year demand conditions.
- Inadequate available fire flow was evident in certain locations throughout the system, and watermain improvements were identified for the existing system, six year and twenty year planning horizons. Improvements necessary to attain an available fire flow of 1,000 gpm were identified and placed into the CIP schedule.

A desktop analysis was conducted to determine if Everett has adequate source and storage for the existing, six year and twenty year planning horizons. Source and storage adequacy was evaluated for Everett's full distribution system, the Casino Tank service area and the Casino Tank/Reservoir 6 service area. The source for each of the three areas includes the Water Filtration Plant (WFP), the Casino Pump Station and the Evergreen Pump Station, respectively. The results of the desktop analysis are summarized below:

Source must be adequate to meet the projected maximum day demand (MDD) for each area being evaluated.

- For the full distribution and wholesale system, there is currently adequate source at the Water Filtration Plant (WFP) to meet the projected demand through approximately 2013. The current capacity of the WFP is 132 mgd. Under 2050 conditions, the WFP will be approximately 131 mgd deficient in capacity.
- At firm capacity, demand in the Casino Tank service area is projected to exceed supply capacity by 2020 and will be approximately 14.8 mgd deficient under projected 2026 demands.
- With one pump out of service, the analysis shows that under buildout conditions (post year 2050), the Evergreen Pump Station needs to have 30.8 mgd added to meet projected demands.

For the storage analysis, the following components were evaluated for each of the reservoirs serving Everett's retail area: operational storage; equalizing storage; standby emergency storage; fire suppression storage; and dead storage.

- For the full system, current storage is adequate until approximately 2033. At 2050 demands, there is a need for an additional 8.1 MG of storage in the Everett distribution system.
- For the Casino Tank service area, a small deficiency in storage is evident in 2011. In the years following 2011 through 2050, a surplus of storage is available to serve the Casino Tank service area from Reservoir No. 6 through the Casino Pump Station.
- For the Casino Tank/Reservoir 6 service area, the current storage is adequate, but becomes deficient in approximately 2029. Under 2050 demands, the total deficit for this service area is approximately 12.5 MG.

The projects identified to remedy system deficiencies are included and scheduled in the CIP accordingly, to ensure that the projected system demand will be met over the planning period.

Chapter 5 – Conservation Program

Everett administers both a regional conservation program implemented throughout the Everett Wholesale Service Area, as well as conservation elements that pertain exclusively to the Everett retail service area. The goal of these conservation efforts is to maximize the benefits of the Sultan River resource by encouraging the efficient use of water.

The regional conservation program for 2007-2012, summarized in Table ES-2, consists of eight primary measures: education, indoor retrofit kits, outdoor irrigation kits, toilet leak detection, toilet rebates, washer rebates, commercial indoor audits, and school irrigation system audits. Additionally, the program includes continuation of the following nine measures in Everett's retail service area: purveyor assistance, customer assistance, bills showing consumptive history, source meters, service meters, leak detection, conservation demonstration garden, conservation pricing, and reuse. Plumbing code savings will also continue as non-code fixtures are replaced at the end of their life by more efficient models.

Table ES-2 6-Year Regional Conservation Program

Component	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget
Programmatic Measures				
1. Education	n/a	0.67	0.67	$1,050,000
2. Indoor Retrofit Kits	45,000	0.40	0.40	$243,000
3. Outdoor Irrigation Kits	30,000	0.20	0.59	$393,000
4. Toilet Leak Detection	232,180	0.45	0.45	$201,360
5. Toilet Rebates	7,200	0.08	0.08	$810,000
6. Clothes washer Rebates	7,200	0.11	0.11	$810,000
7. Commercial Indoor Audits	120	0.04	0.04	$45,000
8. School Irrigation System Audits	60	0.02	0.06	$56,410
Subtotal	n/a	1.97	2.41	$3,608,770
Plumbing Code	n/a	1.76	1.76	$0
Total	n/a	3.73	4.17	$3,608,770

Chapter 6 – Water Rights and System Reliability

Everett currently holds surface and groundwater rights equivalent to an instantaneous production rate (Q_i) of 275 million gallons per day (mgd) and an annual average production rate (Q_a) of 150 mgd. Figure ES-2 shows a comparison of the projected 2007-2100 demands to Everett's existing water rights. The projected average and instantaneous demands through the 20-year planning period of this CWP (2026) are satisfied by existing water rights. However, projected demands exceed existing water rights near 2036 for average day demand (ADD) and near 2046 for maximum day demand (MDD).

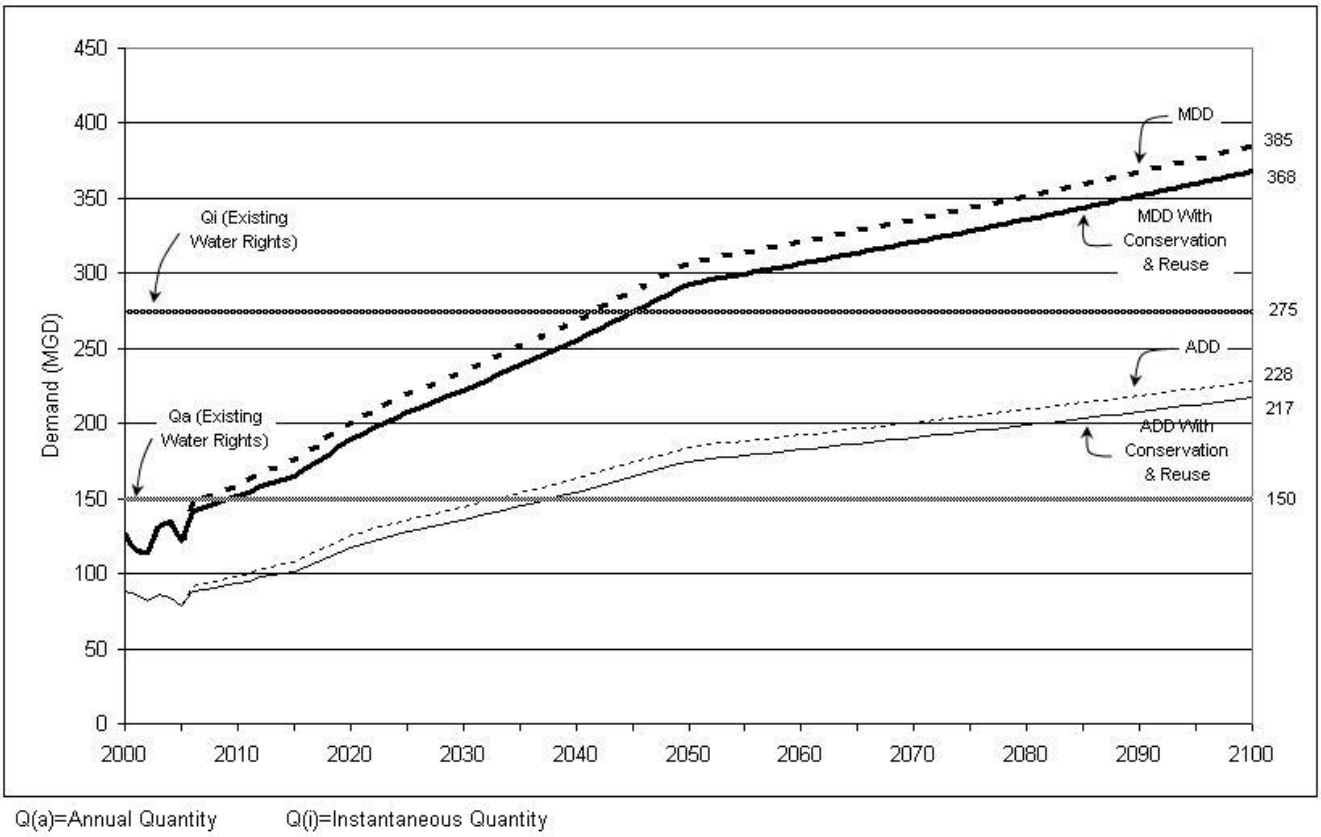


Figure ES-2 Projected Demand Compared to Existing Water Rights

System reliability encompasses multiple issues that together ensure that Everett can continue to provide safe water to meet the needs of growing communities into the future. These issues include yield analysis, watershed protection, alternative sources of supply, interties, and shortage plans. A yield analysis concluded that climate change has the potential to reduce Everett's safe yield by about 10 percent. Everett implements a watershed control program to protect water quality in the watershed. Alternative sources of supply could be developed including the Snohomish River Regional Water Authority water right, additional reclaimed water, and unused groundwater rights. Everett is exploring developing an intertie with Seattle for supply redundancy. Finally, Everett has a water shortage response plan to help manage supply in the event of an unplanned shortage.

Chapter 7 – Regulatory Compliance

Everett's water system is accountable to multiple state and federal drinking water quality regulations. These regulations fall into four main categories: treatment, finished water, distribution system, and consumer confidence and public notification. A review of Everett's monitoring and compliance procedures and water quality monitoring results indicates that Everett is in full compliance with all state and federal regulations. Table ES-3 summarizes Everett's regulatory status and provides associated recommendations for continued compliance.

Table ES-3 Water Quality Regulatory Compliance

Regulation	Compliance?	Recommendations
Surface Water Treatment Rules	Yes	Continue with existing monitoring. Maintain an updated watershed control plan (2006 update included in CWP Appendices).
Epichlorohydrin/Acrylamide	Yes	Prepare for changes in reporting requirements.
Filter Backwash Recycling Rule	Yes	Continue with existing monitoring.
Phase I, II, V Rules	Yes	Continue with existing monitoring.
Radionuclide Rule	Yes	Monitor per requirements established by DOH.
Unregulated Contaminant Monitoring Rule	Yes	No longer effective.
Total Coliform Rule	Yes	Update Total Coliform Monitoring Plan in 2007 to reflect changes in estimated population served.
Total Trihalomethane Rule (1)	Yes	No longer effective.
Stage 1 D/DBP Rule	Yes	Continue with existing monitoring.
Lead and Copper Rule	Yes	Continue working with DOH to gain approval of consolidated monitoring plan. Conduct monitoring per approved plan.
CCR and Public Notification Rules	Yes	Provide annual report to wholesale customers by April 1 of each year. Provide annual report to retail customers and DOH by July 1 of each year. Certify report information before October 1 of each year.

(1) This regulation was replaced with the Stage 1 D/DBP Rule in 2002.

Chapter 8 – Operations and Maintenance

Everett has a well developed operations and maintenance program that includes organizational structure and responsibilities, operator certification, systems operations, design and constructions standards, water quality operations, supplies and equipment, maintenance, and information and records management.

Recommended improvements to this operations and maintenance program include:

- Complete incorporation of water quality data into the new Laboratory Information Management System, which will improve record keeping, report writing and general storage/retrieval needs;
- Improve objective criteria and formal inspection schedule to determine frequency of tank and reservoir cleaning;
- Streamline dechlorination procedures, and improve equipment to reduce flushing efforts;
- Continue distribution wide “uni-directional” flushing where possible;
- Coordinate maintenance needs with capital projects; and
- Improve use of asset management program for distribution maintenance activities, such as hydrant maintenance histories.

Chapter 9 – Capital Improvement Plan

A capital improvement plan (CIP) was developed that mitigates system deficiencies in distribution pipelines, storage, booster pumping, source, treatment and transmission pipelines. CIP projects include those that Everett previously identified and included in their 10-year CIP listing, as well as those identified during the analysis for this CWP. A summary of the total costs for the recommended CIP is shown in Table ES-4.

Table ES-4 Summary of Capital Improvement Program

Project Type	Six Year (Yrs 2007-2012)	Years 2013-2026
Distribution Pipeline	$12,940,000	$75,970,000
Reservoir Storage	$24,910,000	$0
Pump Station Upgrades	$6,570,000	$14,160,000
Source/Treatment	$67,910,000	$63,090,000
Transmission Pipeline	$63,290,000	$343,430,000
Other	$17,510,000	$2,740,000
TOTAL	$193,130,000	$499,390,000

For distribution pipelines, three pipeline replacement projects from the previous CIP are included and funds have been planned in 2015 and 2016 to install meters on any un-metered customer at that time. In addition, funds have been planned each year for pipeline improvements identified in the hydraulic analysis conducted for this CWP and for provision of cathodic protection on steel pipelines in Everett's distribution system.

Recommended storage projects include general reservoir maintenance and rehabilitation. There is no new storage required in the 20-year planning horizon except for the new 2.0 MG elevated tank currently being constructed to replace the existing Casino Reservoir. In addition, operational improvements are presently planned for the Panther Creek facility to be completed by 2011.

For the Casino Pump Station, upgrades are planned for 2020 and 2026. The Evergreen Pump Station also has periodic capacity upgrades, which are planned for 2011, 2013, 2020 and 2026.

The City of Everett currently has plans to upgrade the existing Water Filtration Plant in two stages: adding 26.3 MGD capacity by 2013 and an additional 26.3 MGD by 2018. Other source and treatment projects included in Everett's CIP include facility upgrades at the WFP clearwell, security improvements, procurement of an additional 2 MGD of groundwater supply and rehabilitation/replacement of portal and tunnel facilities.

The recommended transmission line CIP projects include construction of a Cross Tie transmission line (to connect the Pipeline 2/3 corridor with the Pipeline 5 corridor), construction of an Everett-Seattle emergency intertie pipeline, Pipeline No. 2 and 3 replacement projects, and general transmission line maintenance and repairs.

In addition to this static snapshot of capital improvement projects, a database tool was developed that provides a dynamic method of documenting, prioritizing, and managing capital improvement projects into the future.

Chapter 10 – Financial Plan

The purpose of the financial plan is to provide reasonable assurance that Everett has and will have the financial ability to maintain and operate the utility on an ongoing basis, plus have the capacity to obtain sufficient funds to construct the water system improvements as identified in Chapter 9.

Table ES-5 summarizes total capital costs from 2007 through 2012 together with anticipated funding sources. These sources include capital reserves and revenue bond proceeds. Water service capital projects total $125.3 million for the six-year period. The financing plan calls for the use of capital reserves of $60.6 million and revenue bond proceeds in the amount of $88.5 million. Filtration capital projects over the same period total $67.9 million. The financing plan indicates that approximately $30.5 million of this amount will be funded with available capital reserves ($11.0 million of this amount is the proceeds from the DWSRF loan for the Clearwell project) and $37.4 million with revenue bond proceeds.

Table ES-5 6-Year Capital Financing Plan; 2007-2012 (Inflated $)

	2007	2008	2009	2010	2011	2012	TOTAL
WATER SERVICE							
Total Capital Projects	**$8,700,000**	**$25,680,000**	**$29,840,000**	**$ 17,710,000**	**$29,290,000**	**$ 14,120,000**	**$125,340,000**
Funding Sources							
Capital Reserves	$8,700,000	$25,680,000	$ 17,943,665	$ 3,589,214	$ 2,952,179	$ 1,764,422	$60,629,480
Revenue Bond Proceeds			11,896,335	14,120,786	26,337,821	12,355,578	64,710,520
Total	**$8,700,000**	**$25,680,000**	**$29,840,000**	**$ 17,710,000**	**$29,290,000**	**$ 14,120,000**	**$125,340,000**
FILTRATION							
Total Capital Projects	**$ 610,000**	**$ 11,700,000**	**$15,700,000**	**$12,050,000**	**$ 11,550,000**	**$16,300,000**	**$ 67,910,000**
Funding Sources							
Capital Reserves	$ 610,000	$11,700,000	$11,499,279	$2,360,326	$ 2,147,555	$ 2,146,036	$30,463,197
Revenue Bond Proceeds			4,200,721	9,689,674	9,402,445	14,153,964	37,446,803
Total	**$ 610,000**	**$ 11,700,000**	**$15,700,000**	**$12,050,000**	**$ 11,550,000**	**$16,300,000**	**$ 67,910,000**
WATER UTILITY AS A WHOLE							
Total Capital Projects	**$9,310,000**	**$37,380,000**	**$45,540,000**	**$29,760,000**	**$40,840,000**	**$30,420,000**	**$193,250,000**
Funding Sources							
Capital Reserves	$ 9,310,000	$37,380,000	$29,442,944	$5,949,540	$5,099,734	$ 3,910,459	$91,092,677
Revenue Bond Proceeds			16,097,056	23,810,460	35,740,266	26,509,541	102,157,323
Total	**$9,310,000**	**$37,380,000**	**$45,540,000**	**$29,760,000**	**$40,840,000**	**$30,420,000**	**$193,250,000**

Table ES-6 summarizes the projected financial performance and rate revenue requirements of water service for 2007 through 2012. Following the adopted 5% rate increases for 2007 and 2008, the water service will need a 6% rate increase per year for the following four years (2009 through 2012) to meet operating and maintenance costs and debt obligations. Table ES-6 assumes debt coverage by rate increases only. Actual rate increases will depend on whether the City is successful in obtaining available loan and/or grant alternatives.

Table ES-6 Water Service Revenue Requirement Forecast

	2007	2008	2009	2010	2011	2012
Rate Revenues at Existing Rates						
Retail	$9,431,296	$9,667,078	$9,908,755	$10,156,474	$10,410,386	$10,722,698
Wholesale	5,007,848	5,139,053	5,273,696	5,411,867	5,553,658	5,638,074
subtotal: Rate Revenues	**$14,439,144**	**$14,806,132**	**$15,182,452**	**$15,568,341**	**$15,964,044**	**$16,360,771**
Non-rate Revenues	$174,146	$175,017	$175,892	$176,772	$177,655	$178,544
Total Revenues	**$14,613,290**	**$14,981,149**	**$15,358,344**	**$15,745,113**	**$16,141,700**	**$16,539,315**
Expenses						
O&M Expenses (1)	$11,418,346	$11,661,564	$12,272,693	$12,919,638	$13,604,703	$14,333,369
Existing Debt Service	3,374,406	2,513,620	2,443,705	2,350,627	2,392,083	2,228,686
New Debt Service	-	-	966,923	2,114,392	4,252,857	5,255,889
Total Expenses	**$14,792,751**	**$14,175,184**	**$15,683,321**	**$17,384,656**	**$20,249,644**	**$21,817,944**
Annual Rate Adjustment	**5.0%**	**5.0%**	**6.0%**	**6.0%**	**6.0%**	**6.0%**
Cumulative Rate Adjustment	**5.0%**	**10.3%**	**16.9%**	**23.9%**	**31.3%**	**39.2%**
Rate Revenues After Rate Adjustments						
Retail	$9,902,861	$10,657,954	$11,579,867	$12,581,525	$13,669,827	$14,924,718
Wholesale	5,258,240	5,665,806	6,163,105	6,704,053	7,292,482	7,847,527
subtotal: Rate Revenues	**$15,161,101**	**$16,323,760**	**$17,742,972**	**$19,285,579**	**$20,962,309**	**$22,772,244**

Note: (1) Includes additional taxes due to projected rate increases.

Table ES-7 summarizes the projected financial performance and rate revenue requirements of water filtration for 2007 through 2012. In addition to the already adopted 5% a year rate increases for 2007 and 2008, filtration rates are projected to be adjusted by another 5% in 2009 and 6% a year thereafter (2010 – 2012) to meet the utility's filtration related cash needs and coverage requirements through the 6-year analysis period. Table ES-7 assumes debt coverage by rate increases only. Actual rate increases will depend on whether the City is successful in obtaining available loan and/or grant alternatives.

Table ES-7 Filtration Revenue Requirement Forecast

	2007	2008	2009	2010	2011	2012
Rate Revenues at Existing Rates						
Retail	$1,607,938	$1,648,137	$1,689,340	$1,731,574	$1,774,863	$1,828,109
Wholesale	8,920,915	9,154,643	9,394,494	9,640,630	9,893,214	10,043,591
subtotal: Rate Revenues	**$10,528,853**	**$10,802,779**	**$11,083,834**	**$11,372,204**	**$11,668,078**	**$11,871,700**
Non-rate Revenues	$ 918	$ 923	$ 927	$ 932	$ 937	$ 941
Total Revenues	**$10,529,771**	**$10,803,702**	**$11,084,762**	**$11,373,136**	**$11,669,014**	**$11,872,642**
Expenses						
O&M Expenses (1)	$7,006,427	$7,226,240	$7,569,610	$7,938,743	$8,328,350	$8,733,431
Existing Debt Service	3,029,153	2,156,034	2,153,665	2,157,035	2,214,030	2,213,108
New Debt Service	349,474	640,703	981,734	1,768,111	2,530,416	3,677,885
Total Expenses	**$10,385,054**	**$10,022,977**	**$10,705,009**	**$11,863,890**	**$13,072,797**	**$14,624,424**
Annual Rate Adjustment	**5.0%**	**5.0%**	**5.0%**	**6.0%**	**6.0%**	**6.0%**
Cumulative Rate Adjustment	**5.0%**	**10.3%**	**15.8%**	**22.7%**	**30.1%**	**37.9%**
Rate Revenues After Rate Adjustments						
Retail	$1,688,335	$1,817,071	$1,955,623	$2,124,784	$2,308,578	$2,520,505
Wholesale	9,366,960	10,092,993	10,875,301	11,829,848	12,868,178	13,847,600
subtotal: Rate Revenues	**$11,055,296**	**$11,910,064**	**$12,830,924**	**$13,954,632**	**$15,176,755**	**$16,368,106**

Note: (1) Includes additional taxes due to projected rate increases.

Everett continues to maintain the water utility in a healthy financial position and is taking steps with this plan to ensure future stability of the water utility financial status. Everett has a long range financial plan, which enables it to meet projected capital and operational requirements outlined in this plan and does so through upfront rate increases in 2007 and 2008 to meet current needs and a series of needed rate increases to meet future needs. The adoption of the recommended connection charge would also help pay for capital expenditures that would result in a lower borrowing need and/or rate adjustments.

Chapter 1

For Chapter 1, please contact the City.

2. Related Policies, Agreements, and Plans

Everett's program to ensure a comprehensive and reliable system for delivering water to its customers is embedded in a larger network of policies, agreements, and plans that address water supply, land use, and natural resource management within Snohomish County. This chapter describes selected policies, agreements, and plans that relate to the Everett water system and demonstrates that this Comprehensive Water Plan is consistent with them.

2.1. Policies

2.1.1. City of Everett Municipal Code

The operation of Everett's water system is governed by Everett's Municipal Code, which is established by the Everett City Council through City ordinances. The Municipal Code is typically translated by Everett Public Works staff into operational memoranda, policies, and guidelines. Like other major public water utilities, Everett Public Works maintains a set of these operational memoranda, policies, and guidelines.

The codes related to the water system are contained in six of the 15 chapters of Section 14 Water and Sewers of the Everett Municipal Code. The six pertinent chapters are listed and briefly described below. The full text of the six water-related chapters is provided in Appendix 2-1.

Chapter 14.16 Water Rates and Regulations

This chapter contains the majority of the water service codes, including those related to rates, customer categories, service outside of Everett city limits, master meter requirements, establishing new service, infrastructure ownership and maintenance including meters, service line standards, pressure reducing valves, fire service, and other issues.

Two topics in this chapter are of particular interest for this CWP and are therefore discussed in more detail below.

Rates and Charges

Rates and charges for water service are based on standard cost-of-service principles.

Rates for most accounts are comprised of a water charge and a filtration charge, both based on consumption. Both components have a minimum charge regardless of consumption. This rate structure is applied to the following types of metered accounts: domestic, commercial/ industrial/ governmental, and irrigation.

Other rate structures are used for fixed rate accounts, untreated industrial water, master meters to wholesale customers, retail customers outside the city limits, fire hydrants and standpipes, and fire service. For fixed rate accounts, the charge is calculated to be equivalent to a metered charge for similar estimated water consumption and service. For untreated industrial water, Kimberly Clark pays a flat rate. For master meters, a matrix of

meter charges, water charges, and/or filtration charges is used depending on whether the connection is east or west of the Snohomish River and whether the water is pumped or not. For retail customers outside the city limits, charges are computed in the same manner as for in-city customers, and then a 25-percent surcharge is assessed against the water component (not the filtration component).

The code also details a variety of charges including connection charges, penalty charges, and special charges such as for service shutoff and returned checks.

Conditions of Service

Section 14.16.120-130: Mandates an application for water service by the property owner or representative and specifies the payment of service connection charges before water service may begin.

Section 14.16.140: Prohibits issuance of a building permit before water service applications are filed and fees paid.

Section 14.16.330: Describes responsibilities of private developers and Everett in providing water service to new developments. Key provisions of this section require that developers pay for installation of water service when a building permit is requested. It is the responsibility of developers to pay for materials, labor, and equipment necessary to install water service piping from the system's main to each lot in question. All materials, equipment, and labor must meet City standards.

Sections 14.16.340-390: Prohibits the taking of water by private parties without first making application, paying appropriate fees, and receiving approval. These sections also address the right and responsibility of the Utilities Division to impose water use restrictions where appropriate and to prohibit wasting water.

Section 14.16.460: Requires that new connections to the transmission lines be made by master meter.

Chapter 14.20 Water Cross Connections

The cross connection chapter of the code pertains to preventing contamination of the public water system by prohibiting cross connections and requiring backflow prevention devices.

Chapter 14.24 Watershed

The watershed chapter of the code addresses the restricted access to the Chaplain Reservoir Watershed.

Chapter 14.32 Water and Sewer Utility Service Charges

The water and sewer utility service charges chapter discusses issues related to delinquent bills.

Chapter 14.36 Latecomer Agreements

The latecomer agreements chapter pertains to private developers seeking partial recovery of the cost of constructing water system improvements.

Chapter 14.48 Industrial Water

The industrial water chapter of the code covers industrial water use, which is currently used by the Kimberly Clark Tissue Company mill.

2.1.2. Spada Lake Fertilization Policy

Everett has established a policy of opposing fertilization of Spada Lake, which had been suggested as a possible technique to mitigate the effects of raising Culmback Dam on the Spada Lake fishery and on the native trout populations of the upper Sultan River.

In 1999, the *Spada Lake Biological Assessment and Sport Fishery Evaluation* was completed by the Washington State Department of Fish and Wildlife (WDFW). The report included numerous recommendations intended to improve the robustness of the sport fishery. One recommendation was to "perform a literature review and consult with experts in other states or provinces on the potential effectiveness and feasibility of fertilizing the reservoir to enhance primary productivity and edible forms of the zooplankton community."

Although Spada Lake fertilization could increase primary productivity and ultimately improve the resident fishery, there would be significant potential adverse effects on Everett's potable water supply. Fertilization could create potential taste and odor problems, and more importantly, could create trihalomethanes, which can be mutagenic and carcinogenic.

Therefore, in 2003, Everett's Public Works Department established an interim policy that opposes any fertilization of Spada Lake. Upon City Council approval of this CWP, the interim policy will become final and official City of Everett policy. The interim policy is provided in Appendix 2-2.

2.1.3. Service to Annexed Areas

Everett's 2005 Comprehensive Plan makes the following statement regarding annexation: "Annexation is the process by which unincorporated lands adjacent to Everett's boundary become part of Everett. When annexed to Everett, land use designations and zoning districts are assigned. The main reasons for annexation include increasing the efficiency and reducing the fragmentation in the delivery of municipal services, greater control of land use and service planning within a geographically related area, collection of tax revenues to support services that are already being used by residents of an area (parks, library, etc.), and to create more logical city boundaries. By annexing, Everett has more direct control over the land use and service decisions and receives direct tax revenues to support the services provided."

Annexation is governed by Washington State law under Revised Code of Washington (RCW) 35.13.410-.460 and RCW 35A.14.420-.450.

Annexation will affect Everett's water system by adding land areas, water system infrastructure, and water system ratepayers to Everett's existing inventory. When annexations involve assumption of service to customers previously served by a special district, Everett typically assumes the portion of infrastructure associated with that service and pays the district a sum equivalent to the assumed customers' share of district debt. An exception to this practice is with the Mukilteo Water District, where an agreement is in place to defer assumption of service, facilities, and customers for ten years after annexation. Also,

by exception, Everett may determine after an analysis that it is more cost effective to enter into agreement with the existing water provider to continue service after the annexation.

2.1.4. Metering and New Water Use Efficiency Rule

Since 1991, all new connections are required to be serviced through meters, per municipal codes 14.16.100 Metered Service and 14.16.090 Fixed Rate Service.

Everett does provide service to some unmetered services which were in existence prior to the 1991 effective date of Everett's metering requirement. The unmetered services are all retail single-family accounts. While this represents 54 percent of Everett's total connections, the volume of water estimated for those connections is only 6 percent of the total water supplied by Everett. Therefore, the majority of the water provided by Everett is metered.

The water use efficiency rule, associated with the Municipal Water Law, requires that all retail connections be metered and sets a compliance schedule. Everett will meet the metering requirement.

2.1.5. Source Exchange

A source exchange has been considered between Everett and three Snohomish County utilities in order to reduce pressure on environmentally sensitive sources. The utilities are the Cities of Snohomish, Marysville, and Arlington. All three utilities are current wholesale customers of Everett; however, additionally they each have their own independent supply. Snohomish uses surface water from the Pilchuck River, while Marysville and Arlington use groundwater from the Stillaguamish basin. A source exchange would entail Snohomish, Marysville, and Arlington refraining from using those independent supply sources during environmentally sensitive times, especially related to fish habitat, and instead using water from Everett. Everett is amenable to this option in order to foster environmental benefits; however, no firm decisions or commitments have been made.

2.1.6. Lower Snohomish Water

Everett's current surface water diversion in the Snohomish River Watershed is high in the system, on the Sultan River. The concept of diverting water from lower in the system has been examined as part of Everett's participation in the Snohomish River Regional Water Authority water right. As discussed in Section 2.2.3, Everett is legally allowed to divert water from the lower Snohomish River at the intake previously used to supply the former Weyerhaeuser mill. There are currently no firm plans to use lower Snohomish River water due to financial, logistical, and policy challenges. See Section 2.2.3 for a discussion of those challenges.

2.1.7. Jackson Project FERC License

Everett and the Snohomish County PUD (PUD) are the co-licensees of the Henry M. Jackson Hydroelectric Project, which includes Culmback Dam and the downstream water and power supply facilities. The license was granted by the Federal Energy Regulatory Commission (FERC) in 1961. The license covers a variety of issues including, but not limited to, minimum flows, reservoir operating levels, flood control, fish and wildlife mitigation, and public access A copy of the license is provide in Appendix 2-3.

The current FERC license expires in 2011. Everett and the PUD are seeking a new 50-year federal license and initiated the formal re-licensing process in December 2005. Comprehensive information on the relicensing project including the relicensing process, formal documents, and detailed timelines can be obtained from the PUD website as follows:

www.snopud.com/WaterResources/relicensing.ashx.

Key milestones in the relicensing process, and their anticipated dates, are as follows:

- December 2005 Notice Of Intent and Pre-Application Document filed by City and PUD.
- January 2006 Scoping Document 1 issued by FERC.
- May 2006 Scoping Document 2 issued by FERC.
- May 2006 Proposed Study Plan filed by City and PUD.
- October 2006 Director's Study Plan Determination issued by FERC.
- December 2008 Preliminary Licensing Proposal filed by City and PUD.
- May 2009 Final License Application filed by City and PUD.

2.1.8. Recreational Use of Spada Reservoir

In April 2005, Everett created the Spada Lake Recreation Position Paper regarding recreation within the Spada Lake watershed. The position was driven primarily in anticipation of the Jackson Project FERC relicensing process (see Section 2.1.7); however, the position has implications beyond the relicensing. The position paper, which is provided in Appendix 2-4, includes the history of recreation in the watershed, potential water quality impacts of recreation, existing water quality regulations, and Everett's position on recreation in Spada watershed.

Various types of recreation are currently allowed in the watershed and are regulated according to landowner type. Allowed recreation includes hunting, fishing, hiking, picnicking, off-road vehicle riding, mountain biking, horseback riding, camping, and mining. Landowners include Snohomish County PUD, Washington State Department of Natural Resources, the U.S. Forest Service, and private landowners.

The potential water quality impacts of these recreational activities are largely due to human waste, fuel spills, and soil erosion. Everett's Watershed Control Program addresses these issues. See Section 6.8 for a discussion of the program and Appendix 6-4 for the document.

Controlling potential sources of pollution is a practice that is both recommended and required by water supply organizations and regulatory authorities.

Everett's positions on recreation in the watershed are as follows:

- Advocate for low intensity recreation, such as presently exists.
- Discourage expansion of overnight camping.
- Work with DNR to eliminate off road vehicle use.
- Use water quality monitoring to quantify sources of pollution.
- Continue daily watershed patrols.
- Review any proposed land use changes that could intensify recreation and/or impact water quality.

- Work with property owners to minimize recreational activities with the potential to impact water quality.
- Work with Snohomish County to adopt an ordinance that restricts public use to those compatible with the protection of public health and safety.

2.1.9. Removal of Retail Customers from Transmission Lines

The Everett Municipal Code prohibits new retail customer connections to the transmission line. Section 14.16.460 Water Service Outside City Limits of the code states that "new connections to the #2, #3, #4, or #5 water transmission lines shall be by master meter only supplying a minimum of ten or more customers" (part A) and that "No new individual water services will be allowed outside of Everett. All new water services must have a minimum of ten customers and comply with all state regulations for Class 1 (i.e., Class A) or Class 2 (i.e., Class B) public water systems" (part H). (See Section 2.1.1 regarding updating this code language for consistency with WAC 246-290 Public Water Supplies.)

As noted in Chapter 1, there are approximately 458 connections to transmission lines that are 2 inches in diameter and smaller. While a few of these are public water systems, the majority are retail customers that have been grandfathered in over the years. It is recommended that Everett explore removing retail customers from the transmission lines and transferring service responsibility to the appropriate public water system.

There are three benefits to removal of these retail customers from the transmission lines: (1) source reliability to these customers will improve because their current service from the transmission line is considered interruptible, (2) the retail customers should receive higher pressure than currently provided, and (3) removal of these customers will simplify operations for Everett.

Consequently, it is recommended that the following policy be adopted by the City Council:

14.16.465 Transferring of Water Service Outside City Limits

A. All individual customers and Group B public water systems as defined in WAC 246-290-020 (currently less than 15 service connections) served from any of the City's water transmission lines are required to transfer their water service to an alternate water system within 60 calendar days, when:

   1. They are within the service area of a Group A public water system as defined in WAC 246-290-020 (currently 15 or more service connections); and

   2. An active water distribution main owned by the Group A public water system fronts any part of the property or fronts the existing service connection of the individual customer or the Group B public water system.

B. Water connections with easement rights for water delivery from the City are excluded from this policy as determined by the City's Utilities Director.

C. The City's Utilities Director may, on written request from the property owner or the Group B public water sysem, extend the time of the required transfer for a maximum period of six months, provided that this extension is acceptable to the Group A public water system serving the property.

D. Upon completion of the transfer, the City will remove the existing service along with the service meter at its convenience.

2.1.10. Municipal Code Language Update – Recommended Policy

Section 14.16.460 of the Everett Municipal Code requires that new connections to the transmission lines be made by master meter. The language in this section of the Everett Municipal Code is not consistent with current language under WAC 246-290 Public Water Supplies. The Everett Municipal Code states that "new connections to the #2, #3, #4, or #5 water transmission lines shall be by master meter only supplying a minimum of ten or more customers" (part A) and that "All new water services must have a minimum of ten customers and comply with all state regulations for Class 1 or Class 2 public water systems" (part H).

It is recommended that Everett update their municipal code language to the following language:

> "New connections or upsizing of existing connections to the #2, #3, #4, or #5 water transmission lines shall be by master meter only supplying Group A public water systems as defined in WAC 246-290-020 (currently 15 or more service connections)."

2.1.11. Levels of Conservation

Everett and its wholesale customers have long recognized the value of water conservation in supporting cost-effective management of the water system and sound stewardship of the Sultan River. Chapter 5 of the Comprehensive Water Plan describes Everett's historical conservation activities and the conservation program it plans to implement over the next six years.

2.1.12. Reclaimed Water

Everett began providing reclaimed water in 2005. Reclaimed water is treated effluent from a wastewater treatment plant that is suitable for certain non-potable uses. Reclaimed water has the potential to substitute for potable or unfiltered water, thereby reducing Sultan River Basin diversions and providing an environmental benefit. Currently, Everett provides reclaimed water to the Kimberly-Clark mill for industrial purposes. This offsets a portion of the unfiltered water historically used by the mill. Section 3.5 discusses reclaimed water including federal and state regulations, distribution, current demand, and projected demand.

2.1.13. Wholesale Connection Charge

Everett is evaluating changing the structure of wholesale customer rates. Currently, wholesale customers pay a 1.2 multiplier to the water charge component of their rates. The wholesale customers have requested that the rate multiplier be converted to a connection charge, which would be based on new retail connections in wholesale customers' service areas. The change would be designed to be revenue neutral for Everett, but would partially re-allocate revenue from wholesale customers based on growth. Everett is currently conducting a rate study, the results of which will be used to help determine whether this change will be implemented.

2.1.14. Potential Emergency Intertie with Seattle

The concept of an emergency intertie between the Everett and Seattle regional systems has been discussed over the years. An emergency intertie could provide added supply management options and reliability for the systems. The City should pursue development of such an emergency intertie to provide it with a back-up emergency supply. See Section 2.2.3 for a discussion of using water from the Snohomish River Regional Water Authority Water Right for an emergency intertie with Seattle. As a placeholder, this emergency intertie is shown in our capital program as being online in 20 years. This would be subject to numerous factors including approval by the City of Seattle, Alderwood Water and Wastewater District, Silver Lake Water District, Cross Valley Water District, and Snohomish PUD.

2.1.15. Storage Requirements for Wholesale Customers

The State of Washington requires that public water systems have adequate volumes of storage in their distribution systems. WAC 246-290-235 states, in part, "Equalizing storage, as defined in WAC 246-290-010, shall be provided to meet peak periods of demand, either daily or longer, when determined to be necessary based on available, or designed, source pumping capacity. Operational, standby, and fire suppression storage volumes as defined in WAC 246-290-010 shall be provided, as applicable, for all pressure zones to meet both normal as well as abnormal demands of the system.

Some of Everett's wholesale customers have historically relied on Everett's transmission system for their storage requirements, rather than develop storage facilities in their own distribution systems. All wholesale customers should provide adequate storage in accordance with WAC 246-290-235 and independent of Everett's transmission system.

2.1.16. Wholesale Service Area

The City of Everett's water system has served as a regional resource for the residents of Snohomish County for decades. Since Everett is part of the Snohomish River Regional Water Authority (SRRWA) and has a share of its water right, the City of Everett is combining its wholesale service area with the place of use of the SRRWA water right approved by Washington State Department of Ecology. This includes the service area of Northshore Utility District, City of Bothell, and Woodinville Water District. This is discussed as part of Section 2.1.14 and Section 2.2.3.

2.2. Water Agreements

2.2.1. Water Supply Agreements

Everett has many connections to other water systems due to its role as the wholesale provider to most of the public water systems in Snohomish County. As discussed in Chapter 1, Everett has 33 Group A and 25 Group B direct wholesale customers.

Everett currently has formal written water supply agreements with the following three direct wholesale customers: (1) Alderwood Water and Wastewater District, (2) Snohomish PUD/City of Marysville/Tulalip Tribes Joint Operating Agreement (JOA), and (3) City of Sultan. The agreements cover subjects including, but not limited to, water quantity, delivery

points, rates, and water quality. The Alderwood agreement was signed in 2005, expires in 2055, and states Everett will supply water to meet a maximum peak day demand of 106 mgd. The JOA agreement was signed in 1991, expires in 2020, and states Everett will supply water to meet a maximum peak day demand of 27 mgd by 2020. The Sultan agreement was signed in 1999, expires in 2030, and states Everett will supply water to meet a maximum peak day demand of 2.9 mgd by 2025. The full agreements are provided in Appendix 2-5.

A new water supply agreement with the Tulalip Tribes will be developed under the water supply settlement between Everett and the Tulalip Tribes *(Agreement for Settlement, Water Supply, and Water Delivery System Between The Tulalip Tribes of Washington and the City of Everett, Washington*) signed on September 16, 2005. Under this settlement, a renewable 50-year contract will be created whereby Everett will provide the Tulalip Tribes with a maximum of 30 million gallons per day (mgd) of water at an average annual rate, and a maximum of 36 mgd of water during peak periods. The water will be delivered directly to the Tulalip Tribes through a new pipeline planned for completion by 2010. A copy of the settlement is provided in Appendix 2-6.

The remaining direct wholesale customers receive water from Everett without formal agreements. In these cases, the rates, charges, and conditions of service are established as a matter of general policy by Section 14 of the Everett Municipal Code, particularly the following two sub-sections: 14.16.460 Water Service Outside City Limits and 14.16.710-713 Rates and Charges.

2.2.2. Mutual Aid Agreement

Everett and several of its wholesale customers entered into a Water and Sewer Mutual Aid Agreement in 1995. The Agreement was updated in 2007 and now includes twelve of Everett's wholesale customers. The agreement, which is found in Appendix 2-7, details information about providing resources to each other in response to disasters and emergencies. Topics in the agreement include, in part, protocols for making a request, protocols for responding to a request, control of resources, and cost reimbursement.

Parties to the agreement include the following utilities:

1. Alderwood Water and Wastewater District
2. Arlington, City of
3. Cross Valley Water District
4. Edmonds, City of
5. Everett, City of
6. Highland Water District
7. Lynnwood, City of
8. Marysville, City of
9. Mukilteo Water District
10. Olympic View Water and Sewer District
11. Public Utility District of Snohomish County
12. Silver Lake Water District
13. Snohomish, City of

2.2.3. Snohomish River Regional Water Authority Water Right

Everett, the Woodinville Water District (Woodinville), and the Northshore Utility District (Northshore) formed the Snohomish River Regional Water Authority (SRRWA) to acquire a water right formerly held by the Weyerhaeuser (Weyco) Timber Company.

The *1996 Snohomish River Regional Water Authority Plan of Use Weyerhaeuser Timber Company Water Right No. S1-10617C* is a plan that analyzes issues associated with the SRRWA's application to the Washington State Department of Ecology (Ecology) for acquiring the Weyerhaeuser water right. Acquisition of the water right led to changing the purpose of use from manufacturing to municipal, and changing the place of use from a former industrial site in North Everett to "areas served by the Snohomish River SRRWA", which includes the consolidated service areas of the SRRWA members. The original Weyco water right has an instantaneous withdrawal rate of 56 cubic feet per second (cfs) (36 mgd). While the water right does not specify an annual quantity limitation, the SRRWA requested an amount based on the historical maximum annual withdrawal rate perfected by Weyerhaeuser in normal plant operation of 32,700 acre-feet per year (29 mgd). Subsequent to the strategic plan, Ecology approved the water right transfer, with an instantaneous withdrawal rate (Qi) of 56 cfs or 36 mgd, subject to flow conditions, but reduced the annual quantity (Qa) to 26,547 acre-feet per year or 23.7 mgd. Everett received 42 percent of the approved water right, which equates to a Qi of 15 mgd (23.3 cfs) and a Qa of 11,062 afy (9.9 mgd).

Subsequent to the 1996 strategic plan, Everett and its SRRWA partners engaged in further analysis of how the SRRWA might utilize this water in the future. One finding was that in the near term, Everett has no immediate plans to use its portion of this water right. This is due to a combination of factors including available supply, water quality, methods of use, treatment costs, and transmission costs. However, it should be noted that as the supply, demand, and cost parameters change in the future, it will be more likely that the SRRWA water will be used by the partners. The SRRWA continues to study the various options consistent with the development schedule inscribed in the Report of Examination (ROE),

Water quality is an issue since the current intake for the SRRWA water right is located on the lower Snohomish River. The lower Snohomish River has lower water quality than the partners' current sources. Everett's source is the Sultan River, which is higher up in the Snohomish River watershed. The Tolt River is the ultimate source for Northshore and Woodinville. Water of lower quality, even when meeting legal standards, is less appealing both for customers and for utilities mixing water in transmission systems.

A treatment plant would need to be built if water were diverted at the current intake, since no treatment plant exists at that location. The plant would need to treat to drinking water standards if water were used for potable purposes. The intake is near Everett's pipeline for the industrial water it provides to Kimberly Clark. If the SRRWA water right were used only to supply Kimberly Clark, the treatment plant would only need to treat to industrial standards. If the water right were used to replace water that Kimberly Clark now receives from Everett's Sultan supply, it could be possible to "swap" and use treated Sultan water to supply Northshore and Woodinville.

Transmission systems would need to be built to deliver the water to Northshore and/or Woodinville, regardless of whether the water is obtained from the current intake or from the Sultan River. Portions of existing transmission systems might be utilized, namely the new Clearview pipeline and reservoir. However, additional new pipelines would still be needed

to extend from Clearview to Northshore and Woodinville. Any use of the Clearview pipeline and reservoir would need to be negotiated with the Clearview Water Supply Agency, which owns those facilities.

The use of the SRRWA water right will continue to undergo analysis of issues regarding water quality, treatment costs and transmission costs. It remains the City's intent to continue to be active in regional water resource planning processes and to coordinate, as appropriate, the future development of the SRRWA supply source with Seattle and other regional purveyors. This would be done in compliance with the Washington Department of Health Coordinated Water System Plan (CWSP) rules, guidelines, and processes. Additionally, Everett and Snohomish County PUD would need to approve exportation of any Sultan River water south of the Snohomish/King County border, in accordance with their joint management of the Sultan River water and power supply project.

2.3. Water Plans

2.3.1. Wholesale Customer Comprehensive Water Plans

The Comprehensive Water Plans of 11 of Everett's largest direct wholesale customers were reviewed to verify that information regarding demographic and demand projections, and discussions of regional facilities, were consistent with information contained in Everett's CWP. The CWPs of three indirect wholesale customers were also reviewed.

The following wholesale customers' CWPs were reviewed. The dates of the plans are indicated as well.

- Alderwood Water and Wastewater District (2003):
  - Edmonds, City of (2002) - indirect wholesale customer
  - Lynnwood, City of (2005 draft) - indirect wholesale customer
  - Mountlake Terrace, City of (2001) - indirect wholesale customer
- Cross Valley Water District (1999)
- Highland Water District (2000)
- Marysville, City of (2003)
- Monroe, City of (2005 draft)
- Mukilteo Water District (2003)
- Roosevelt Water Association (2004 draft)
- Silver Lake Water District (2003)
- Snohomish, City of (2005 draft)
- Snohomish PUD #1 (2002)
- Three Lakes Water Association (1996)

Direct comparisons between the data in Everett's CWP and wholesale customers' plans were not always possible due to a variety of issues including different time frames, shifting service area boundaries due to annexation, and uncertainty whether conservation adjustments were included in customers' plans.

Given modifications to partially correct for those issues, there appears to be broad consistency between these plans and Everett's CWP. In general, the demand forecast in Everett's CWP is within 15 percent of the numbers estimated by the wholesale customers. However, there are three cases where the difference varies by more than 15 percent. For Highland, the Everett CWP numbers are approximately 130 percent of the numbers in

Highland's CWP (for example, 2025 ADD at 0.44 mgd vs 0.34 mgd). For Monroe, the Everett CWP numbers are approximately 55 percent of the numbers in Monroe's CWP (for example, 2025 ADD at 2.0 mgd vs 3.63 mgd). For Roosevelt, the Everett CWP numbers are approximately 10 percent of the numbers in Roosevelt's CWP (for example, 2025 ADD at 0.3 mgd vs 2.93 mgd).

While the reason for these discrepancies is unclear, the impact is not significant in terms of the overall Everett system. Everett has sufficient water rights to accommodate such discrepancies. While Everett's source capacity has some constraints, namely capacity at the filtration plant, these demand forecast discrepancies would not have a significant impact on the volume of the capacity expansion, but rather might shift the timing of those expansions slightly.

Everett's wholesale customers were given the opportunity to review the demand forecasts in this Comprehensive Water Plan, as part of their review of a Planning Data Memorandum provided to wholesale customers.

The reviewed wholesale customers' comprehensive plans acknowledge that Everett is the supply source for their drinking water, either in full or in part.

2.3.2. North Snohomish County Coordinated Water System Plan

The 1991 North Snohomish County Coordinated Water System Plan (CWSP) provides a framework for planning and resource management for the urbanizing areas of the county not served by the Everett system. The CWSP was created under state legislation enacted in 1977 aimed at slowing the proliferation of small systems and consolidating existing systems. The purpose of the CWSP is to provide water utilities within the planning area with a consistent approach to meeting the needs of growth as defined by the County's Comprehensive Land Use Plan.

A Water Utility Coordinating Committee (WUCC) guided development of this plan. The CWSP was completed after three years of discussions among Snohomish County, Everett, the Tulalip Tribes, Snohomish Public Utility District (PUD), water utilities, the Washington State Department of Health (DOH), and Ecology. The CWSP covers a large portion of the County's land area north, east, and southeast of Everett. Everett and the service areas of utilities in the southwest portion of the County are not within the planning area for the CWSP.

The CWSP acknowledges, among many other points, that Everett offers a logical source of future water supply to meet growing demands in many areas of the County.

2.3.3. Regional Water Supply Outlook

The 2001 Regional Water Supply Outlook (Outlook) is a regional assessment of water supply and demand through 2020 throughout King, Pierce, and Snohomish Counties. The Outlook was developed by the Central Puget Sound Water Suppliers Forum (Forum), which is a group of water utilities and other organizations involved in water supply planning in the central Puget Sound area.

Direct comparisons between the data in Everett's CWP and the Outlook were not feasible due to a variety of issues including shifting service area boundaries due to annexation and Everett adding wholesale customers over time. However, a similar demand forecasting

methodology was used for both the Outlook and this CWP. That methodology combines demographic data from the Puget Sound Regional Council (PSRC) and water use factors. For the CWP, a more recent version of the PSRC data used, as well as updated water use factors.

2.4. General Plans

2.4.1. City of Everett Comprehensive Plan

In 2005, Everett completed a 10-year update of its 1994 Comprehensive Plan, as required by the State of Washington's Growth Management Act (GMA). The 2005 City of Everett Comprehensive Plan guides growth and development in Everett for the next 20 years.

The Comprehensive Plan includes ten main sections: (1) Introduction, (2) Land Use, (3) Shoreline Land Use, (4) Housing, (5) Transportation, (6) Capital Facilities, (7) Economic Development, (8) Urban Design, (9) Parks and Recreation, and (10) Other Information. A summary of information pertinent to Everett's Comprehensive Water Plan is provided below and associated chapters are provided in Appendix 2-8. It indicates that Everett's Comprehensive Water Plan is consistent with Everett's Comprehensive Plan.

Introduction

Chapter 1 of Everett's Comprehensive Plan includes forecasts of population and employment. However, these numbers cannot be directly compared with numbers in the CWP because the planning areas are different. The planning area for Everett's Comprehensive Plan includes areas within the current city boundary, as well as unincorporated areas with a reasonable chance of being annexed in the next 20 years. The planning area for the CWP is the current water service area, as defined by the 1991 North Snohomish County Coordinated Water System Plan. A preliminary analysis was conducted to estimate population associated with the potential annexation areas shown in Everett's Comprehensive Plan. It appears that these data are relatively consistent with the population forecast in Everett's CWP.

Land Use

Chapter 2 of Everett's Comprehensive Plan provides zoning designations for land within the current city boundary. Figure 2-1 shows the various zoning designations. This map was developed for the Everett CWP using zoning data provided by Everett.

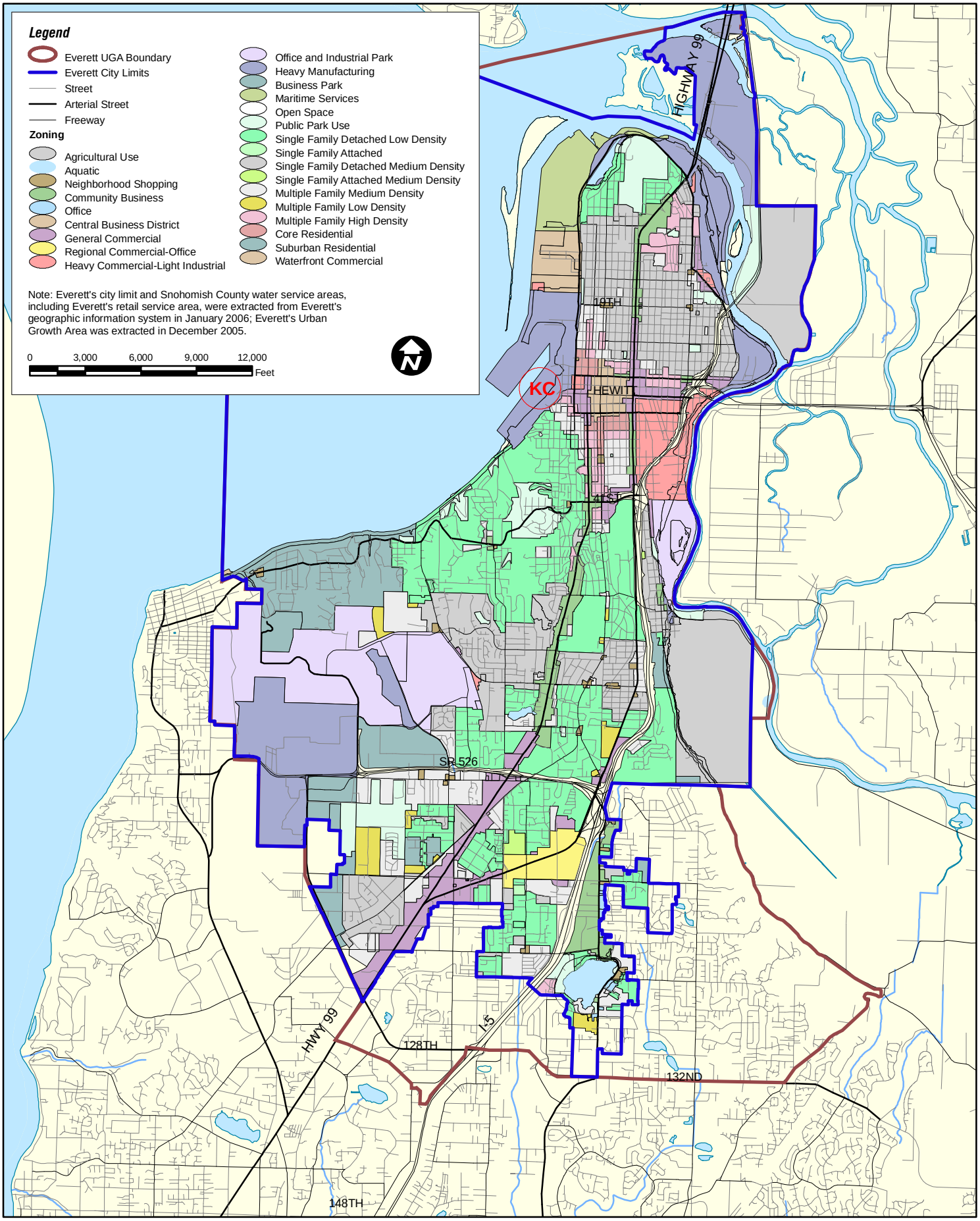
Housing

Chapter 4 of Everett's Comprehensive Plan provides housing production targets to be built by 2025. However, the information is not provided in a manner that allows comparison with the housing estimates developed for Everett's CWP.

Capital Facilities

Chapter 6 of Everett's Comprehensive Plan provides information related to water service, and in particular provides goals and a Capital Improvement Program (CIP). Two water service goals are relevant to this CWP. First, Goal 6.1-Concurrency and Provision of

Service states that Everett should “ensure that those public facilities and services needed to support development, and required to be “concurrent” under GMA, are adequate to serve the development at the time it is available for occupancy and use.” Second, Goal 6.3-Consistency states Everett should “ensure consistency among elements of Everett’s Comprehensive Plan and among affected agencies and neighboring jurisdictions’ plans.” This CWP supports both of those goals.



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City of Everett Zoning

FIGURE 2-1

2.4.2. Snohomish County Comprehensive Plan

In 2005, Snohomish County completed a 10-year update of its 1995 Comprehensive Plan, as required by the State of Washington's Growth Management Act. The 2005 Snohomish County Comprehensive Plan guides growth and development in the unincorporated areas of Snohomish County for the next 20 years.

The General Policy Plan, which is the primary document of the Comprehensive Plan, includes nine main sections: (1) Population and Employment, (2) Land Use, (3) Housing, (4) Transportation, (5) Capital Facilities, (6) Utilities, (7) Economic Development, (8) Natural Environment, and (9) Interjurisdictional Coordination. A summary of information pertinent to Everett's Comprehensive Water Plan is provided below and associated chapters are provided in Appendix 2-9. It indicates that Everett's Comprehensive Water Plan is consistent with Snohomish County's Comprehensive Plan.

Population and Employment

The Population and Employment chapter of the Snohomish County Comprehensive Plan provides projections for population and employment numbers for the year 2025. These forecasts are necessary in order to ensure that the anticipated urban growth can be accommodated within the Urban Growth Areas (UGAs). The forecasts extend beyond the UGAs and include forecasts for the entire county.

The population and employment forecasts provided in the draft Snohomish County Comprehensive Plan are similar to those provided in Chapter 3 of this Comprehensive Water Plan. The 2025 countywide population number provided in the County's plan is 932,951 compared with 889,125 in Everett's CWP, a difference of five percent. The 2025 countywide employment number provided in the County's plan is 345,332 compared with 334,399 in Everett's CWP, a difference of 3 percent. Sub-area comparisons are not easily made because the County Comprehensive Plan breaks out sub-areas based on urban growth areas, while Everett's CWP breaks out sub-areas based on water utility service areas.

It should be noted that a similar comparison of the number of households was not possible because the Snohomish County Comprehensive Plan does not provide countywide forecasts for the number of households.

Land Use

The Snohomish County Comprehensive Plan characterizes land use classifications for all unincorporated land in the county. It also designates 13 UGAs as listed below.

1. Arlington
2. Darrington
3. Gold Bar
4. Granite Falls
5. Index
6. Lake Stevens
7. Maltby
8. Marysville
9. Monroe
10. Snohomish

11. Southwest County (Bothell, Brier, Edmonds, Everett, Lynnwood, Mill Creek, Mountlake Terrace, Mukilteo, and Woodway)
12. Stanwood
13. Sultan

Figure 2-2 shows the land use classifications and the urban growth areas throughout Snohomish County. It also includes boundaries for Everett's current wholesale water customers. This map was developed for the Everett CWP using data provided by Snohomish County.

Utilities

Snohomish County does not supply water; however, it has a vested interest in water supply since it is ultimately responsible for water service if a water district fails or becomes financially insolvent. The Snohomish County Comprehensive Plan identifies the following goals and associated objectives for utility planning:

Goal UT 1: Enhance the efficiency and quality of service from utility providers through the review and evaluation of utility, land use, transportation, and natural environment planning documents.

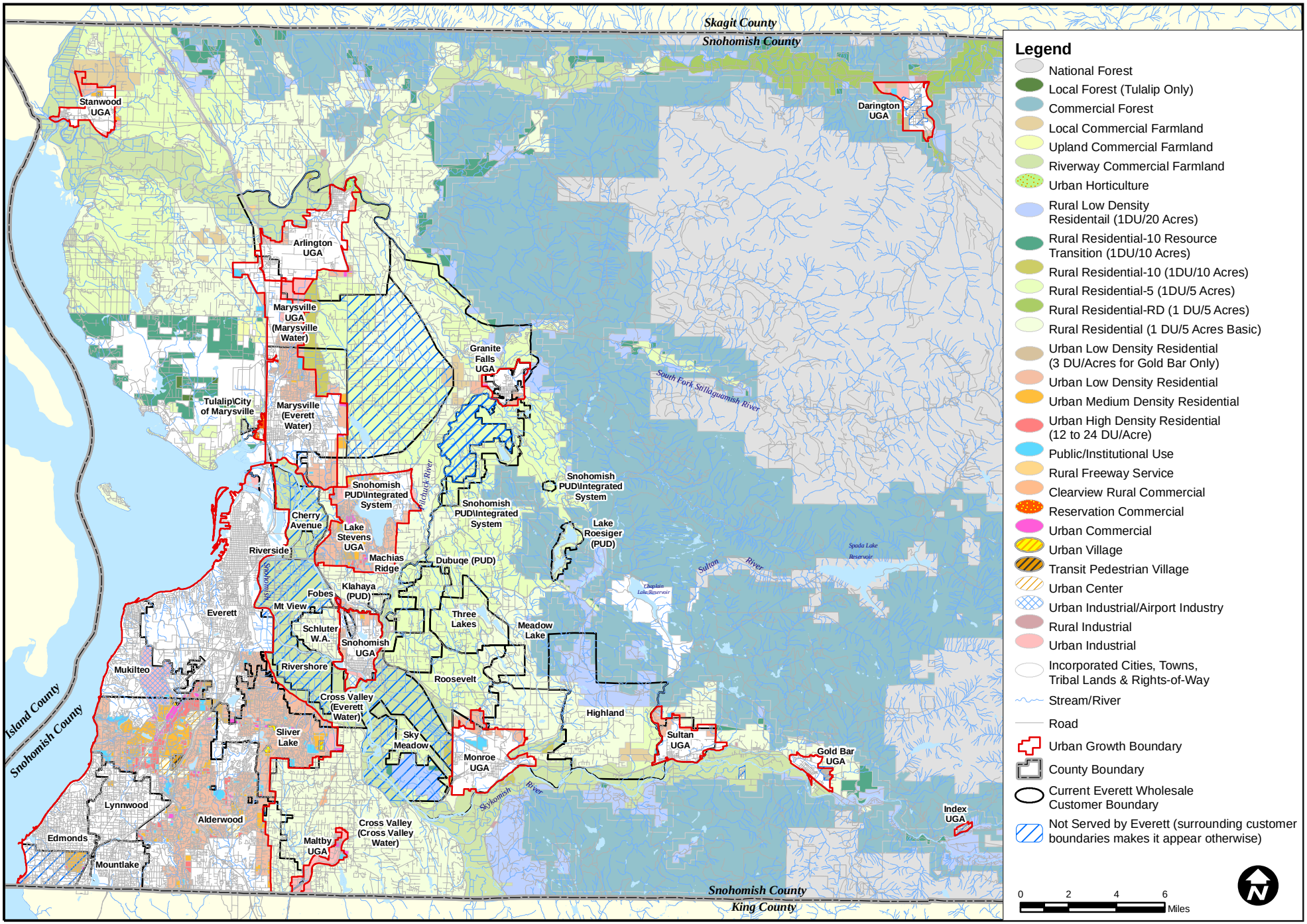
> **Objective UT 1A:** Pursue a more coordinated facility planning process among the various utility providers serving Snohomish County.
>
> **Objective UT 1B:** Achieve and maintain consistency between utility system expansion plans and planned land use patterns.

Goal UT 2: Work with provider agencies of Snohomish County and assist them to ensure the availability of a reliable, high quality water supply for all households within the county in a manner that is consistent with the comprehensive plan and protection of the natural environment.

> **Objective UT 2A:** All new residential developments should be able to demonstrate the availability of a potable water supply meeting state water quality standards and of sufficient capacity to serve domestic requirements.
>
> **Objective UT 2B:** Work with provider agencies to assist them in modifying their system plans as required to support the land use element of the comprehensive plan.

This CWP is consistent with these goals and objectives since its preparation involved coordination with water utilities and land use planning agencies across Snohomish County.

A related item to note is that public water systems are allowed outside of UGAs. This policy is documented in the Countywide Planning Policies (CWPP) of Snohomish County, which guide the development and revision of local comprehensive plans. The CWPPs were developed by Snohomish County and its cities, towns, and the Tulalip Tribes through a joint planning process called Snohomish County Tomorrow. Countywide Planning Policy number RU-3 states that "public water supply systems may be developed in the rural areas to meet the requirements of rural residents." Figure 2-2 illustrates that Everett does supply water outside of UGAs.



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Note: Snohomish County water service areas, including Everett's retail service area, were extracted from Everett's geographic information system in January 2006; Everett's Urban Growth Area was extracted in December 2005.

Snohomish County Land Use

FIGURE 2-2

Interjurisdictional Coordination

The Interjusidictional Coordination chapter of the Snohomish County Comprehensive Plan discusses the need for coordination across jurisdictions. An overriding goal is to "promote the coordination of planning, financing, and implementing programs between the county and local jurisdictions including tribal governments." One reason this coordination is necessary is that certain planning issues, such as water supply, cross jurisdictional boundaries. Another reason is that as land is incorporated, governance shifts from county to municipal control. This CWP supports interjurisdictional coordination in that it was prepared with involvement from cities, Snohomish County, the Tulalip Tribes and water utilities across Snohomish County.

2.4.3. Snohomish River Basin Salmon Conservation Plan

The 2005 Snohomish River Basin Salmon Conservation Plan guides protection and restoration of salmon in the Snohomish River basin over the next 10 years. It was developed by the Snohomish Basin Recovery Forum, a group representing a variety of perspectives, including local government (including Everett), the Tulalip Tribes, business, recreation, agriculture, the environment, the public, and others.

The focus of the plan is habitat improvement related to the following habitat indicators: riparian forest, instream passage barriers, edge habitat, instream habitat structure, forest cover, impervious surface, and road density. The plan focuses primarily on the nearshore, estuary and main stem habitats, and to a lesser degree on the lowland tributaries and the headwaters. Specific habitat improvement recommendations are made in the plan; however, none of the recommendations affect the municipal water supply functions of Everett.

Instream flows were not included in the analyzed habitat indicators. While the plan does identify known low flow problems, the plan states that full analysis of instream flows is beyond the scope of the plan and that the Shared Strategy for Puget Sound is currently developing a strategy to address flow issues.

3. Planning Data and Demand

This chapter presents information on demographics and water demand for Everett's regional water system. Data from recent years is reviewed, and a forecast of future demand through year 2100 is developed.

Everett delivers potable water supplies to retail customers in its own service area, and supplies water on a wholesale basis to other water systems in Snohomish County. In addition, Everett provides unfiltered industrial water supply to the Kimberly-Clark mill, located in Everett. Everett also supplies reclaimed water to the mill. Each of these categories is discussed in the following sections:

3.1 Customer Categories and Characteristics
3.2 Potable Water
3.3 Unfiltered Industrial Water
3.4 Non-revenue Water
3.5 Reclaimed Water
3.6 Summary of Total System Demand

3.1. Customer Categories and Characteristics

3.1.1. Retail Customer Connections

Everett serves potable water directly to residential, commercial, and other customers throughout the Everett retail service area (Figure 1-1). A small percentage of the direct retail connections served by Everett are located outside of the Everett Retail Service Area. These connections are located along the various transmission lines operated by Everett. The majority of the retail service area is within the City limits. However, some of the retail service area lies outside of the City limits and a small portion of Everett is not served by the Everett water system. Retail connections are categorized into nine billing classes, each of which is described below. Table 3-1 lists the number of metered connections with sales of potable water by billing class for 2000 through 2005.

Table 3-1 Retail Connections

Connection Type [1]	Approximate Number of Connections					
	2000	2001	2002	2003	2004	2005
Retail (Potable)						
Single-Family Residential						
Outside City (metered)	1,342	1,338	1,342	1,396	1,450	1,459
Inside City (metered/Flat) [2]	130	129	129	129	127	128
Inside City (metered)	3,380	3,525	3,663	3,800	3,997	4,128
Inside City (non-metered/Flat)	13,353	13,266	13,218	13,213	13,158	13,115
Single-Family Subtotal	*18,205*	*18,258*	*18,352*	*18,538*	*18,732*	*18,830*
Multi-Family Residential						
Outside City	96	95	92	91	90	91
Inside City	2,890	2,916	2,939	2,980	2,984	2,999
Multi-Family Residential Subtotal	*2,986*	*3,011*	*3,031*	*3,071*	*3,074*	*3,090*
Multi-Family Irrigation	81	80	91	88	89	97
Commercial and Industrial	1,836	1,833	1,837	1,832	1,833	1,830
Commercial and Industrial Irrigation	184	178	176	179	188	197
Government	121	117	123	119	119	126
City of Everett	49	47	51	49	52	47
City of Everett Irrigation	46	36	39	52	53	53
Fire Service	61	59	47	56	41	30
Kimberly-Clark (Unfiltered Industrial) [3]	1	1	1	1	1	1

Source: City of Everett - Billing system data, extracted January 2006.
Notes:
(1) Connections are based on the number of customer accounts with sales.
(2) These customers have meters; however, they are billed on a flat rate basis.
(3) This connection is considered a retail connection; however, it is presented separately as it receives unfiltered water.

***1. Single-Family Residential*:** This billing class includes metered and non-metered single-family household connections inside and outside of the City limits.

***2. Multi-Family Residential*:** This billing class includes all multi-family housing, from duplexes to large apartment complexes inside and outside of the City limits. This billing class excludes specific irrigation connections identified in the multi-family irrigation billing class.

***3. Multi-Family Irrigation*:** This category includes separate irrigation meters installed at some multi-family customer sites.

***4. Commercial and Industrial*:** This billing class includes most of the non-residential connections served by Everett inside and outside City limits. This billing class excludes specific irrigation connections identified in the commercial and industrial irrigation billing class and connections for unfiltered water.

***5. Commercial and Industrial Irrigation*:** This billing class represents select connections to commercial or industrial sites for irrigation purposes. This does not include irrigation connections for multi-family households or City of Everett irrigation.

***6. Governmental*:** This billing class represents connections to public sector accounts, such as schools, parks, and local, state, and federal government offices or facilities.

***7. City of Everett*:** This billing class represents connections to City-owned facilities.

8. City of Everett Irrigation: This billing class includes separate irrigation meters installed at some of Everett's properties.

***9. Fire Service*:** This billing class includes charges for stand-by capacity for fire requirements.

In addition to these customer categories, Everett provides unfiltered industrial water on a retail basis to the Kimberly-Clark mill through a separate pipeline.

3.1.2. Wholesale Customer Connections

Everett also provides potable water to 29 wholesale water customers through 59 connections. Each of these customers is a public water system that delivers water to residences and businesses through its own local distribution system. These systems are identified and discussed further in the following section.

3.2. Potable Water

This section reviews data on production and sales of potable water. Production refers to water produced at the Water Filtration Plant, while sales represents water delivered to customers. This section also assesses non-revenue water, which is the difference between production and sales. This section then presents a forecast of demand for potable water.

3.2.1. Production of Potable Water

Water produced at the Water Filtration Plant for the 11-year period from 1995 to 2005 is displayed in Table 3-2. Production increased eight percent during this time, reflecting the significant growth that has occurred in Snohomish County. Production has a distinct seasonal pattern, with sales in August being approximately 67 percent higher than in January.

Later in this section, peaking factors are used to project maximum day demands. The maximum day peaking factor is defined as the ratio of maximum day demand (MDD) to average day demand (ADD). This system wide peaking factor was 1.8 during the most recent three years (2003 – 2005).

Table 3-2 Historical Potable Water Production for Retail and Wholesale Distribution (1995-2005)

Month	Potable Water Production (Million Gallons) [1]												
												Average	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	10-Year (1996-2005)	3-Year (2003-2005)
January	1,320	1,225	1,307	1,297	1,308	1,362	1,410	1,341	1,352	1,385	1,280	1,327	1,339
February	1,070	1,115	1,156	1,156	1,161	1,300	1,235	1,261	1,126	1,234	1,179	1,192	1,180
March	1,189	1,267	1,231	1,281	1,306	1,387	1,382	1,346	1,294	1,342	1,332	1,317	1,323
April	1,186	1,178	1,247	1,284	1,284	1,355	1,340	1,245	1,306	1,426	1,320	1,298	1,351
May	1,582	1,246	1,482	1,465	1,446	1,513	1,563	1,373	1,427	1,670	1,561	1,475	1,553
June	1,826	1,560	1,448	1,611	1,531	1,731	1,594	1,786	2,086	1,983	1,535	1,687	1,868
July	2,169	2,190	1,754	2,123	1,829	2,262	1,985	2,068	2,763	2,585	2,095	2,166	2,481
August	1,609	2,038	2,213	2,307	1,890	2,295	1,928	2,266	2,487	2,290	2,469	2,218	2,415
September	1,593	1,417	1,581	1,877	1,747	1,679	1,706	1,691	1,828	1,551	1,731	1,681	1,703
October	1,194	1,396	1,341	1,343	1,414	1,505	1,441	1,363	1,433	1,508	1,396	1,414	1,446
November	1,145	1,290	1,260	1,303	1,343	1,399	1,355	1,255	1,299	1,368	1,360	1,323	1,342
December	1,254	1,353	1,285	1,374	1,342	1,440	1,440	1,313	1,334	1,367	1,325	1,357	1,342
Total Production	17,135	17,275	17,304	18,421	17,601	19,228	18,380	18,306	19,735	19,709	18,585	18,455	19,343
Average Day Production (MGD)	46.9	47.2	47.4	50.5	48.2	52.5	50.4	50.2	54.1	53.9	50.9	50.5	52.9
Maximum Day Production (MGD)	90.0	82.0	85.0	86.0	74.1	85.0	74.1	82.0	94.8	99.3	90.3	85.3	94.8
Peaking Factor (Maximum Day/Average Day)	1.9	1.7	1.8	1.7	1.5	1.6	1.5	1.6	1.8	1.8	1.8	1.7	1.8

Note:

(1) Total potable water is based on total production at Everett's Water Filtration Plant. Production for April through September 2003, and June through December 2004, were adjusted upwards to correct for inaccurate readings by the Finished Meter (FE60). Corrections were estimated by comparing the volume of water reported by upstream meters to that of the Finished Meter. Source: TM to Everett from HDR on December 20, 2005 regarding "Water Balance Analysis of Everett's Filter Plant Meters."

3.2.2. Sales of Potable Water

Sales of potable water represent water delivered to customers for their consumption, excluding the unfiltered industrial supply delivered to Kimberly-Clark. In the case of wholesale customers, water sold by Everett is distributed to end users through the receiving system's distribution network. In the case of retail customers, Everett's sales data are broken down by customer classes.

Table 3-3 and Figure 3-1 show the retail and wholesale potable water sales and non-revenue water. Approximately 22 percent of the potable water produced at the Water Filtration Plant is delivered to customers in Everett's retail service area. Seventy-five percent is delivered to wholesale customers. The remainder is non-revenue water, representing a variety of unbilled uses and system losses in Everett's transmission and distribution system (see Section 3.4).

Table 3-3 Historical Retail and Wholesale Potable Water Sales (2000-2005)

Category	Potable Water Sales (MGD)							
							Averages	
	2000	2001	2002	2003	2004	2005	6-Year (2000-2005)	3-Year (2003-2005)
Average Daily								
Retail (1)	12.7	11.8	11.6	12.7	11.5	10.3	11.7	11.5
Wholesale	36.8	35.6	37.1	40.0	41.5	38.0	38.2	39.8
Non-Revenue (2)	3.0	2.9	1.5	1.4	0.8	2.6	2.1	1.6
Total Potable (3)	52.5	50.4	50.2	54.1	53.9	50.9	52.0	52.9

Notes:

(1) Retail includes metered and non-metered households. Single-family non-metered household sales estimated based on the metered households' water use factor adjusted by +20 percent.

(2) Non-revenue is calculated as total production less water sold (retail and wholesale).

(3) Total potable water is based on total production at Everett's Water Filtration Plant. Production for April through September 2003, and June through December 2004, were adjusted upwards to correct for inaccurate readings by the Finished Meter (FE60). Corrections were estimated by comparing the volume of water reported by upstream meters to that of the Finished Meter. Source: TM to Everett from HDR on December 20, 2005 regarding "Water Balance Analysis of Everett's Filter Plant Meters."

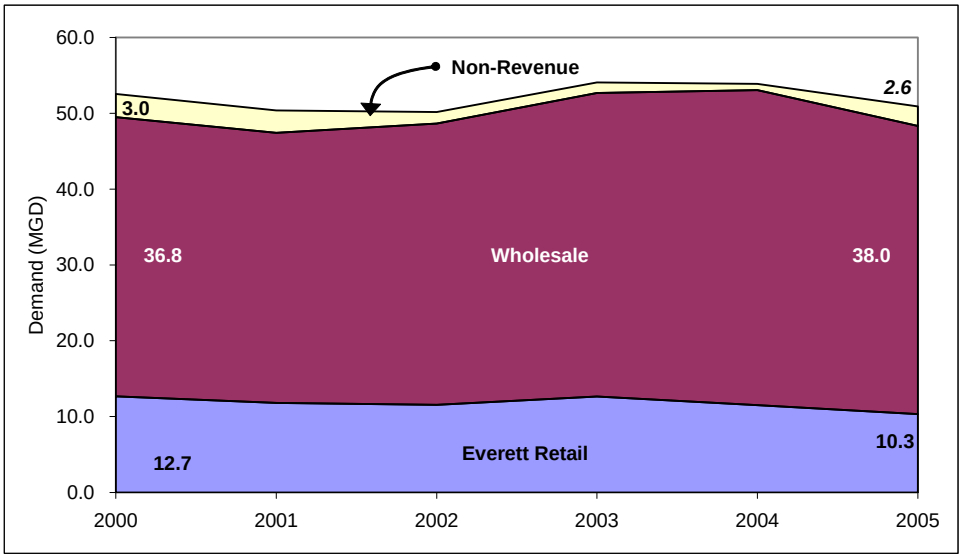

Figure 3-1 Historical Retail and Wholesale Potable Water Sales (2000 – 2005)

A more detailed listing of retail sales by customer class is provided in Table 3-4 and Figure 3-2. The largest customer category in the retail service area is single-family residential, which consumed approximately 39 percent of water sold during the three years from 2003 to 2005. The commercial/industrial and multi-family residential categories accounted for 27 percent and 24 percent, respectively. The remaining six customer categories together consumed nearly 11 percent of the total water delivered in the retail service area.

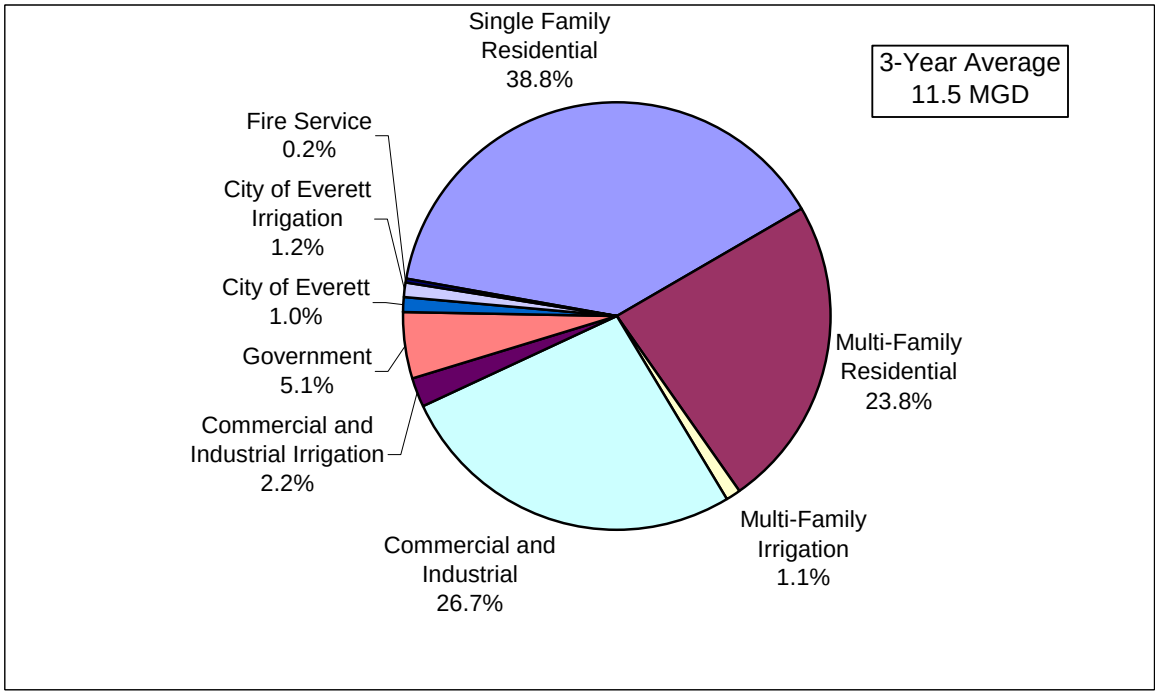

Figure 3-2 Average Annual Sales by Everett Retail Billing Class for 2003-2005

Table 3-4 Annual Retail Sales of Potable Water by Billing Class

Everett Retail Billing Classes	Potable Retail Water Sales (Millions of Gallons)							
							Average Sales	
	2000	2001	2002	2003	2004	2005	6-Year (2000-2005)	3-Year (2003-2005)
Single-Family Residential								
Outside City (metered)	106.3	103.8	112.1	132.1	115.6	104.8	112.4	117.5
Inside City (metered/Flat)	11.8	11.4	11.3	12.7	20.6	10.5	13.1	14.6
Inside City (metered)	248.5	242.5	264.2	309.4	290.9	270.5	271.0	290.3
Inside City (non-metered/Flat)(1)	1,210.5	1,140.8	1,197.7	1,352.4	1,209.9	1,062.5	1,195.6	1,208.3
Single-Family Subtotal	1,577.0	1,498.5	1,585.3	1,806.6	1,637.0	1,448.4	1,592.1	1,630.6
Multi-Family Residential								
Outside City	45.4	40.2	39.6	45.2	36.5	32.6	39.9	38.1
Inside City	1,051.1	1,027.8	977.9	1,031.8	963.1	888.9	990.1	961.2
Multi-Family Subtotal	1,096.5	1,068.0	1,017.6	1,077.0	999.6	921.4	1,030.0	999.3
Multi-Family Irrigation	42.1	33.0	37.8	48.1	45.7	39.9	41.1	44.5
Commercial and Industrial	1,525.8	1,317.7	1,176.2	1,230.2	1,125.8	1,011.1	1,231.1	1,122.4
Commercial and Industrial Irrigation	71.2	63.4	76.1	102.3	94.2	76.3	80.6	90.9
Government	214.4	217.1	219.4	233.4	211.7	191.7	214.6	212.3
City of Everett	41.6	38.5	45.9	50.4	40.8	28.6	41.0	40.0
City of Everett Irrigation	39.9	54.3	45.4	60.6	53.2	42.7	49.4	52.2
Fire Service	27.6	12.5	12.6	8.8	7.3	7.9	12.8	8.0
Total Retail Sales	4,636.3	4,303.0	4,216.2	4,617.5	4,215.3	3,767.9	4,292.7	4,200.2
Average Day Sales (MGD)	12.7	11.8	11.6	12.7	11.5	10.3	11.7	11.5

Source: City of Everett - Billing system data extracted February 2006.
Notes:
(1) Sales for non-metered single-family households is estimated based on the number of non-metered households multiplied by the Everett retail water use factor for metered single-family household adjusted by +20 percent.

Table 3-5 shows sales to Everett's wholesale customers. Each customer is a separate public water system in Snohomish County. Wholesale customers are arranged in order of quantity of water sold. Alderwood Water and Wastewater District is by far the largest single customer, receiving 58 percent of the total wholesale deliveries on average from 2003 to 2005. Alderwood Water and Wastewater District consumes a portion of this water in its own service area, and also delivers water to other water systems. The second largest customer is Snohomish County Public Utility District No. 1, which received 12 percent of the water delivered to wholesale customers from 2003 to 2005. The City of Marysville is the third largest customer in terms of water sold, receiving nine percent. The remaining wholesale customers range from sizable communities to small subdivisions, and collectively receive 21 percent of the wholesale water delivered. For more information on wholesale customers and their service areas, see Section 1.4 of the Comprehensive Water Plan.

Table 3-5 Wholesale Water Connections and Sales

Wholesale Customer	2005 Points of Connection to Everett System	Sales (million gallons)							
		2000	2001	2002	2003	2004	2005	Average Sales	
								6-Year (2000-2005)	3-Year (2003-2005)
Alderwood WWD	3	7,958	7,569	7,704	8,035	8,807	8,633	8,118	8,492
PUD	12	1,226	1,198	1,417	1,804	1,683	1,624	1,492	1,704
City of Marysville	1	1,225	1,279	1,343	1,272	1,442	1,260	1,303	1,324
City of Monroe	3	787	774	792	923	813	776	811	837
Mukilteo WD	2	816	747	660	737	786	756	750	760
Silver Lake WD (1)	3	863	887	1,038	1,101	1,061	243	866	802
City Of Snohomish	5	121	100	147	152	143	140	134	145
Roosevelt	2	148	140	113	171	95	135	133	133
Highland WD (2)	4	90	87	93	105	90	88	92	94
Cross Valley WD	5	111	93	94	118	90	70	96	93
Three Lakes Water	2	46.1	43.2	48.4	69.9	63.8	53.4	54.1	62.4
Wilkshire Lane WD	1	9.7	8.9	9.5	14.6	13.8	14.4	11.8	14.3
Machias Ridge	1	23.1	18.2	21.3	27.1	14.1	13.2	19.5	18.1
City of Sultan	1	--	--	--	2.9	31.8	9.4	7.3	14.7
Schluter Water	1	11.1	10.0	9.0	10.2	9.1	8.8	9.7	9.4
Sultan Estates Water	1	9.1	8.2	7.1	7.5	11.0	8.2	8.5	8.9
Iliad Inc Co	1	6.0	4.5	4.6	7.5	7.0	5.9	5.9	6.8
Fobes District	1	4.9	4.9	4.9	5.5	5.5	5.7	5.2	5.6
Meadow Lake	1	5.0	4.3	4.0	5.1	4.4	4.2	4.5	4.5
Pilchuck Riviera	1	4.3	4.6	5.0	8.6	4.2	3.8	5.1	5.6
North Ridge	1	4.2	4.4	4.2	5.1	4.1	3.6	4.2	4.3
Cherry	1	1.6	2.0	2.2	5.0	3.2	2.7	2.8	3.6
Twin Roads	1	1.7	1.7	2.2	2.6	2.4	2.6	2.2	2.5
Riverside	1	2.1	2.2	1.6	2.0	2.0	2.1	2.0	2.0
Blackman's WD	1	2.2	2.1	3.8	2.7	2.2	2.0	2.5	2.3
Cascade Acres	1	1.8	4.3	2.8	2.0	1.5	1.9	2.4	1.8
Pilchuck 26 Tracks	1	1.9	1.8	2.1	5.4	2.9	1.8	2.6	3.4
Aldercrest Water	1	1.5	1.3	1.3	1.7	1.5	1.3	1.4	1.5
Homestead Estates	1	1.0	0.9	0.9	1.2	1.2	1.1	1.0	1.1
Total	59	13,481	13,002	13,536	14,604	15,196	13,871	13,948	14,557

Source: City of Everett Billing Data, January 2006.

Note: (1) Beginning in 2005 Silver Lake began receiving the majority of water through the Clearview Connection, which is part of Alderwood meter #3.

(2) Highland Water District staff stated that their internal records show slightly different numbers.

3.2.3. Maximum Day Demand Peaking Factors for Potable Water Sales

Section 3.2.1 presented system-wide potable production data, including the peaking factor for Maximum Day Demand (MDD). The MDD peaking factor is the MDD divided by the

Average Day Demand (ADD). On a system-wide basis, the average peaking factor for potable water from 2003 to 2005 was 1.8 (see Table 3-2). The system-wide figure includes both wholesale and retail customers. The MDD peaking factor for the retail system alone cannot be directly determined based on available data. However, based on data for system-wide peaking, it is estimated to be 1.75. MDD peaking factors for each wholesale customer are shown in Table 3-6. These values were obtained from wholesale customers' water system plans where available, and were estimated for the remaining wholesale customers.

These MDD peaking factors are used to project Maximum Day Demands, later in this section.

Table 3-6 Peaking Factors for Wholesale Customers

Wholesale Customer	MDD Peaking Factor	Wholesale Customer	MDD Peaking Factor
Alderwood WWD (1)	1.78 (District and Wholesale from District Storage Facilities) 1.89 (AWWD Only)	Roosevelt (1)	1.40
		Seven Lakes (2)	1.87
Arlington (2)	2.00	Silver Lake (1)	2.0
Cross Valley (1)	2.00	Sky Meadow (2)	1.87
Edmonds (1)	1.99	Snohomish County Public Utility District #1: Integrated System (1)	1.87
Gold Bar (2)	2.89	Snohomish County Public Utility District #1: Satellite Systems (1)	2.36
Granite Falls (2)	2.36	Snohomish, City of (1)	2.40
Highland (1)	2.00	Stanwood (2)	1.87
Kayak (2)	1.87	Startup (2)	1.80
Lynnwood (1)	1.70	Sultan (2)	2.25
Marysville (1)	1.87	Tatoosh (2)	1.87
Meadow Ridge (2)	1.87	Three Lakes (1)	2.50
Monroe (1)	2.00	Tulalip (2)	1.87
Mountlake Terrace(1)	1.91	Warm Beach (2)	1.87
Mukilteo (1)	2.00	Warm Beach CG (2)	1.87
Olympic View (2)	2.45	Wilderness Ridge (2)	1.87
Estimated Factor for Remaining Customers		2.01	

Notes:
(1) Peaking factors from wholesale customers' water system plan, unless noted otherwise under source description below.
(2) Extracted from 2000 Everett Comprehensive Water Plan and based on Regional Water Supply Outlook.
Sources:
(a) City of Snohomish 2005 Water System Plan - Review Draft, July 2005. Chapter 2, page 2-7.
(b) Roosevelt Water Association Water System Plan - Draft, March 2004. Chapter 2, page 2-3, Table 2-4.
(c) Mukilteo Water District Water System Comprehensive Plan Update, 2003. Chapter 2, page 2-19.
(d) City of Monroe 2005 Water System Plan - Draft, May 17, 2005. Chapter 2, page 2-4, Table 2.3.
(e) City of Marysville 2002 Water System Plan Update, February 2003. Chapter 4, page 5-10.
(f) Three Lakes Water Association Comprehensive Water System Plan - Final Draft, August 1996. Chapter 3, page 3-5.

(g) Highland Water District Comprehensive Water System Plan, 2000. Chapter 2, page 2-7, Table 2-6. Table showed 2006=1.97 and 2020=2.00
(h) Silver Lake Water District Water System Comprehensive Plan, August 2003. Chapter 2, page 2-13, Table 2-8. Historical data shows 1.78, but 2.0 utilized in their plan.
(i) City of Lynnwood Water System Plan - Draft, June 2005. Peaking factor averaged 1.41 between 1998 and 2003 with a peak of 1.72.
(j) Mountlake Terrace Comprehensive Water Plan, 3-1-01. Chapter 3, page 3-10, Table 3-7.
(k) Snohomish County Public Utility District #1 Water System Plan, December 2002. Chapter 3 page 3-20.
(l) Snohomish County Public Utility District #1 Water System Plan, December 2002. Chapter 3 page 3-20.
(m) City of Edmonds 2002 Water Comprehensive Plan, June 2002. Chapter 2, page II-3, Table II-6. 1994-1999 average 1.99 MDD/ADD.
(n) Cross Valley Water District Water Comprehensive Plan, September 1999. Appendix J.
(o) Alderwood Water and Wastewater District Water System Plan, January 2003. Chapter 4, page 4-9, Table 4-6 and 4-7. Based on 1998-2000 average.

3.2.4. Large Customers of Potable Water

The demand forecast developed later in this section will use average water use per employee as one input. This value can be skewed on the high side if very large commercial or industrial facilities are included that have a much larger water use per employee than most commercial/industrial customers. Therefore, large water-using customers are examined to determine whether some of them should be handled separately in the forecast.

Table 3-7 presents the 25 retail customers having the largest demand based on data from Everett's billing database. All of these are customers using potable water (Kimberly-Clark's separate, unfiltered supply is not included in this table). Together these 25 customers accounted for 1,031 million gallons per year, on average during the years 2003 to 2005. This translates to 2.8 mgd, out of total retail sales of 11.5 mgd. This list was examined to identify large commercial/industrial customers whose water use per employee could skew the water use factors used for forecasting demand (see Section 3.2.5).

The top ten customers on the list all use more than 90,000 gallons per day (annual value in Table 3-7 divided by 365 days). However, five of these customers receive water at many different sites, indicating water use at each site is similar to many other commercial/industrial customers. Of the five remaining customers, four were identified as likely to have water use per employee that is disproportionately high compared with other commercial/industrial accounts. These four customers are: Boeing Company, Kimberly-Clark (potable supply), Rinker Materials, and Overall Laundry. Together, these four customers use 429 million gallons per year, or 1.21 mgd. This is approximately 10 percent of the total water use in Everett's retail service area. Water use and employment data associated with these four companies was handled separately in the demand forecast, under the heading "Large Customers."

This approach helps to ensure that water use factors used to forecast demand in the remaining non-residential category are not skewed on the high side. The Naval Station was not included in the Large Customer category because, although it has significant water usage, it also has a high employment, so its water use per employee is not expected to skew Everett's non-residential water use factor.

Table 3-7 25 Largest Retail Customers: Connections, Sales, and Ranking

Retail Customers (1)	Number of Potable Connections in 2005	Average Potable Water Sales for 2003-2005 (Million Gallons)
Boeing Co	7	166.7
Kimberly-Clark Corp	7	120.2
Rinker Materials	3	93.8
Everett, City of	106	92.9
Naval Station Everett	2	57.7
Everett Housing Authority	46	55.5
Overall Laundry	2	53.2
Port of Everett	36	43.2
Everett School Dist	47	36.7
Providence PEMC	19	34.5
Cintas Corp	2	27.3
Walden Pond Holdings LLC	22	24.3
Achilles USA INC	4	22.1
Covington Farms Apts	23	21.6
John Fluke Mfg	7	21.4
Everett Golf/Country	3	19.3
Orlo Williams	23	18.5
Huntington Park	29	17.3
Sno Co Jail Facilities	1	17.3
Fulton's Crossing Apts	17	16.7
North Creek Apts	27	15.2
Park Ridge Apts	2	14.4
Woodside Crossing	19	14.3
Fulton's Landing Apts	16	14.0
The Bluff at Evergreen	1	13.0
Total	471	1,031.1

Notes:

(1) Sales shown is the sum of all billing accounts. Some customers may purchase water at multiple locations throughout the retail area.

3.2.5. Water Use Factors for Potable Water

Water use factors were calculated for Everett's retail and wholesale service areas. A water use factor is a measure of water use per unit, such as water use per household or water use per employee. This information can be combined with demographic data in developing the demand forecast. Separate water use factors were developed for the single-family residential, multi-family residential, and non-residential categories. Results for Everett's retail service area are presented in Table 3-8. Results for Everett's wholesale customers are presented in Table 3-9.

The single-family water use factor of 238.7 gpd per household also serves as an Equivalent Residential Unit (ERU) for the retail service area. ERUs are used in analyzing system needs in terms of certain regulatory requirements such as fire flow and distribution system storage requirements.

Note that the water use factor for Everett's single family customer class used for the demand forecast decreases over time to take into account the shifting weighted average of metered and unmetered homes. As discussed elsewhere, metered homes use less water than

unmetered homes. Therefore, as the unmetered homes become metered, the water use factor will decrease.

Table 3-8 Water Use Factors and Equivalent Residential Units (ERUs) for Everett's Retail Service Area

Customer Category	Number of Potable Connections (1)	Number of Households or Employees	Average Day Demand (gpd)				Number of ERUs (3)
			Potable Water Sales (2)	Sales Per Connection	Water Use Factor (Sales Per Household or Employee)	Equivalent Residential Unit (ERU) (3)	
Single-Family Households (4)	18,700	18,700	4,463,418	238.7	238.7	238.7	18,700
Multi-Family Households (5)(6)	3,168	17,092	2,857,348	902.0	167.2	238.7	11,971
Non-Residential (7)	2,285	66,274	2,988,665	1,307.8	45.1	238.7	12,521
Total	24,153	n/a	10,309,430	n/a	n/a	n/a	43,193

Notes:
(1) The number of connections is based on the average number of active accounts in Everett's billing system during the time period of 2003-2005.
(2) Potable water sales are based on Everett's reported sales for 2003 through 2005.
(3) ERUs are a method of representing water use by non-residential customers as an equivalent number of residential customers. An ERU can be thought of as the volume of water used by an average single-family household.
(4) Assumes the number of single-family households is equal to the number of metered and unmetered connections.
(5) The number of multi-family households is estimated based on PSRC data and represents the 2003-2005 average.
(6) Connections include multi-family households and multi-family irrigation.
(7) The number of employees is estimated based on PSRC data and represents the 2003-2005 average.

Table 3-9 Water Use Factors and Equivalent Residential Units for Select Everett Wholesale Customers

Wholesale Customer	Water Use Factors for Select Everett Wholesale Customers		
	Single-Family (gallons per day per household)	Multi-Family (gallons per day per household)	Non-Residential (gallons per day per employee)
Factors From Water System Plans			
City of Marysville	223 (2001) and 211 (2007)	190 (2001) and 179 (2007)	104 (2001) and 96 (2007)
City of Lynnwood (1)	213	117	43
Mountlake Terrace (2)	198	ua	ua
Snohomish County Public Utility District #1: Integrated and Satellite Systems	221 (2001), 215 (2007), and 211 (2010)	72 (2001), 70 (2007), and 69 (2010)	39 (2001), 38 (2007), and 38 (2010)
City of Edmonds (2)(3)	219	133	49
Alderwood Water and Wastewater District	239	139	55
City of Monroe (2)	210	ua	ua
Silver Lake Water District (1)(2)	208	ua	67
Mukilteo WD (2)	240	ua	ua
City of Snohomish (2)	217	ua	ua
Estimated Factor for Remaining Customers (5)	219	130	51

Notes:
(1) Non-residential factor extracted from Everett's 2000 Comprehensive Water Plan.
(2) The water use factor for single-family is based on the assumption that the number of single-family households is equivalent to the number of reported single-family connections.
(3) Multi-family and non-residential factors extracted from Everett's 2000 Comprehensive Water Plan.
(4) "ua" refers to water use factors not provided in customer's water system plan.
(5) Calculated as the average of the other factors shown. Non-residential excludes City of Marysville from average.

Sources:
(a) City of Marysville 2002 Water System Plan Update, February 2003. Chapter 4, page 5-14, Table 5-9.
(b) City of Lynnwood Water System Plan - Draft, June 2005. Calculated from households in Table 2-2 (page 2-2) and consumption in Table 2-5 (page 2-4).
(c) Mountlake Terrace Comprehensive Water Plan, 3-1-01. Chapter 3, page 3-6, Table 3-2. 1997-1999 average day consumption per single-family connection.
(d) Snohomish County Public Utility District No. 1 Water System Plan, December 2002. Chapter 3, page 3-20, Table 3-8. Table provides future per unit water use for both the Integrated and Satellite systems.
(e) City of Edmonds 2002 Water Comprehensive Plan, June 2002. Chapter 2, page II-3, Table II-5. Based on 2000 data.
(f) Alderwood Water and Wastewater District Water System Plan, January 2003. Chapter 4, page 4-9, Table 4-5. Based on 1998-2000 average.
(g) City of Monroe 2005 Water System Plan - Draft, May 17, 2005. Chapter 2, page 2-1, Table 2.xx. Based on 2003 scrubbed data.
(h) Silver Lake Water District Water System Comprehensive Plan, August 2003. Chapter 2, page 2-17, Table 2-12.
(i) Mukilteo Water District Water System Comprehensive Plan Update, 1997. Chapter 2, page 2-13, Table 2-5 and page 2-19 Table 2-10. Based on 1993 through 1995 average.
(j) City of Snohomish 2005 Water System Plan - Review Draft, July 2005. Chapter 2, page 2-3, Table 2-3. Based on 2003 data.

3.2.6. Demand Projection Methodology for Potable Water Use

A demand forecast was prepared to predict the need for potable water in future years. Year 2050 was identified as the “buildout” condition. The forecast was prepared for all years

through 2050. This section summarizes results for planning horizons at the initial base year, six years, twenty years, and buildout (2007, 2012, 2026, and 2050). Both the retail and wholesale service areas are addressed. A long-term forecast to 2100 was also generated.

A separate forecast was developed for Everett's retail service area and for each wholesale customer. The forecasts were then summed to determine the total forecasted demand for potable water. For each service area, the following five components were forecast:

- Single-family residential
- Multi-family residential
- Non-residential (excluding the four largest commercial/industrial accounts)
- Large industrial potable demand (customers using at least 100,000 gpd)
- Non-revenue water

A consistent methodology was used for Everett's retail service area and wholesale service area. This methodology is based on demographic projections from the Puget Sound Regional Council (PSRC), subdivided into water utility service areas. These demographic projections are combined with recent data on water use in each service area to produce a forecasted demand. Components of the demand forecasting methodology are described below:

Demographic Forecast: PSRC forecasts of single-family households, multi-family households, and employment were obtained, as described in Appendix 3-1 titled "Demographics Technical Memorandum." The source was PSRC's 2003 forecast, which covers years 2010, 2020, and 2030. The average annual growth rate from 2020 to 2030 was used to extrapolate the demographic forecasts to 2050. The forecasts were allocated to individual water system service areas as described in Appendix 3-1. Results from the demographic forecast are presented in Table 3-10 and Figure 3-3.

Water Use Factors: Water use factors were defined for Everett and each water system that purchases water from Everett. A water use factor represents average water use per household or per employee. See Section 3.2.5 for further information.

In each year of the forecast, the projected number of single-family households, multi-family households and employment were multiplied by the appropriate water use factor. This yields a projected demand in the single-family sector, the multi-family sector, and the commercial/industrial sector, for Everett and for each water system that purchases water from Everett.

Large Customers (Retail): In Everett's retail service area, four customers were evaluated separately, due to their large water use and disproportionate effect on demand. These are: Kimberly-Clark, Boeing, Rinker Materials, and Overall Laundry. These customers were contacted to discuss expectations about future water needs. Since these customers are evaluated separately, the water use and employment associated with these four customers were removed from the overall water use and employment data for the commercial/industrial sector in Everett's retail service area. This category does not include the unfiltered supply delivered to Kimberly-Clark, which is discussed separately in Section 3.3.

Non-Revenue Water: In addition to water sold directly to retail customers, there is a "non-revenue" component of demand. Non-revenue water represents water that is used for unbilled purposes such as fire fighting and hydrant flushing for water quality purposes; unmetered uses such as hydrant usage at construction sites; and/or leakage and other losses in the water system. Non-revenue water is estimated through the water balance

process presented in Section 3.4. The percentage of non-revenue water based on production is converted into a percentage based on sales. This percentage is then held constant throughout the forecasting period. The configuration of source meters in the Everett system does not permit differentiating non-revenue water in the transmission system from non-revenue water in the retail distribution system. The percentage of non-revenue water is calculated by subtracting wholesale deliveries and retail sales from total water production at the Water Filtration Plant. This value, termed "Retail/Transmission Non-Revenue," represents a combination of non-revenue uses and losses in Everett's distribution system and non-revenue losses in the transmission system that serves the entire region (retail plus wholesale). This figure does not include non-revenue uses and losses in individual water systems that purchase water from Everett.

Wholesale customer non-revenue water was estimated separately. The percentages of non-revenue water were also held constant throughout the forecasting period. Data on non-revenue water for each system was obtained from recent water system plans, for those wholesale customers who had prepared such plans. For the remaining customers, an estimate of non-revenue water was developed by taking an average of the customers who had prepared plans.

Table 3-10 Demographics for Snohomish County by Everett Customer Category (Future Service Area)

Customer Category (1) (2)	Everett Retail (3)	Everett Direct Wholesale	Everett Indirect Wholesale	Total Everett Retail and Wholesale	Areas Served by Other Utilities	Areas Not Served by a Public Water System	County Total
Population (4)(5)							
2005-Existing Yr	89,435	315,143	100,052	**504,630**	99,649	41,266	**645,545**
2007-Plan Yr 1	97,710	327,670	102,169	**527,549**	101,696	43,147	**672,392**
2012-Plan Yr 6	110,997	369,737	107,690	**588,425**	95,317	47,416	**731,157**
2026-Plan Yr 20	172,014	440,345	150,461	**762,820**	87,072	51,174	**901,066**
2050	216,277	655,916	191,660	**1,063,853**	123,768	71,903	**1,259,524**
Single-Family Household (4)(5)							
2005-Existing Yr	20,425	84,230	25,292	**129,948**	32,108	14,096	**176,152**
2007-Plan Yr 1	21,908	87,431	25,550	**134,889**	32,753	14,731	**182,373**
2012-Plan Yr 6	24,759	98,733	26,447	**149,939**	30,667	16,274	**196,880**
2026-Plan Yr 20	38,659	123,403	39,816	**201,877**	28,940	17,904	**248,720**
2050	49,660	187,521	52,236	**289,417**	43,024	26,021	**358,463**
Multi-Family Household							
2005-Existing Yr	17,092	33,746	15,661	**66,500**	4,564	911	**71,975**
2007-Plan Yr 1	19,069	36,135	16,528	**71,732**	4,855	1,063	**77,650**
2012-Plan Yr 6	22,191	43,086	18,543	**83,820**	5,012	1,342	**90,174**
2026-Plan Yr 20	35,558	49,743	23,831	**109,132**	4,582	1,599	**115,314**
2050	46,840	79,851	30,888	**157,578**	5,631	2,174	**165,384**
Employment							
2005-Existing Yr	88,448	76,150	52,381	**216,979**	19,165	4,116	**240,260**
2007-Plan Yr 1	92,849	79,078	54,028	**225,955**	19,153	4,203	**249,312**
2012-Plan Yr 6	101,548	91,282	58,914	**251,745**	16,051	4,451	**272,247**
2026-Plan Yr 20	129,856	108,985	82,801	**321,642**	12,970	4,690	**339,303**
2050	177,129	160,307	126,065	**463,500**	17,853	6,292	**487,644**

Notes:

(1) This table contains the projected demographics for the future service area. This accounts for growth in all water service areas, annexation by Everett, new wholesale customers and reductions for single-family households with private wells.

(2) The data shown in this table was developed by assigning a share of the demographics for each PSRC Transportation Analysis Zone (TAZ) based on the percentage of intersection between each TAZ and each subarea of Snohomish County. No adjustments have been made to the distribution of demographics within each TAZ (i.e. the analysis assumes an even distribution of demographics within each TAZ).

(3) A small number of single-family households within the Everett retail and wholesale service areas are actually served by private wells. The number of affected single-family households was estimated based on the Regional Water Supply Outlook and those numbers were excluded from population and single-family household numbers presented in this table.

(4) Everett retail customers located outside of Everett's city limits and core retail service area that are served through diversions from Everett's transmission lines are not included under the Everett Retail category. However, these customers are included in the demographics of the service area for which they are physically located. There are approximately 458 connections along the transmission line.

(5) Demographics for the Future Service Area (FSA) may be lower than those shown for the Current Service Area (Table 3) due to the subtraction of single-family households with private wells and due to reclassification of demographics from wholesale to Everett Retail.

Conservation and Code Savings: Water demands can be reduced through water conservation programs and due to continued improvements in efficiency of water-using equipment related to Washington State's plumbing code. These elements are discussed separately, in the conservation section of the Water System Plan. Conservation and Code Savings are subtracted from the system-wide demand forecast to yield a conservation-adjusted forecast. This has the same effect as if the water use factors for each individual system were adjusted to account for conservation and code savings. See Section 5.6.4 for a discussion of the conservation adjustments.

Maximum Day Demand (MDD): MDD is calculated by applying a MDD peaking factor to average day demand. Development of the MDD peaking factor is described in Section 3.2.3. MDD peaking factors were developed for each wholesale customer as well as for Everett's retail service area.

New Wholesale Customers: It is anticipated that certain water systems in Snohomish County will begin purchasing water from Everett in the future. One, the Tulalip Reservation, a water system that currently purchases water on an indirect wholesale basis, will also begin receiving water directly from Everett to serve a different part of their service area. Forecasts for new wholesale customers were developed using the same methodology discussed above. However, the Tulalip Tribes demands for 2006 through 2050 were provided by the Tulalip Tribes. The Tulalip Tribe's demands are from the Time-Demand Analysis from the Water Demand and Route Evaluation Summary Memorandum (November 2005, Parametrix). For further information on the assumptions and demographic forecast for new wholesale customers, see Appendix 3-1. Forecasted demands for new customers are presented in section 3.2.7.

Forecast for 2051 through 2100: For long-term planning purposes, the total system demand forecast presented in Section 3.6 was extended from year 2050 to 2100. The forecast was extended assuming a 0.5 percent increase per year in potable water demand; industrial, unfiltered demand was held constant. This reflects the potential that zoning and land use may change by 2050 allowing further growth beyond current buildout conditions.

After this consistent methodology was used to generate draft demand forecast numbers, Everett's wholesale customers were given the opportunity to review the forecasts proposed for their service areas. In several cases, wholesale customers commented that their internal forecasts differed from the Everett-generated forecasts. There are several possible reasons for these discrepancies including using different demographic data, water use factors, and other reasons. When discrepancies occurred, the wholesale customers' internal forecast and the draft Everett-generated forecast were compared and the larger of the two forecasts was used. This is a conservative approach that ensures that Everett will be able to provide the higher of the numbers if needed. The following changes were made from the standard methodology due to wholesale customer comments:

- **Lynnwood:** All ADD and MDD numbers were increased by 15%.
- **Mukilteo:** All ADD and MDD numbers were increased, ranging from 21% to 45%.
- **Arlington:** ADD and MDD numbers were increased in years 2017-2050, ranging from 3% to 48%.
- **Dubuque and Klahaya:** All ADD and MDD numbers were increased, ranging from 100% to 206%.
- **Granite Falls:** All ADD and MDD numbers were increased, ranging from 540% to 970%. Note that while these percentages are quite large, the absolute value of the quantity of water is small. For example, the 2050 ADD is 1.1 mgd.

- **PUD Integrated System:** All ADD and MDD numbers were increased, ranging from 12% to 46%.
- **Lake Roesiger:** All ADD and MDD numbers were increased, ranging from 2300% to 3733%. Note that while these percentages are quite large, the absolute value of the quantity of water is small. For example, the 2050 ADD is 0.24 mgd.
- **Sultan:** ADD and MDD numbers were increased in years 2009-2016 and 2037-2050, ranging from 2% to 60%.
- **Silver Lake:** All ADD and MDD numbers were increased by 24%.

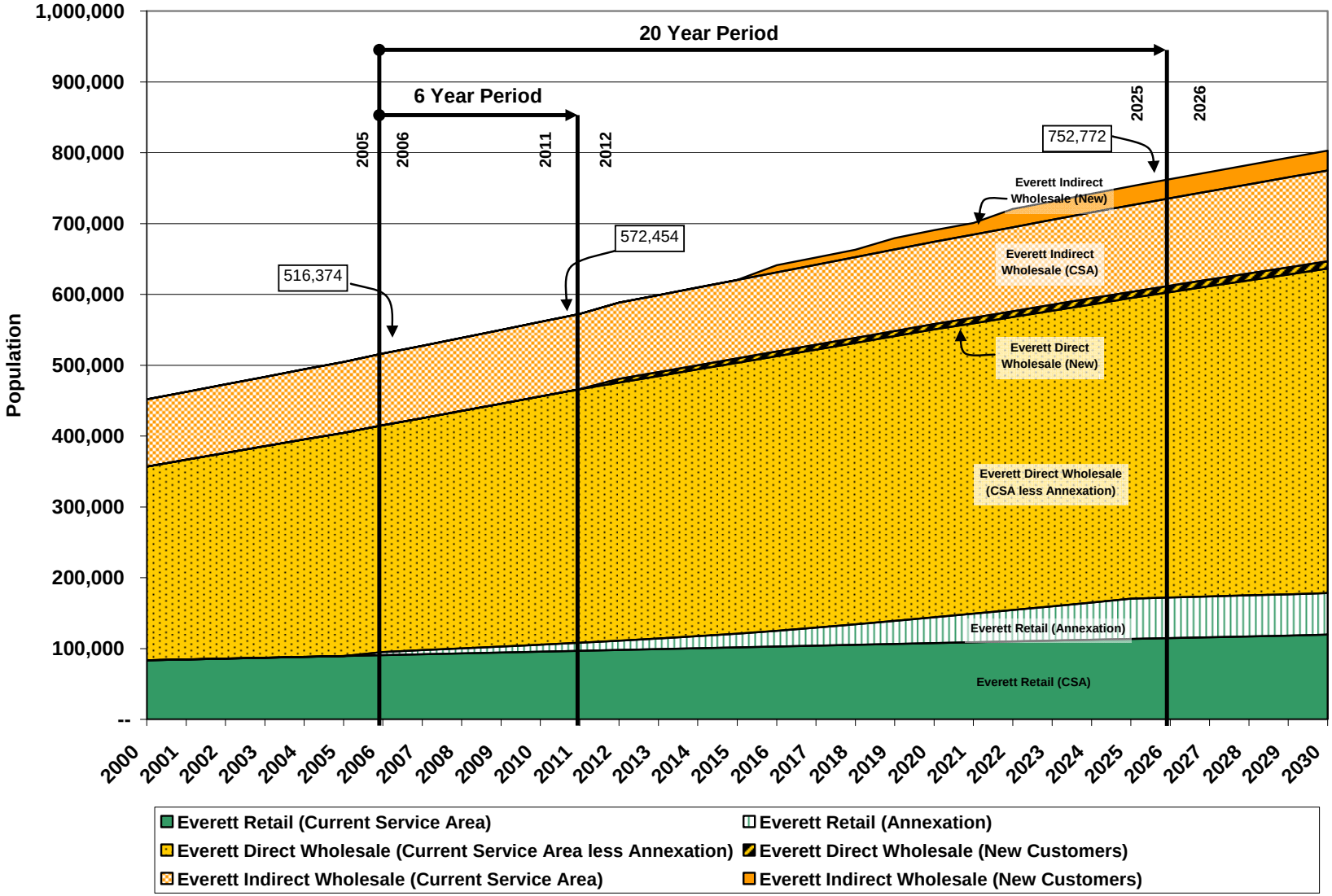

Figure 3-3 Population Forecast for Everett Served Areas (Future Service Area)

Note: (1) Excludes single-family households on private wells.

3.2.7. Demand Forecast Results for Potable Water Use

Results of the demand forecast are presented below. The forecast presented here has been developed for purposes of system-wide planning. Local forecasts prepared for individual water systems that receive water from Everett may differ from the forecast shown here. Local forecasts should be used for planning and development of local infrastructure by individual systems. The regional forecast presented here will be used for planning and development of regional facilities. In addition, the forecast for Everett's own retail service area will be used in modeling hydraulic conditions and identifying system needs within Everett's local distribution system.

Average day (ADD) and maximum day demand (MDD) forecast results for Everett and its current wholesale customers are shown in Table 3-11 and Table 3-12. Without considering savings from code and conservation, potable water ADD is projected to increase from 62.9 mgd to 91.3 mgd (45 percent) between 2007 and 2026. MDD is projected to increase from 117.0 mgd to 168.0 mgd (44 percent).

Within Everett's retail service area, ADD is projected to increase by 62 percent from 2007 to 2026. MDD is also projected to increase by 62 percent during this time.

Two of Everett's wholesale customers, Silver Lake Water District and Mukilteo Water District, are projected to experience declines in demand between 2011 and 2025, followed by increases in demand after 2025. This is due to the effect of projected annexation of district lands by Everett. As annexation occurs, service to customers in these areas will gradually be transferred to Everett, resulting in reduced demand by these two systems. Annexation will also affect service areas of Alderwood Water and Wastewater District and Cross Valley Water District. However, the effects are not sufficient to outweigh demographic growth in those service areas.

Table 3-13 presents sectoral demand components for Everett's retail service area and the two largest wholesale customers. Similar detail was developed for all of the wholesale customers, but is not presented here due to space limitations. The demand of the group of water systems displayed in Table 3-13 represents approximately 50 percent of the total potable water system demands.

Table 3-11 Everett Retail and Current Wholesale Customer Average Day Demand Based on the Future Service Area (Without Conservation Savings)

Customer Category [1]	Average Day Demand (MGD) [2][3]			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Everett Retail with Annexation	**12.7**	**14.2**	**20.6**	**27.0**
Direct Wholesale				
Alderwood	15.1	16.9	21.1	33.2
Marysville (Everett Portion) [P]	4.5	5.0	6.1	9.4
Silver Lake	4.2	4.4	3.6	4.7
Snohomish P.U.D.\Integrated System	4.1	5.5	7.3	11.6
Mukilteo	2.8	2.8	3.1	3.8
Monroe	1.4	1.6	2.1	3.0
Cross Valley (Everett Portion) [P]	0.5	0.9	1.5	2.3
Dubuque & Klahaya (P.U.D.)	0.4	0.5	0.6	0.8
Tulalip\Marysville [4]	0.4	0.7	0.7	0.7
Highland	0.4	0.4	0.5	0.6
City of Snohomish (Everett Portion) [P]	0.3	0.3	0.4	0.6
Roosevelt	0.2	0.3	0.3	0.5
Three Lakes	0.1	0.1	0.2	0.2
Sultan (Everett Portion) [PF]	0.1	0.2	0.3	0.4
Lake Roesiger (P.U.D.)	0.1	0.1	0.2	0.2
West Machias Ridge	0.04	0.04	0.1	0.1
Meadow Lake	0.02	0.03	0.03	0.04
Schluter W.A.	0.02	0.03	0.04	0.1
Machias Ridge	0.02	0.02	0.02	0.03
Cherry Avenue	0.01	0.01	0.01	0.02
Fobes	0.01	0.01	0.01	0.01
Rivershore	0.01	0.01	0.01	0.02
Mt. View	0.002	0.002	0.003	0.005
Riverside	0.002	0.002	0.003	0.003
East Machias Ridge	0.001	0.001	0.002	0.002
Subtotal Direct Wholesale	34.7	39.8	48.0	72.2
Indirect Wholesale				
Lynnwood	4.2	4.5	5.5	8.0
Edmonds	3.3	3.4	3.8	4.6
Mountlake	2.2	2.3	2.7	3.7
Arlington[6]	2.1	2.3	4.3	4.3
Sky Meadow	0.1	0.1	0.1	0.2
Granite Falls	0.32	0.38	0.7	1.1
Subtotal Indirect Wholesale	12.3	13.0	17.2	21.8
Total Wholesale Served by Everett	**47.0**	**52.8**	**65.2**	**94.0**
Retail/Transmission Non-Revenue [5]	3.2	3.7	5.4	7.8
Total System Demand (Without Conservation)	62.9	70.8	91.3	128.8

Notes:

(P) Service area of public water system is partially served by Everett water. Demographics served are shown under Everett Direct Wholesale category.

(PF) Service area of public water system is initially partially served by Everett but will be eventually fully served. Demographics served are shown under Everett Direct Wholesale category.

(1) Based on demographic data from Technical Memorandum on Demographics. Demographics exclude single-family households with private wells.

(2) Demand is the sum of demand shown in Table 3-13, Sector Demands for Everett and Five Large Wholesale Customers, plus non-revenue water. In addition, for Everett retail large customer demand is added to this figure.

(3) Results based on the regional forecasting methodology may be different from utilities' own forecasts. Wholesale customers will be consulted for up-to-date information, as new infrastructure is designed and developed.

(4) Tulalip currently receives some Everett water through the City of Marysville (see Tulalip\City of Marysville under Everett Direct Wholesale). It is anticipated that within the 20 year planning period Tulalip will receive water directly from Everett. The Tulalip Tribe's demands classified as Tulalip/Marysville are based on the Time-Demand Analysis from the Water Demand and Route Evaluation Summary Memorandum (November 2005, Parametrix). Tulalip/Marysville demands for 2005-2011 are the sum of Business Park, 4th Street Business Area, Olympic View, and Tulalip Water Utility. Demands for 2012-2050 are assumed to remain constant at 2011 levels; with additional Tulalip demands for these areas supplied through a new, direct connection with Everett. See Table 3-14 for additional projected demand.

(5) Everett's retail/transmission non-revenue demand is calculated as a percentage of Everett's retail sales and wholesale customer purchases from Everett. This includes wholesale customer sales and their non-revenue water. The percent non-revenue for Everett's retail area and transmission system is based on historical sales and production data.

(6) Arlington is supplied by Snohomish P.U.D., as well as non-Everett related sources. The Arlington demands in this table are only the demands associated with the supply agreement between Snohomish P.U.D. and Arlington.

Table 3-12 Everett Retail and Current Wholesale Customer Maximum Day Demand Based on the Future Service Area (Without Conservation Savings)

Customer Category [1]	Maximum Day Demand (MGD) [2][3]			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Everett Retail with Annexation	22.3	24.9	36.1	47.2
Direct Wholesale				
Alderwood	26.9	30.2	37.6	59.1
Silver Lake	8.3	8.8	7.3	9.4
Marysville (Everett Portion) [P]	8.3	9.3	11.5	17.6
Snohomish P.U.D.\Integrated System	7.7	10.5	13.6	21.7
Mukilteo	5.5	5.6	6.2	7.5
Monroe	2.9	3.2	4.1	5.9
Dubuque & Klahaya (P.U.D.)	1.1	1.0	1.2	1.4
Tulalip\Marysville [4]	1.3	2.0	2.0	2.0
Cross Valley (Everett Portion) [P]	1.0	1.8	2.9	4.6
Highland	0.7	0.8	0.9	1.3
City of Snohomish (Everett Portion) [P]	0.7	0.8	0.9	1.4
Three Lakes	0.3	0.3	0.4	0.6
Roosevelt	0.3	0.4	0.5	0.7
Lake Roesiger (P.U.D.)	0.2	0.2	0.4	0.5
Sultan (Everett Portion) [PF]	0.2	0.5	0.6	1.0
West Machias Ridge	0.07	0.08	0.1	0.1
Meadow Lake	0.05	0.05	0.06	0.07
Schluter W.A.	0.04	0.05	0.07	0.1
Machias Ridge	0.04	0.04	0.05	0.06
Cherry Avenue	0.02	0.02	0.02	0.03
Fobes	0.01	0.01	0.02	0.03
Rivershore	0.01	0.01	0.02	0.03
Mt. View	0.004	0.004	0.006	0.009
Riverside	0.004	0.004	0.005	0.007
East Machias Ridge	0.002	0.003	0.003	0.004
Subtotal Direct Wholesale	65.8	75.5	90.5	135.0
Indirect Wholesale				
Lynnwood	7.1	7.6	9.4	13.5
Edmonds	6.6	6.8	7.6	9.2
Mountlake	4.2	4.4	5.2	7.0
Arlington[6]	4.2	4.7	8.6	8.5
Sky Meadow	0.2	0.2	0.3	0.4
Granite Falls	0.72	0.70	0.7	2.1
Subtotal Indirect Wholesale	23.0	24.5	31.8	40.7
Total Wholesale Served by Everett	88.8	100.0	122.3	175.7
Retail/Transmission Non-Revenue [5]	6.0	6.8	9.6	14.0
Total System Demand (Without Conservation)	117.0	131.7	168.0	236.9

Notes:

(P) Service area of public water system is partially served by Everett water. Demographics served are shown under Everett Direct Wholesale category.

(PF) Service area of public water system is initially partially served by Everett water but will be eventually fully served. Demographics served are shown under Everett Direct Wholesale category.

(N) New direct or indirect wholesale customer.

(1) Based on demographic data from Technical Memorandum on Demographics. Demographics exclude single-family households with private wells.

(2) Based on MDD to ADD peaking factors applied to projected average day demand.

(3) Results based on the regional forecasting methodology may be different from utilities' own forecasts. Wholesale customers will be consulted for up-to-date information, as new infrastructure is designed and developed.

(4) Tulalip currently receives some Everett water through the City of Marysville (see Tulalip\City of Marysville under Everett Direct Wholesale). It is anticipated that within the twenty year planning period Tulalip will receive water directly from Everett. The Tulalip Tribe's demands classified as Tulalip/Marysville are based on the Time-Demand Analysis from the Water Demand and Route Evaluation Summary Memorandum (November 2005, Parametrix). Tulalip/Marysville demands for 2005-2011 are the sum of Business Park, 4th Street Business Area, Olympic View, and Tulalip Water Utility. Demands for 2012-2050 are assumed to remain constant at 2011 levels; with additional Tulalip demands for these areas supplied through a new, direct connection with Everett. See Table 3-15 for additional projected demand.

(5) Everett's retail/transmission non-revenue demand is calculated as a percentage of Everett's retail sales and wholesale customer purchases from Everett. This includes wholesale customer sales and their non-revenue water. The percent non-revenue for Everett's retail area and transmission system is based on historical sales and production data.

(6) Arlington is supplied by Snohomish P.U.D., as well as non-Everett related sources. The Arlington demands in this table are only the demands associated with the supply agreement between Snohomish P.U.D. and Arlington.

Table 3-13 Sector Demands for Everett and Two Large Wholesale Customers

Customer [1][2]	Single-Family Households				Multi-Family Households				Employment [3]			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Everett Retail												
Demographic Forecast	21,908	24,759	38,659	49,660	19,069	22,191	35,558	46,840	70,675	79,374	107,682	154,955
Water Use Factor (gpd per demographic unit) [4]	235.6	232.5	223.9	220.6	167.2	167.2	167.2	167.2	45.1	45.1	45.1	45.1
Sector Demand (gpd)	5,160,640	5,755,691	8,657,551	10,954,189	3,187,811	3,709,707	5,944,227	7,830,293	3,187,146	3,579,444	4,856,011	6,987,813
Alderwood												
Demographic Forecast	36,497	39,859	49,380	75,454	19,641	24,011	30,528	52,402	38,262	42,460	52,984	81,280
Water Use Factor (gpd per demographic unit)	239.0	239.0	239.0	239.0	139.0	139.0	139.0	139.0	55.0	55.0	55.0	55.0
Sector Demand (gpd)	8,722,877	9,526,319	11,801,804	18,033,472	2,730,167	3,337,463	4,243,377	7,283,894	2,104,417	2,335,300	2,914,114	4,470,406
Marysville (Everett Portion) [P]												
Demographic Forecast	12,021	13,260	17,554	28,032	4,319	5,276	7,356	11,178	8,042	8,417	9,722	12,686
Water Use Factor (gpd per demographic unit)	223.0	223.0	211.0	211.0	190.0	190.0	179.0	179.0	104.0	104.0	96.0	96.0
Sector Demand (gpd)	2,680,696	2,956,886	3,703,944	5,914,754	820,553	1,002,391	1,316,676	2,000,773	836,374	875,416	933,345	1,217,862

Notes:
(P) Service area of public water system is partially served by Everett water. Demographics served are shown under Everett Direct Wholesale category.
(1) Everett retail does not include potable demand for four largest commercial/industrial customers. These customers are treated separately in the forecast.
(2) Wholesale customer sector demand does not include wholesale customers' non-revenue water.
(3) Employment of four large water-using customers not included (Boeing, Kimberly-Clark, Rinker Materials, and Overall Laundry).
(4) The Everett retail single family water use factor shifts over time to reflect the shifting weighted average of metered to unmetered homes.

Table 3-14 and Table 3-15 display demands associated with new wholesale customers that begin to receive water from Everett in the future. The largest of these, the Tulalip Reservation, currently receives water serving a portion of its service area through an indirect wholesale connection to Marysville. The Marysville connection is anticipated to remain active, and an additional, direct connection is planned. For purposes of supply planning, it is assumed this connection will become active in 2012 (See Technical Memorandum on Demographic Data for Demand Forecast). By 2026, the new wholesale customers are anticipated to add 15.7 mgd in ADD to Everett's system and 21.1 mgd in MDD.

Table 3-14 Everett's New Wholesale Customer Average Day Demand Based on the Future Service Area (Without Conservation Savings)

Customer Category (1)	Average Day Demand (MGD) (2)			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Direct Wholesale				
Tulalip (3)	--	2.1	12.8	21.2
Subtotal Direct Wholesale	--	2.1	12.8	21.2
Indirect Wholesale				
Kayak Water	--	--	1.2	1.7
Marysville Estates - Aqua Hills	--	--	0.8	1.1
Seven Lakes	--	--	0.7	0.9
Silvana	--	--	0.2	0.2
Silvana River\Front Park	--	--	0.1	0.1
Stanwood	--	--	0.03	0.04
Tulalip\Seven Lakes	--	--	0.02	0.04
Unknown Name	--	--	0.003	0.005
Warm Beach	--	--	0.002	0.004
Warm Beach\Conference	--	--	0.001	0.001
Subtotal Indirect Wholesale	--	--	2.9	4.1
Total Wholesale Served by Everett	**--**	**2.1**	**15.7**	**25.2**

Notes:

(1) Based on demographic data from Technical Memorandum on Demographics. Demographics exclude single-family households with private wells.

(2) Results based on the regional forecasting methodology may be different from utilities' own forecasts. Wholesale customers will be consulted for up-to-date information, as new infrastructure is designed and developed.

(3) Tulalip currently receives some Everett water through the City of Marysville (see Tulalip\City of Marysville under Everett Direct Wholesale). It is anticipated that within the 20 year planning period Tulalip will receive water directly from Everett. For planning purposes, it is assumed that this connection will begin operating in 2012. The Tulalip Tribe's demands classified as "Tulalip" in this table are based on the Time-Demand Analysis from the Water Demand and Route Evaluation Summary Memorandum (November 2005, Parametrix). Demands for 2012-2050 are the additional demands beyond what is supplied by the Tulalip/Marysville connection shown in Table 3-11. This includes the demands for streamflow augmentation which are assumed to begin in 2012 and forecasted to be 10 mgd by 2020.

Table 3-15 Everett's New Wholesale Customer Maximum Day Demand Based on the Future Service Area (Without Conservation Savings)

Customer Category [1]	Maximum Day Demand (MGD) [2][3]			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Direct Wholesale				
Tulalip [4]	--	2.3	15.5	29.7
Subtotal Direct Wholesale	--	2.3	15.5	29.7
Indirect Wholesale				
Kayak Water	--	--	2.2	3.2
Marysville Estates - Aqua Hills	--	--	1.5	2.0
Seven Lakes	--	--	1.3	1.7
Silvana	--	--	0.3	0.4
Silvana River\Front Park	--	--	0.2	0.2
Stanwood	--	--	0.07	0.09
Tulalip\Seven Lakes	--	0.0	0.05	0.08
Unknown Name	--	--	0.006	0.008
Warm Beach	--	0.0	0.004	0.007
Warm Beach\Conference	--	--	0.002	0.002
Subtotal Indirect Wholesale	--	0.0	5.6	7.7
Total Wholesale Served by Everett	**--**	**2.3**	**21.1**	**37.5**

Notes:
(1) Based on demographic data from Technical Memorandum on Demographics. Demographics exclude single-family households with private wells.
(2) Based on MDD to ADD peaking factors applied to projected average day demand.
(3) Results based on the regional forecasting methodology may be different from utilities' own forecasts. Wholesale customers will be consulted for up-to-date information, as new infrastructure is designed and developed.
(4) Tulalip currently receives some Everett water through the City of Marysville (see Tulalip\City of Marysville under Everett Direct Wholesale). It is anticipated that within the twenty year planning period Tulalip will receive water directly from Everett. For planning purposes, it is assumed that this connection will begin operating in 2012. The Tulalip Tribe's demands classified as "Tulalip" in this table are based on the Time-Demand Analysis from the Water Demand and Route Evaluation Summary Memorandum (November 2005, Parametrix). Demands for 2012-2050 are the additional demands beyond what is supplied by the Tulalip/Marysville connection shown in Table 3-12. This includes the demands for streamflow augmentation which is assumed to begin in 2012 and forecasted to be 10 mgd by 2020.

The forecast data presented above is based on calculations using current water use factors. However, water use is expected to be reduced from two elements: plumbing code savings and conservation programs. Code savings were calculated for the retail and wholesale service areas, based on assumptions regarding gradual replacement of older, non-code plumbing fixtures. Code savings are estimated to be 1.8 mgd in 2012 and 3.3 mgd in 2026, remaining constant thereafter[1]. Conservation savings are based on the conservation program described in Chapter 5 of the Comprehensive Water Plan. These reductions are shown in Table 3-16.

[1] The code savings figure is actually assumed to be fully achieved by 2018.

Table 3-16 Potable Demand Projections With and Without Conservation Savings

Demand Category	Average Day Demand (MGD)				Maximum Day Demand (MGD)			
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Everett Retail with Annexation	12.7	14.2	20.6	27.0	22.3	24.9	36.1	47.2
Current Wholesale Customers less Annexation	47.0	52.8	65.2	94.0	88.8	100.0	122.3	175.7
Potential Future Wholesale Customers	0.0	2.1	15.7	25.2	0.0	2.3	21.1	37.5
Retail/Transmission Non-Revenue	3.2	3.7	5.4	7.8	6.0	6.8	9.6	14.0
Total Demand Without Conservation Savings	**62.9**	**72.9**	**107.1**	**154.1**	**117.0**	**134.1**	**189.2**	**274.3**
Conservation Savings	(1.1)	(2.0)	(2.9)	(4.3)	(2.0)	(3.7)	(5.4)	(7.9)
Code Savings	(0.5)	(1.8)	(3.3)	(3.3)	(0.5)	(1.8)	(3.3)	(3.3)
Total Demand with Conservation Savings	***61.3***	***69.2***	***100.9***	***146.4***	***114.5***	***128.6***	***180.5***	***263.1***

Notes:
(1) Based on Future Service Area boundaries. Thus includes annexation and new customers.

3.3. Unfiltered Industrial Water

3.3.1. Production of Unfiltered Water

Everett delivers unfiltered industrial water to one retail customer: the Kimberly-Clark Corporation Mill[2]. Like the potable supply, this water originates at Lake Chaplain. However, it is not treated at the Water Filtration Plant and is not required to meet drinking water standards.

The quantity of unfiltered industrial water delivered to Kimberly-Clark is shown in Table 3-17. During the three-year period 2002, 2003, and 2005, average deliveries were 30.4 mgd. This is significantly lower than deliveries from 1995-2001, which averaged 35.3 mgd.

Like the potable system, the demand for unfiltered water at Kimberly-Clark is variable. However, the peaking profile is not as steep as for potable water. The ratio of MDD to ADD is only 1.1. In addition, peak demands can occur in any month of the year. This is different from the potable water system, where peak demands occur on hot summer days.

[2] In addition to unfiltered water, the Kimberly-Clark Mill also receives a separate supply of potable water. Potable water and unfiltered water are used for different purposes at the Mill.

Table 3-17 Production of Unfiltered (Industrial) Water

Month	Unfiltered (Industrial) Water Production (Million Gallons)												
												Average	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	5-Year (2000-2003 & 2005)	3-Year (2002, 2003, &-2005)
January	1,015	1,008	1,007	1,082	1,046	997	964	989	1,073	820	881	981	981
February	933	901	895	944	961	944	929	893	891	780	793	890	859
March	928	830	1,008	1,028	988	1,036	995	989	899	864	879	959	922
April	949	1,053	1,027	1,010	955	992	1,018	957	911	908	924	960	931
May	1,091	1,125	1,225	1,096	999	1,073	1,022	989	976	979	873	987	946
June	1,087	1,100	1,198	1,074	985	1,166	1,047	957	963	1,050	777	982	899
July	1,242	1,080	1,076	950	1,182	1,247	1,105	989	1,106	1,030	842	1,058	979
August	1,434	1,378	1,220	1,095	1,099	1,198	1,274	989	1,144	963	861	1,093	998
September	1,367	1,247	1,186	1,118	1,104	1,107	1,221	957	1,140	950	831	1,051	976
October	1,223	1,103	1,106	1,036	1,087	1,129	1,217	989	1,092	973	798	1,045	960
November	1,079	972	1,082	997	1,025	1,007	1,176	957	754	859	725	924	812
December	995	1,018	1,072	1,022	1,049	993	1,202	989	820	825	736	948	848
Total Production	13,343	12,813	13,100	12,451	12,481	12,888	13,169	11,647	11,769	11,003	9,919	11,878	11,112
Average Day Production (MGD)	36.6	35.0	35.9	34.1	34.2	35.2	36.1	31.9	32.2	30.1	27.2	32.5	30.4
Maximum Day Production (MGD)	46.3	44.4	39.5	37.3	38.1	40.2	41.1	31.9	36.9	35.0	30.8	36.2	33.2
Peaking Factor (Maximum Day/Average Day)	1.3	1.3	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.2	1.1	1.1	1.1

Notes:

(1) Unfiltered (Industrial) Water is water sales to Kimberly-Clark.

(2) Total water production for potable and unfiltered has been adjusted to account for potable water produced at Everett's filtration plant but supplied to Kimberly-Clark through the industrial pipeline. This occasionally occurs during times of maintenance on the industrial pipeline.

3.3.2. Sales of Unfiltered Water

Table 3-18 displays sales of unfiltered water. This is the amount received at the Kimberly-Clark Mill, which is less than the quantity produced at the upstream end of the transmission pipeline. The difference between production and sales is non-revenue water for the unfiltered system. Non-revenue water during the three years 2002, 2003, and 2005 was approximately 8.6 percent of total unfiltered production.

Table 3-18 Sales of Unfiltered Water

Category	Unfiltered Water Sales (MGD)							
							Averages	
	2000	2001	2002	2003	2004	2005	5-Year (2000-2003 & 2005)	3-Year (2002, 2003, & 2005)
Average Day								
Kimberly-Clark	26.7	34.3	30.7	27.3	31.8	25.4	28.9	27.8
Non-Revenue (1)	8.5	1.8	1.2	5.0	ua	1.7	3.6	2.6
Total Unfiltered (2)	35.2	36.1	31.9	32.2	30.1	27.2	32.5	30.4

Notes:

(1) Non-revenue is calculated as total unfiltered production less water sold.

(2) Total Unfiltered water is based on total production. Due to inaccuracies in 2004 meter readings 2004 non-revenue unfiltered water could not be estimated. The master meter at Reservoir #4 was replaced in December 2004/January 2005.

3.3.3. Projected Demand for Unfiltered Industrial Water

Projected demand for unfiltered industrial water includes continued deliveries to the Kimberly-Clark Mill, as well as any new demands for additional industrial customers that do not require potable supply. Sources of unfiltered industrial water may include not only Lake Chaplain, but also Everett's water right on the Lower Snohomish River, managed collectively by the Snohomish River Regional Water Authority (SRRWA).

For purposes of forecasting demand, the following assumptions are made:

- Unfiltered water from Lake Chaplain will continue to serve the Kimberly-Clark mill. The quantity of water needed at the mill will remain constant. This volume will be based on values from 2002, 2003 and 2005 (accurate data was not available for 2004). However, these values are reduced by the quantity of industrial cooling water now replaced by reclaimed water produced at Everett's Water Pollution Control Facility (WPCF). See Section 1.5 for details.
- At this time the exact quantity and nature of use of Everett's water right on the Lower Snohomish River has not been determined. There is currently no production from this source of supply. This water is available for industrial and/or other uses by Everett and its partners in SRRWA (Woodinville Water District and Northshore Utility District). For purposes of this Comprehensive Water Plan, no demand is identified at this time. At such time as new needs for this supply are identified, these needs will be compared with the quantity available from the Snohomish River source.

Based on these assumptions, Table 3-19 displays projected demand for unfiltered industrial water.

Table 3-19 Projected Daily Demands for Unfiltered Industrial Water System with Reclaimed Water

Unfiltered Industrial Demand	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Average Day Demand (MGD)				
Kimberly-Clark (Industrial) (1)	30.4	30.4	30.4	30.4
Portion Served by Reclaimed Water	(2.0)	(2.0)	(2.0)	(2.0)
Total Unfiltered ADD with Reclaimed Water	28.4	28.4	28.4	28.4
Maximum Day Demand (MGD)				
Kimberly-Clark (Industrial) (1)	33.2	33.2	33.2	33.2
Portion Served by Reclaimed Water	(3.5)	(3.5)	(3.5)	(3.5)
Total Unfiltered MDD with Reclaimed Water	29.7	29.7	29.7	29.7

Notes:
(1) Projected industrial demand is based on average historical unfiltered sales and non-revenue for 2002, 2003, and 2005; 2004 is excluded due to inaccuracies in meter readings. The percentage non-revenue applied, based on unfiltered sales, is 9.5 percent (this is different from the percentage based on production).

3.4. Non-Revenue Water

Previous sections have discussed non-revenue water for the potable water system and the unfiltered industrial supply. Table 3-20 presents non-revenue water for both systems combined. Non-revenue water for both systems combined amounts to 5.5 percent of total production. This is well within the normal range for a public water system.

Table 3-20 Everett's 2005 Water Balance (Potable and Unfiltered)

Categories	Potable Water (1)		Untreated (Industrial) Water (2)		Total Potable and Untreated	
	Volume (MGD)	% of Produced Water	Volume (MGD)	% of Produced Water	Volume (MGD)	% of Produced Water
Revenue Water						
Billed Water Exported (i.e. wholesaled)	38.0	74.6	0.0	0.0	38.0	48.7
Billed Metered Consumption - Permanent Meters (i.e. sold to retail customers)	7.4	14.6	25.4	93.6	32.9	42.1
Billed Unmetered Consumption (i.e. sold to unmetered residential customers)	2.9	5.7	0.0	0.0	2.9	3.7
Non-Revenue Water	2.6	5.1	1.7	6.4	4.3	5.5
Total Water Production (3)	50.9	100.0	27.2	100.0	78.1	100.0

Notes:
(1) Potable water includes Everett Retail and Wholesale potable water sales.
(2) Unfiltered (Industrial) Water is water sales to Kimberly-Clark.
(3) Total potable water is based on total production at Everett's filter plant. Production for April thru September 2003 and June through December 2004 were adjusted upwards to correct for inaccurate readings by the Finished Meter (FE60). Corrections were estimated by comparing the volume of water reported by upstream meters to that of the Finished Meter. Source: TM to Everett from HDR on December 20, 2005 regarding "Water Balance Analysis of

Everett's Filter Plant Meters."

3.5. Reclaimed Water

In addition to unfiltered industrial water, Everett recently began delivering reclaimed water to the Kimberly-Clark mill. Reclaimed water is treated effluent from a wastewater treatment plant that is suitable for certain non-potable uses. By substituting for raw water supplies, this reduces diversions from the Sultan River Basin and provides an environmental benefit.

Everett's Water Pollution Control Facility (WPCF) treats wastewater to a secondary effluent level. This involves primary treatment to physically remove solids from the wastewater; secondary treatment using microorganisms to further purify the treated water; and disinfection. Everett's reclaimed water is designated as a "Special Class" by the Department of Ecology. It is treated to the same requirements as the WPCF's wastewater discharge, and sufficient chlorine is added to maintain a minimum total chlorine residual of 0.1 mg/L to the Kimberly Clark Facility.

The use of Everett's reclaimed water is governed by National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number WA-002449-0, issued by the Washington State Department of Ecology and dated May 9th, 2005. The water is authorized for use as single-pass, non-contact cooling water at Kimberly-Clark's heat exchanger in their mill bleach plant. Operations and maintenance procedures are jointly approved by the Department of Ecology and the Department of Health in an agreement with Everett titled "Operating Guidelines and Procedures for Treated Effluent Reuse as Non-Contact Cooling Water," signed October 2005.

Kimberly-Clark began receiving reclaimed water in November of 2005, and between November 2005 and January 2006 reclaimed water use ranged from 1 to 3 MGD. It is anticipated that Kimberly-Clark's demand for reclaimed water will be approximately 3 to 4 MGD during the summer months. Due to the potentially higher temperature of reclaimed water as compared to unfiltered water from Chaplain Reservoir, it was initially anticipated that one gallon of reclaimed water would substitute for a lesser amount of unfiltered industrial water. Data on deliveries during the winter months of 2005 and 2006 showed little differential in temperature between the two sources; therefore every gallon of reclaimed water delivered to Kimberly-Clark represents a one gallon reduction in untreated demand. However, as the only deliveries have occurred during the winter months, a more accurate understanding of this relationship will be gained in the summer of 2006 when temperature differences could become significant.

Reclaimed water is conveyed to Kimberly-Clark through improvements to the "Crosstown Line," which conveys treated effluent from the wastewater treatment plant to Everett's outfall in the bay. These improvements, needed solely for delivering reclaimed water, cost approximately $10,000. The new pipeline ties into the existing north leg of the #3 Transmission Line, which is isolated from the potable drinking water system and used to deliver reclaimed water to Kimberly-Clark. Kimberly-Clark has eight backflow prevention devices that isolate the reclaimed water used in the cooling water system from the potable water supply from Reservoir 4 (unfiltered water from Lake Chaplain). Kimberly-Clark is able to switch back and forth between the two sources as needed. The reclaimed water will offset demands that would otherwise need to be supplied by untreated water from Chaplain Reservoir via the #4 Transmission Line.

Everett has also evaluated the feasibility of providing reclaimed water to other customers. Customers with the greatest potential to use reclaimed water include the City-owned Legion Golf Course at American Legion Memorial Park, the City-owned Walter Hall Golf Course, and the private Everett Golf and Country Club. Of these customers, Legion Golf Course is the best prospect due to its proximity to the Crosstown Line, within one mile. However, additional permitting would be required for this type of application, and treatment to Class A reclaimed water standards would presumably be required.

Everett currently does not have any plans to provide reclaimed water to other customers within the next six years. This decision is driven by the high infrastructure cost to treat and deliver reclaimed water and the fact that there is no pressing need to use reclaimed water since Everett has an adequate supply of water and the production and distribution infrastructure is already in place.

3.6. Summary of Total System Demand

Previous sections have forecast the demand for potable water, unfiltered industrial water, and reclaimed water. Table 3-21 summarizes total demand for all three categories, as well as reductions in demand due to code savings, conservation, and reuse. The table focuses on the first, sixth, and 20th planning years of 2007, 2012, and 2026, as well as years 2050 and 2100.

Without conservation or reuse, the total system demand on an average day basis, is projected to rise from 93.3 mgd in 2007, to 103.4 mgd in 2012, to 137.5 mgd in 2026. On a maximum day basis, the total system demand is projected to rise from 150.2 mgd in 2007, to 167.3 mgd in 2012, to 222.4 mgd in 2026.

With conservation and reuse, the total system demand on an average day basis, is projected to rise from 89.8 mgd in 2007, to 97.6 mgd in 2012, to 129.3 mgd in 2026. On a maximum day basis, the total system demand is projected to rise from 144.2 mgd in 2007, to 158.3 mgd in 2012, to 210.2 mgd in 2026.

These results are also displayed in Figure 3-4.

The 2100 forecast, based on a 0.5 percent increase in potable water demand, shows a total demand with conservation and reuse of 217 mgd for the average day and 368 mgd on the peak day. A 2100 forecast based on 0.25 percent shows an ADD of 195 mgd and an MDD of 328 mgd and based on 0.75 percent shows an ADD of 243 mgd and an MDD of 413 mgd.

Table 3-21 Summary of Projected Daily Demands for Potable and Unfiltered Water With and Without Additional Conservation Savings

Demand	Average Day Demand (MGD)					Maximum Day Demand (MGD)				
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**2100**[6]	**2007** (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**2100**[6]
Demand Without Conservation Savings or Reuse										
Potable Water Demand [1]	62.9	72.9	107.1	154.1	197.7	117.0	134.1	189.2	274.3	352.0
Kimberly-Clark Industrial Demand [2]	30.4	30.4	30.4	30.4	30.4	33.2	33.2	33.2	33.2	33.2
Subtotal Demand Without Conservation or Reuse	93.3	103.4	137.5	184.5	228.1	150.2	167.3	222.4	307.5	385.2
Conservation and Reuse										
Conservation Savings [3]	(1.1)	(2.0)	(2.9)	(4.3)	(5.6)	(2.0)	(3.7)	(5.4)	(7.9)	(10.3)
Code Savings [3]	(0.5)	(1.8)	(3.3)	(3.3)	(3.3)	(0.5)	(1.8)	(3.3)	(3.3)	(3.3)
Reclaimed Water Supplies [4]	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)	(3.5)	(3.5)	(3.5)	(3.5)	(3.5)
Subtotal Conservation and Reuse	(3.6)	(5.7)	(8.2)	(9.6)	(10.9)	(6.0)	(9.0)	(12.2)	(14.7)	(17.1)
Demand With Conservation Savings and Reuse										
Potable Water Demand [3]	61.3	69.2	100.9	146.4	188.8	114.5	128.6	180.5	263.1	338.5
Unfiltered Water Demand (Kimberly-Clark Industrial) [5]	28.4	28.4	28.4	28.4	28.4	29.7	29.7	29.7	29.7	29.7
Total Demand With Conservation and Reuse	89.8	97.6	129.3	174.9	217.2	144.2	158.3	210.2	292.8	368.2

Notes:
(1) Includes Everett retail, current and new wholesale customers, and non-revenue potable demand.
(2) Includes demand for unfiltered and reclaimed water.
(3) All conservation and code savings are applied to potable water demand.
(4) All reclaimed water supplies are supplied to Kimberly-Clark.
(5) Unfiltered demand is Kimberly-Clark's demand less reclaimed water supplies.
(6) The forecast between 2050 and 2100 is estimated based on a 0.5 percent increase per year in potable water demand. Industrial demand was held constant.

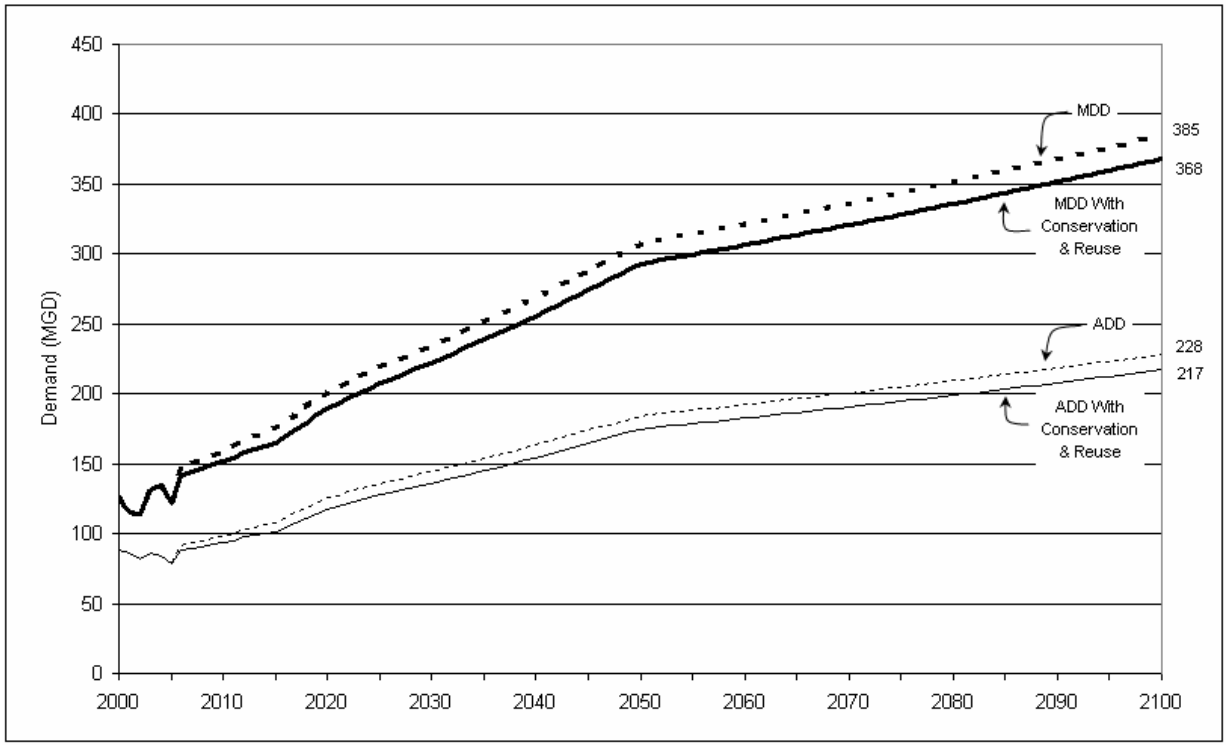

Figure 3-4 Projected Demand with and without Additional Conservation Savings and Reuse (Potable and Unfiltered Water Demand)

4. System Analysis

4.1. Hydraulic Analysis

4.1.1. Methodology

The City of Everett's water system was analyzed using the hydraulic modeling software program H2OMAP Water produced by MWH Soft, Inc. The H2OMAP Water software is a Microsoft Windows-based program that has a standalone graphics package and can be used to enter all of the system properties and display them on the monitor graphically. All of the modeling calculations are performed within the H2OMAP Water program.

4.1.2. System Components

The H2OMAP Water software allows all of the pipes and junction nodes in the Everett distribution system to be entered into one complete model, which consists of approximately 15,000 pipes and 13,500 junction nodes, along with pressure reducing stations, reservoirs, and pump stations.

The model input files were created directly from the City's GIS data base. The data base was imported directly into the H2OMAP software and the GIS identification number was retained within the model database so that edits to the GIS and model databases could be coordinated. A number of coordination steps were taken using algorithms in the modeling software to locate places where importation of pipelines from the GIS system that should be connected did not result in a single node at the junction of the two lines as well as other anomalies.

The original model developed directly from the GIS system utilized data from the previous H2ONET hydraulic model that described pump stations, pressure reducing and flow control valves, and reservoirs. Demands from the previous model were also inserted into the H2OMAP model. A Technical Memorandum produced by CH2M-Hill describing the process followed in the creation of the model is included in Appendix 4-1.

Once the model was received by HDR several additional steps were taken to ensure successful operation of the model. Information on the reservoirs in the model (diameter, elevations, etc.) was checked and adjusted so that the reservoirs would operate during extended period simulations. In addition, the City surveyed all pressure reducing valves (PRVs) to determine their ground elevation and the downstream pressure setting. This information was also input into the model.

Water mains owned by the Alderwood Water and Wastewater District, the City of Mukilteo and Silver Lake Water District are in the model, but are excluded from use during any analysis. Also, any pipelines that do not transport potable water, such as Transmission Main No. 4 and Reservoir #4 are excluded from analysis.

4.1.3. Diurnal Curve Development

In order to perform extended period simulations with the hydraulic model, a diurnal curve needs to be input into the model. A diurnal curve describes the hourly fluctuation in demand based on the ratio between the hourly demand and the average demand for the 24-hour period.

In many systems, an assumed diurnal curve must be used because there is inadequate information on hourly demands to create a system specific curve. For the Everett system, it is possible to create a diurnal curve using production and reservoir volume information. Appendix 4-2 contains a detailed discussion of the development of the City of Everett specific diurnal curve.

Table 4-1 lists the diurnal curve values on a 15-minute interval that will be used during extended period simulations. Four separate curves were developed; two each for January and July demands. One set of curves is for the full system including wholesale customers, and the second set of curves includes the Everett retail system only, excluding the wholesale customers. Figure 4-1 and Figure 4-2 show the curves graphically for January and July, respectively.

Table 4-1 City of Everett Diurnal Curves

	January Curves		July Curves	
Time	**Total Demand**	**Retail Demand**	**Total Demand**	**Retail Demand**
0:00	0.904	0.770	0.981	0.962
0:15	0.897	0.746	0.978	0.950
0:30	0.889	0.722	0.975	0.937
0:45	0.882	0.698	0.971	0.925
1:00	0.874	0.674	0.968	0.912
1:15	0.866	0.649	0.965	0.900
1:30	0.859	0.625	0.962	0.888
1:45	0.851	0.601	0.958	0.875
2:00	0.843	0.577	0.955	0.863
2:15	0.836	0.553	0.952	0.851
2:30	0.828	0.529	0.948	0.838
2:45	0.820	0.505	0.945	0.826
3:00	0.813	0.480	0.942	0.813
3:15	0.805	0.456	0.938	0.801
3:30	0.798	0.432	0.935	0.789
3:45	0.790	0.408	0.932	0.776
4:00	0.782	0.384	0.928	0.764
4:15	0.803	0.443	0.925	0.751
4:30	0.824	0.502	0.922	0.739
4:45	0.845	0.561	0.919	0.727
5:00	0.866	0.620	0.915	0.714
5:15	0.887	0.679	0.912	0.702
5:30	0.908	0.738	0.916	0.716
5:45	0.929	0.797	0.920	0.731
6:00	0.950	0.856	0.924	0.745

	January Curves		July Curves	
Time	Total Demand	Retail Demand	Total Demand	Retail Demand
6:15	0.971	0.915	0.928	0.759
6:30	0.992	0.974	0.933	0.774
6:45	1.013	1.034	0.937	0.788
7:00	1.034	1.093	0.941	0.802
7:15	1.055	1.152	0.945	0.817
7:30	1.076	1.211	0.949	0.831
7:45	1.097	1.270	0.953	0.845
8:00	1.118	1.329	0.957	0.860
8:15	1.139	1.388	0.962	0.874
8:30	1.160	1.447	0.966	0.888
8:45	1.153	1.422	0.970	0.903
9:00	1.145	1.397	0.974	0.917
9:15	1.137	1.371	0.978	0.931
9:30	1.129	1.346	0.982	0.946
9:45	1.121	1.321	0.987	0.960
10:00	1.114	1.295	0.991	0.975
10:15	1.106	1.270	0.995	0.989
10:30	1.098	1.245	0.999	1.003
10:45	1.090	1.220	1.003	1.018
11:00	1.082	1.194	1.007	1.032
11:15	1.075	1.169	1.011	1.046
11:30	1.067	1.144	1.016	1.061
11:45	1.059	1.118	1.020	1.075
12:00	1.051	1.093	1.024	1.089
12:15	1.043	1.068	1.028	1.104
12:30	1.036	1.043	1.032	1.118
12:45	1.028	1.017	1.027	1.132
13:00	1.020	0.992	1.022	1.123
13:15	1.012	0.967	1.017	1.114
13:30	1.004	0.941	1.012	1.104
13:45	0.997	0.916	1.007	1.095
14:00	0.989	0.891	1.002	1.085
14:15	0.998	0.926	0.997	1.076
14:30	1.006	0.961	0.992	1.067
14:45	1.015	0.996	0.987	1.057
15:00	1.024	1.031	0.982	1.048
15:15	1.033	1.066	0.977	1.038
15:30	1.042	1.101	0.972	1.029
15:45	1.051	1.136	0.979	1.042
16:00	1.060	1.171	0.987	1.055
16:15	1.068	1.205	0.995	1.067
16:30	1.077	1.240	1.003	1.080
16:45	1.086	1.275	1.011	1.093
17:00	1.085	1.273	1.019	1.106
17:15	1.084	1.270	1.027	1.119

	January Curves		July Curves	
Time	**Total Demand**	**Retail Demand**	**Total Demand**	**Retail Demand**
17:30	1.084	1.267	1.035	1.132
17:45	1.083	1.265	1.042	1.144
18:00	1.082	1.262	1.050	1.157
18:15	1.081	1.259	1.058	1.170
18:30	1.080	1.257	1.066	1.183
18:45	1.080	1.254	1.074	1.196
19:00	1.079	1.251	1.082	1.209
19:15	1.078	1.249	1.090	1.221
19:30	1.077	1.246	1.098	1.234
19:45	1.077	1.244	1.106	1.247
20:00	1.076	1.241	1.113	1.260
20:15	1.075	1.238	1.121	1.273
20:30	1.064	1.207	1.129	1.285
20:45	1.052	1.176	1.137	1.298
21:00	1.041	1.145	1.125	1.272
21:15	1.029	1.113	1.113	1.247
21:30	1.018	1.082	1.101	1.221
21:45	1.007	1.051	1.089	1.195
22:00	0.995	1.020	1.077	1.169
22:15	0.984	0.989	1.065	1.143
22:30	0.973	0.957	1.053	1.117
22:45	0.961	0.926	1.041	1.091
23:00	0.950	0.895	1.029	1.065
23:15	0.939	0.864	1.017	1.040
23:30	0.927	0.833	1.005	1.014
23:45	0.916	0.801	0.993	0.988
23:59	0.904	0.770	0.981	0.962

These values are unitless

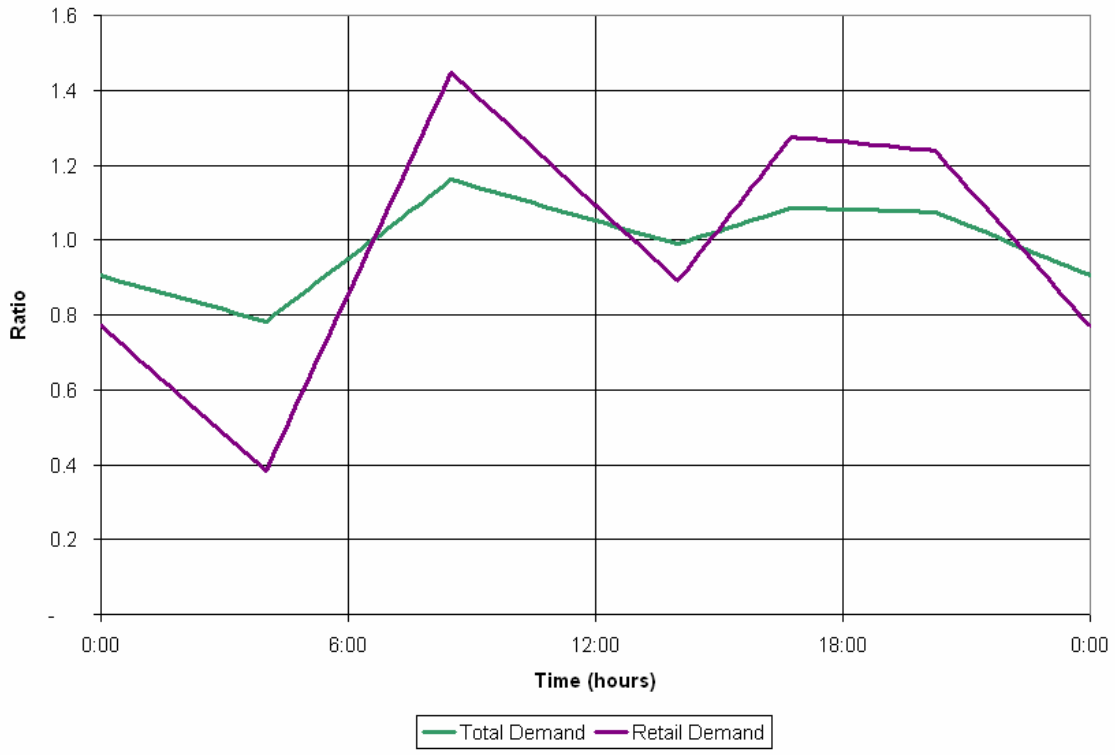

Figure 4-1 January Diurnal Curve

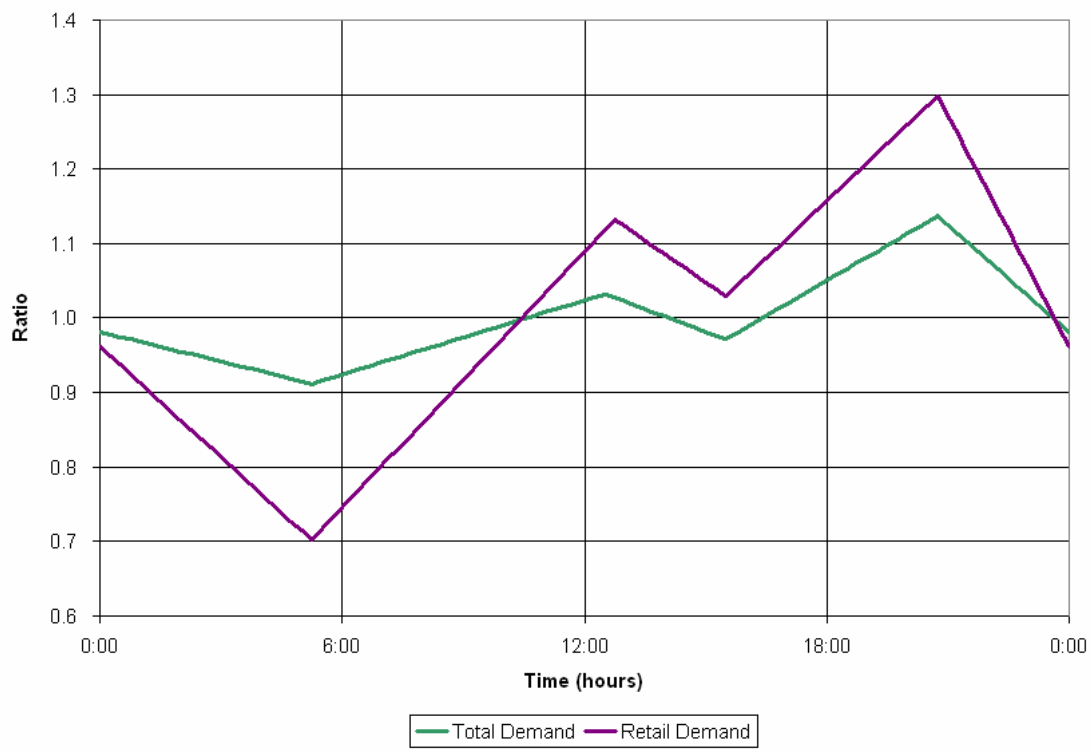

Figure 4-2 July Diurnal Curve

The curve was created by assuming that the volume of water produced plus the volume of water delivered to the distribution system from reservoirs minus the volume of water entering reservoirs equals the demand for any specific period of time. This calculation is completed for each 15-minute interval. The 15-minute value is divided by the average value for the 24-hour period to obtain a peaking factor.

4.1.4. Current and Future System Demands

Chapter 3 presents information on water demands for the Everett water system for the existing system and provides an estimate of projected water demands through the year 2100. For the hydraulic model, demands were developed for the retail system and a select number of wholesale customers (including Silver Lake, Mukilteo and Alderwood Water and Wastewater District) that are served through master meters in the distribution system.

The demand forecast numbers were used to determine the total demand on the Everett retail system. Demand allocation for the hydraulic model, which is how the demand is distributed spatially within the system, was determined by evaluating customer billing information. Customers within the distribution system are typically billed according to metered water use. An average water use per meter (or customer) can be developed from historical billing information. These average numbers can be associated to model nodes if the meters are geocoded within the system's GIS.

The H2OMAP Demand Allocator module was used to develop and load demands into the model. Fifteen months of customer billing data, provided by the City of Everett, was compiled and an average water use (in gpm) was calculated for each current customer consuming water within the retail area. The meters were geocoded within the Everett retail area. Geocoding is a GIS operation for converting street addresses into spatial data that can be displayed as features on a map

H2OMAP Demand Allocator uses GIS technology to assign geocoded consumption data to designated demand nodes. For each demand node in the network model, the program identifies and sums demands imposed by all meters within an associated demand service area polygon. For the Everett model, demand area polygons were generated for designated demand nodes using the Thiessen polygon generation capability within the software. Nodes located near a storage reservoir, pump station or PRV stations were not included as demand nodes within the hydraulic model.

After the demand allocation process was conducted, the total system demand was adjusted with multipliers for each pressure zone to match the demand forecast numbers presented in Chapter 3. Demand allocation was the same for the existing system, six year and twenty year planning horizons. The total demand was adjusted for each modeling scenario, as shown in Table 4-2.

Table 4-2 Pressure Zone Demands

Pressure Zone	HGL (ft)	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Lowell	271				
ADD (mgd)		0.14	0.14	0.16	0.20
MDD (mgd)		0.24	0.25	0.28	0.36
Low	283				
ADD (mgd)		5.03	5.30	6.25	8.48
MDD (mgd)		8.94	9.45	11.09	15.02
Intermediate	361				
ADD (mgd)		0.67	0.71	0.85	1.19
MDD (mgd)		1.19	1.26	1.50	2.11
View Ridge	418				
ADD (mgd)		0.44	0.46	0.54	0.72
MDD (mgd)		0.78	0.81	0.95	1.28
View Drive	422				
ADD (mgd)		0.09	0.09	0.11	0.15
MDD (mgd)		0.15	0.16	0.19	0.26
Valley View	434				
ADD (mgd)		0.08	0.08	0.10	0.12
MDD (mgd)		0.13	0.15	0.17	0.22
Bridle Park	464				
ADD (mgd)		0.14	0.14	0.17	0.24
MDD (mgd)		0.24	0.26	0.31	0.43
Lower Eastmont	479				
ADD (mgd)		0.09	0.10	0.14	0.18
MDD (mgd)		0.16	0.18	0.25	0.31
Claremont	484				
ADD (mgd)		0.79	0.82	0.95	1.28
MDD (mgd)		1.41	1.46	1.69	2.27
Hanabrook	501				
ADD (mgd)		0.01	0.01	0.01	0.02
MDD (mgd)		0.02	0.02	0.02	0.03
Dogwood	564				
ADD (mgd)		0.70	0.71	0.77	0.92
MDD (mgd)		1.25	1.26	1.36	1.62
Kenilworth	568				
ADD (mgd)		0.01	0.01	0.01	0.02
MDD (mgd)		0.02	0.02	0.02	0.03
585	587				
ADD (mgd)		0.90	0.94	1.11	1.45
MDD (mgd)		1.59	1.67	1.97	2.58
Stratton Hills	638				
ADD (mgd)		0.03	0.03	0.04	0.06
MDD (mgd)		0.06	0.06	0.07	0.10

Pressure Zone	HGL (ft)	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050
Madison	645				
ADD (mgd)		0.55	0.57	0.65	0.86
MDD (mgd)		0.98	1.01	1.16	1.52
Silver Lake 640	640				
ADD (mgd)		0.41	0.43	0.51	0.69
MDD (mgd)		0.74	0.77	0.90	1.22
Industry	674				
ADD (mgd)		0.80	1.27	3.50	4.15
MDD (mgd)		1.41	2.27	6.20	7.36
High Service	720				
ADD (mgd)		4.68	5.28	8.77	12.41
MDD (mgd)		8.32	9.43	15.56	21.98

4.1.5. Calibration

Steady-state calibration of the model was performed by comparing field fire flow test results with simulations from the model. Twenty-five field fire flow tests were completed in June of 2005 at various locations throughout the Everett distribution system. The test locations were selected to maximize the friction losses during the fire flow event by placing the test locations as far from sources of water for each pressure zone as possible.

Following the initial calibration effort, several of the original fire flow test results became suspect. Reasons why the results were not used include; hydraulic grades higher than the maximum anticipated in the pressure zone, flows too high or low compared to the modeled value, valves determined after the test to be closed, and flow hydrant and gage hydrants in separate pressure zones. Several locations were selected for retesting in July 2006.

Demands were allocated as described in Section 4.1.4. Total demand matched the calculated average demand for the day of the field testing. The calculated demand was developed by using the total volume of water produced at the WFP plus the net decrease in volume for each reservoir minus the net increase in volume for each reservoir in the system. This was then converted to an average value in gallons per minute. Demands already allocated within the model were uniformly increased or decreased to meet the demand on the calibration day.

Reservoir elevations were set at the average level for the day of the fire flow test. These elevations differed slightly for each of the 25 calibration scenarios. Pumps at the Evergreen and Casino pump stations operated based on the level of the reservoirs.

Table 4-3 contains the field fire flow data and the results of the calibration simulations. Most of the calibration simulation results are within 5 psi of the field fire flow results. We were unable to reach agreement with several of the tests. These are identified in Table 4-3, in the comment column.

Table 4-3 City of Everett WSP Hydraulic Model Calibration

Hydrant Test No.	Pressure Zone	Approx. ZONE HGL (ft)	*Gage Hydrant ID*	Gage Node Elev (ft)	Field Static Pressure (psi)	Field Static HGL (ft)	Model Static Pressure (psi)	Model Static HGL (ft)	Pressure Difference (psi)	*Flow Hydrant Node ID*	Hydrant Flow (gpm)	Hydrant Node Elev (ft)	Field Residual Pressure (psi)	Field Residual HGL (ft)	Model Residual Pressure (psi)	Model Residual HGL (ft)	Pressure Difference (psi)	Comments
1	Low	283	*16706*	52.4	97	276.2	99.6	282.1	2.6	*16726*	1,343	44.6	81	239.3	85.5	249.6	4.5	
2	Low	283	*1512*	101.1	80	285.6	78.5	282.1	-1.5	*1502*	1,053	107.6	58	234.9	34.7	181.1	-23.3	Something in Model is still wrong. FF 3 has lower loss for similar flow and is farther away from connections to upper zones.
3	Low	283	*21588*	89.5	79	271.8	84.1	283.5	5.1	*21578*	986	96.7	70	251.0	81.1	276.7	11.1	Not sure valve was closed in this zone for the test in round 1; not a dead end; REDONE with valve closed
3	Low	285	*21586*	88.5	78	268.4	84.1	282.4	6.1	*21578*	740	96.7	55	215.4	59.6	225.9	4.6	
4	Intermediate	362	*11584*	159.1	85	355.2	85.2	355.6	0.2	*11582*	1,164	146.1	82	348.3	82.0	348.3	0.0	Not a dead end.
5	Intermediate	362	*12142*	172.5	80	357.1	79.8	356.6	-0.2	*12144*	1125	168.57	78	352.5	75.1	345.7	-2.9	
6	Claremont	484	*13624*	352.2	61	493.0	61.2	493.5	0.2	*13612*	950	361.4	48	463.0	47.2	461.2	-0.8	
7	Claremont	484	*17912*	310.0	77	487.6	81.6	498.3	4.6	*17990*	800	287.69	38	397.7	41.8	406.5	3.8	
8	Lowell	271	*15744*	65.0	92	277.2	93.9	281.6	1.9	*15742*	812	54.1	30	134.2	~~78.5~~	~~246.0~~	~~48.5~~	Valve must be closed in zone; FF low in field; can't match with model. Use only static result.
9	585	585	*16796*	395.0	76	570.3	80.4	580.5	4.4	*16794*	894	376.1	42	491.9	36.4	478.9	-5.7	Static HGL is higher than others even though location is at far end of zone. Connection with higher zone or Evergreen PS is in model by mistake.
9	585	585	*16796*	395.0	75	568.0	81.4	582.7	6.3	*16794*	785	376.11	34	473.4	46.1	501.3	12.1	Static HGL is higher than others even though location is at far end of zone. Connection with higher zone or Evergreen PS is in model by mistake.
10	585	585	*8622*	456.4	51	574.0	53.1	578.9	2.1	*9294*	770	452.88	38	544.1	37.6	543.1	-0.4	
11	585	585	*6898*	430.0	65	580.0	64.3	578.4	-0.7	*6900*	610	442.7	38	517.7	39.1	520.1	1.1	
12	Eastmont	483	*8432*	305.1	80	489.6	82.9	496.4	2.9	*29998*	1,178	260.0	64	452.7	63.4	451.2	-0.6	
13	Madison	645	*15858*	450.0	79	632.3	80.9	636.5	1.9	*15910*	1,020	432.7	50	565.4	48.6	562.2	-1.4	
14	Madison	645	*11510*	444.2	92	656.4	93.9	660.8	1.9	*12516*	1,236	464.0	84	637.9	83.4	636.4	-0.7	One pump during static, two during fire flow.
15	Dogwood	564	*17386*	330.2	82	519.4	86.6	530.0	4.6	*xx-9*	785	346	45	434.0	42.1	427.4	-2.9	
16	Dogwood	564	*17074*	380.0	64	527.6	63.1	525.7	-0.9	*17072*	1,118	353.6	40	472.3	38.8	469.6	-1.2	
17	View Ridge	418	*18136*	185.0	99	413.4	100.5	416.9	1.5	*18186*	1,164	195.0	74	355.7	79.9	369.3	5.9	Berry Line operations affect this zone
18	View Ridge	418	*17886*	128.5	124	414.6	124.9	416.7	0.9	*17982*	1,369	119.9	90	336.1	91.3	339.2	1.3	Berry Line operations affect this zone
19	Ring Creek	661	*15192*	462.2	84	656.0	81.0	649.1	-3.0	*15190*	1,381	447.0	68	619.1	66.1	614.7	-1.9	
21	View Ridge	418	*14924*	230.0	81	416.9	81.0	416.9	0.0	*13708*	800	216.38	57	361.5	55.4	357.7	-1.6	Berry Line operations affect this zone
22	High Service	715	*23376*	495.0	90	702.6	94.1	712.1	4.1	*23316*	2,351	511.9	82	684.2	75.1	668.3	-6.9	Corrections to bring this test closer will make Test 24 farther away
23	High Service	715	*3670*	486.5	98	712.5	97.8	712.1	-0.2	*3608*	2,319	480.6	90	694.1	88.3	690.3	-1.7	
24	High Service	715	*11260*	573.2	60	711.6	60.3	712.2	0.3	*11840*	1,291	575.0	50	688.5	60.1	711.9	10.1	Corrections to bring this test closer will make Test 22 farther away
25	Low	283	*22300*	15.0	112	273.4	114.9	280.0	2.8	*30794*	1300	18.42	88	218.0	94.4	232.9	6.4	

4.1.6. Modeling Scenarios

The City has an extensive distribution system with approximately 380 miles of mains throughout the retail service area. Many of these mains were installed more than 50 years ago and are reaching the end of their useful lives. Aging infrastructure, inadequately sized pipes and increasing demands all contribute to cause areas of low pressure during peak hour demands and substandard fire flows at locations or areas where the existing system cannot provide adequate service during existing and future peak hour demand conditions. The model was used to identify potential improvements that would increase the distribution system capacity to meet the required level of service for static pressures and fire flows.

In accordance with WAC 246-290-230, a minimum pressure of 30 psi must be maintained at all customer connections under peak hour demand (PHD) conditions with equalizing storage depleted. A minimum of 20 psi must be maintained for fire flows under MDD conditions with equalizing and fire flow storage depleted. Pipe velocity in the distribution system must be maintained at 8 feet per second or less under all flow conditions. If these criteria could not be met, improvements were identified and through an iterative trial-and-error process, implemented until pressure and velocity criteria could be satisfied with the minimum total pipe and facility additions.

A number of steady state hydraulic analyses were completed for each pressure zone for existing (2005), six year (2012) and twenty year (2026) demand conditions. These included fire flow demand (MDD plus fire flow) and peak hour demand. Table 4-4 describes the modeling scenarios conducted as part of the Everett Comprehensive Water Plan.

Table 4-4 Modeling Scenarios for Everett Comprehensive Water Plan

Description	Facilities	Demand	Purpose
Existing Year CIP Fire Flow	Existing System	2005 Maximum Day Demand plus fire flow	Evaluate system and develop CIP for existing fire flow conditions
Existing Year CIP Peak Hour	Existing System	2005 Peak Hour Demand	Evaluate system and develop CIP for existing system peak hour conditions
Plan Year 20 CIP Fire Flow	Plan Year 20 CIP	Plan Year 20 Maximum Day Demand plus fire flow	Evaluate system performance and develop CIP for Plan Year 20 fire flow conditions
Plan Year 20 CIP Peak Hour	Plan Year 20 CIP	Plan Year 20 Peak Hour Demand	Evaluate system and develop CIP for Plan Year 20 peak hour conditions
Plan Year 6 CIP Fire Flow	Plan Year 6 CIP	Plan Year 6 Maximum Day Demand plus fire flow	Identify portions of the Plan Year 20 CIP needed to meet Plan Year 6 fire flow conditions
Plan Year 6 CIP Peak Hour	Plan Year 6 CIP	Plan Year 6 Peak Hour Demand	Identify portions of Plan Year 20 CIP needed to meet Plan Year 6 peak hour conditions

The modeling scenarios were conducted in the order shown in Table 4-4. Under peak hour demands for existing system, six year and twenty year planning horizon conditions, the Everett system experienced very few problems within the distribution system. Areas where

pressure was below 30 psi in the system during peak hour conditions were along transmission lines or near reservoirs, which is considered an acceptable level of service.

Inadequate available fire flow was evident throughout the system, due to aging infrastructure, small pipe diameters in older residential areas, and long dead end lines. To provide adequate fire flow throughout the system, pipeline improvements were identified for the existing system (2005), six year (2012) and twenty year (2026) planning horizons. The methodology for fire flow analysis is explained in greater detail in Section 4.2 and the results are presented in Chapter 9.

4.2. Fire Flow Analysis

Fighting a fire is the single largest demand that a small water system will experience. Large volumes of water at high flow rates are required at point locations, resulting in high velocities in pipelines, excessive head losses, and extreme pressure drops. To minimize the effects of these forces on the system and still provide the necessary fire flows, the water distribution network must be designed with an adequate combination of supply, storage, and pipe sizing.

Fire flow requirements are set by the fire department and depend on the type of development (residential or commercial) and particular construction details (e.g. whether a structure has a built-in sprinkler or other fire suppression system). Typical required fire flows in the City are shown in Table 4-5.

Table 4-5 Fire Flow Requirements

Type of Development	Required Fire Flow (gpm)	Minimum Duration (hours)
Single-Family Home (less than 3,600 SF)	1,000	2
Single-Family Home (greater than 3,600 SF)	1,500	2
Multi-Family Dwelling	1,500 – 4,000	2-4 (1)
Non-residential	1,500 – 4,000	2-4 (1)

Notes:
(1) Minimum duration depends on the required fire flow: less than 2,750 gpm, 2 hours; 3,000 – 3,750 gpm, 3 hours; and 4,000 gpm or greater, 4 hours.

H2OMAP Water calculates the available flow (one node at a time) which can be delivered to the fire at the specified node. For the City of Everett, fire flow computations were carried out for steady state simulations. Using GIS information for system hydrants, fire flows were initially assigned to all demand nodes within 150 feet of hydrants within the system. The number of fire flow nodes was manually reduced during the analysis, in an effort to try and match one node for each fire hydrant, to reduce the overall run time of the hydraulic model.

A fire flow demand of 1,000 gpm was used for the fire flow analysis for the City of Everett. The fire flow demand was imposed on the distribution system loaded for maximum day demand. Analyses for maximum day demand conditions within the system, plus fire flow, were conducted for existing year (2005), the six year (2012) and the twenty year planning horizon (2026).

For the fire flow analysis, the model was used to estimate the available fire flow under two scenarios: while maintaining a minimum residual pressure of 20 psi at the fire flow location and while maintaining a minimum residual pressure of 20 psi at all services in the same pressure zone as the fire flow. This constitutes the minimum level of service as required by DOH.

In areas where the capacity of the distribution system was not sufficient to provide the required fire flow, specific improvements were developed and recommended to increase the system capacity to meet fire flow requirements. The fire flow analyses were run for one pressure zone at a time and improvements were added until all of the pressure zone was able to provide flows of 1,000 gpm to fight fires. Specific areas, such as the Industry pressure zone, the western edge of the High pressure zone (near Boeing), the Providence Medical Center and portions of the downtown core area required available fire flow of between 3,000 and 4,000 gpm.

4.3. Source Analysis

Three separate tables have been prepared to analyze the source adequacy of the Everett system. The following sets of pressure zones were evaluated for source adequacy:

- Full Distribution System
- Casino Tank Service Area
  - Bridle Park Pressure Zone,
  - Lower Eastmont Pressure Zone,
  - Kenilworth Pressure Zone,
  - Stratton Hills Pressure Zone,
  - Silver Lake 640 Pressure Zone,
  - Industry Pressure Zone, and
  - High Service Pressure Zone
- Casino Tank and Reservoir 6 Service Area
  - Casino Pump Station Demands (same as the set above)
  - View Ridge Pressure Zone,
  - Valley View Pressure Zone,
  - Claremont Pressure Zone,
  - Hanabrook Pressure Zone,
  - Dogwood Pressure Zone ,
  - 585 Pressure Zone,
  - Madison Pressure Zone, and
  - 650 Pressure Zone

These pressure zones are combined in this manner since water is capable of moving from the upper zone to lower zones through pressure reducing valves and source water needs to pass through the pump station and reservoir in order to be delivered to customers in the pressure zone. The hydraulic profile in Chapter 1 (Figure 1-8) can be used to see the interconnections between the pressure zones in the two service areas.

Source analysis is completed to meet the criteria outlined in the Washington State Department of Health Water System Design Manual (Design Manual), 2001. This plan utilizes these guidelines as criteria for determination of reasonable treated water source required in each pressure zone.

Source must be adequate to meet the MDD for the area being evaluated. In this analysis, the capacity of the existing WFP will be used as the source for the full system. The Evergreen Pump Station is considered to be the source for the Reservoir 6 Service Area and the Casino Pump Station is the source for the Casino Tank Service Area. The capacity of the two pump stations is calculated with one pump out of service and the remaining pumps operating for the full 24-hours during a day. Since all four pumps in the Casino Pump Station are identical, the pump out of service does not matter. For the Evergreen Pump Station, one of the 3,500 gpm pumps is assumed out of service.

The following paragraphs discuss the results of the source evaluation.

Full System

Table 4-6 shows the source analysis for the full Everett retail and wholesale system. The only source for the system is the Water Filtration Plant (WFP) with a current capacity of 132 mgd. There is currently adequate source at the WFP to meet the projected demand through approximately 2013. Following that date demand begins to exceed the existing capacity and will be approximately 131 mgd deficient under 2050 demands.

The City is aware of the potential deficit and has begun the process to evaluate the options for expansion of the WFP.

Table 4-6 Evaluation of Source Adequacy for City of Everett Water System

	Year				
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**Max** (4)
Projected ERUs and Demand					
Equivalent Residential Units (ERUs) (1)	273,837	307,464	431,541	629,067	315,601
Projected Demand (mgd) (2)					
Average Day	61.34	69.17	100.87	146.44	73.77
Maximum Day	114.53	128.60	180.49	263.11	132.00
Available Source (mgd)	132.00	132.00	132.00	132.00	132.00
Water Filtration Plant (132 MGD) (3)	132.00	132.00	132.00	132.00	132.00
Total Available Source (mgd)	132.00	132.00	132.00	132.00	132.00
Source Surplus/(Deficiency) (mgd)	17.47	3.40	(48.49)	(131.11)	0.00
Year Demand Crossover Source			2013		

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Conservation is assumed to reach the set value by 2012 and remain at that level throughout the planning period.
(3) Capacity of Water Filtration Plant based on design capacity and assumes plant is operating 24 hours per day.
(4) Maximum number of ERUs that can be served by existing Water Filtration Plant is based on MDD of 132 mgd at 418 gpd/ERU.

Casino Tank Service Area

Source in the Casino Tank Service Area consists of the Casino Pump Station. The pump station has four identical pumps each with a capacity of 6,000 gpm. The analysis is performed assuming one pump is out of service and the remaining three pumps operate for 24-hours during the MDD. Thus, for this analysis the capacity of the Casino Pump Station is assumed to be 25.9 mgd.

Demand in the Casino Tank Service Area is projected to exceed the supply capacity by 2020 and will be approximately 14.8 mgd deficient under projected 2050 demands. Table 4-7 shows the source analysis for the Casino Tank Service Area.

Table 4-7 Evaluation of Source Adequacy for Casino Tank Service Area

	Year				
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**Max** (4)
Projected ERUs and Demand					
Equivalent Residential Units (ERUs) (1)	41,165	46,231	72,693	97,322	61,973
Projected Demand (mgd) (2)					
Average Day	9.28	10.42	16.64	22.01	14.19
Maximum Day	17.22	19.34	30.40	40.71	25.92
Available Source (mgd)					
Casino Pump Station Pump 1 (6,000 gpm) (3)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 2 (6,000 gpm) (3)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 3 (6,000 gpm) (3)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 4 (6,000 gpm) (3) (assumed out of service)	0.00	0.00	0.00	0.00	0.00
Total Available Source (mgd)	25.92	25.92	25.92	25.92	25.92
Source Surplus/(Deficiency) (mgd)	8.70	6.58	(4.48)	(14.79)	0.00
Year Demand Crossover Source			2020		

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Conservation is assumed to reach the set value by 2012 and remain at that level throughout the planning period.
(3) Capacity of Casino Pump Station assumes 24 hour operation with one pump out of service.
(4) Maximum number of ERUs that can be served by existing Casino Pump Station is based on firm capacity of 25.92 mgd at 418 gpd/ERU.

Casino Tank and Reservoir 6 Service Area

The Evergreen Pump Station provides the source for the combined Casino Tank and Reservoir 6 Service Area. The pump station has a total capacity of approximately 24.5 mgd. In this analysis one of the pumps (5.04 mgd, 3,500 gpm capacity) is assumed to be out of service resulting in a capacity of 19.4 mgd.

Demand in this service area currently exceeds the source capacity used in this analysis (See Table 4-8). Current MDD can be met by using all five pumps, but the analysis assumes that one pump is out of service. The ultimate capacity of the Evergreen Pump Station needs to be increased by 30.8 mgd for 2050 conditions.

Table 4-8 Evaluation of Source Adequacy for Casino Tank and Reservoir 6 Service Areas

	Year				
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	Max (4)
Projected ERUs and Demand					
Equivalent Residential Units (ERUs) (1)	55,904	61,484	90,211	120,067	46,479
Projected Demand (mgd) (2)					
Average Day	12.75	13.99	20.77	27.39	10.70
Maximum Day	23.38	25.72	37.73	50.22	19.44
Available Source (mgd) (1)					
Evergreen Pump Station Pump 1 (2,500 gpm) (3)	3.60	3.60	3.60	3.60	3.60
Evergreen Pump Station Pump 2 (2,500 gpm) (3)	3.60	3.60	3.60	3.60	3.60
Evergreen Pump Station Pump 3 (3,500 gpm) (assumed out of service) (3)	0.00	0.00	0.00	0.00	0.00
Evergreen Pump Station Pump 4 (3,500 gpm) (3)	5.04	5.04	5.04	5.04	5.04
Evergreen Pump Station Pump 5 (5,000 gpm) (3)	7.20	7.20	7.20	7.20	7.20
Total Available Source (mgd)	19.44	19.44	19.44	19.44	19.44
Source Surplus/(Deficiency) (mgd)	(3.94)	(6.28)	(18.29)	(30.78)	0.00

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Conservation is assumed to reach the set value by 2012 and remain at that level throughout the planning period.
(3) Capacity of Evergreen Pump Station assumes 24 hour operation with one pump out of service.
(4) Maximum number of ERUs that can be served by existing Casino Pump Station is based on firm capacity of 25.92 mgd at 418 gpd/ERU.

Proposed Mitigation Schedule

Table 4-9 is a schedule showing the year that additional capacity is needed for the full system and the two service areas. Each service area is independent in that increased capacity for one service area will not assist in mitigating a deficit in any other service area. The additional capacity could be installed earlier than shown on the table, but must be in place by the year identified. New source is added during the year that existing source becomes inadequate. Planned new source is adequate to meet increased demands for at least 6 years.

Table 4-9 Suggested New Source and Booster Pumping Improvement Schedule

	Year					
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2013	2020	2026 (Plan Yr 20)	2050
Existing Source Surplus/(Deficiency) (mgd)						
Casino Tank Service Area	8.7	6.6	5.8	0.3	(4.5)	(14.8)
Casino Tank and Reservoir 6 Service Area	(3.9)	(6.3)	(7.1)	(13.1)	(18.3)	(30.8)
System-wide Surplus/(Deficiency)	17.5	3.4	(0.3)	(26.3)	(48.5)	(131.1)
New Source and Booster Pumping Construction during interval (mgd) (1)						
Casino Tank Service Area	-	-	-	4.6	10.2	
Casino Tank and Reservoir 6 Service Area	6.4	-	7.0	5.0	12.4	
System-wide Surplus/(Deficiency)	-	-	26.3	26.3	78.6	
Total New Source and Booster Pumping (mgd) (2)						
Casino Tank Service Area	-	-	-	4.6	14.8	14.8
Casino Tank and Reservoir 6 Service Area	6.4	6.4	13.4	18.4	30.8	30.8
System-wide Surplus/(Deficiency)	-	-	-	26.3	52.6	131.2
Source Surplus/(Deficiency) after Improvements (mgd)						
Casino Tank Service Area	8.7	6.6	5.8	4.9	10.3	0.0
Casino Tank and Reservoir 6 Service Area	2.5	0.1	6.3	5.3	12.5	0.0
System-wide Surplus/(Deficiency)	17.5	3.4	26.0	26.3	82.7	0.1

Notes:
(1) The year identified for new source or booster pumping is the latest in which it must be provided. New facilities could be constructed at an earlier time, if desired.
(2) The amount listed is a running total of the amount of new capacity, not the amount that needs to be added each year.

4.4. Storage Analysis

DOH requires public water systems to provide sufficient storage to meet any seasonal or diurnal variations in demand, fire flows, and emergency demands such as during power outages and equipment failures. As with the source analysis, the criteria for storage adequacy are outlined in the Design Manual.

For a given reservoir design, each of the five storage components listed below must be considered:

- Operational Storage;
- Equalizing Storage;
- Standby Emergency Storage;
- Fire Suppression Storage; and
- Dead Storage, if any.

Only effective storage may be used in determining actual available, or design storage volume. Effective volume is equal to the total volume minus the dead storage built into the reservoir. Total storage volume required has been interpreted as the sum of Equalizing Storage, plus the larger of Fire Storage, and Standby (Emergency) Storage. Operational storage is any surplus storage that is available after subtracting the other required storage components (Exhibit 8-1 in the Design Manual). For this plan, storage requirements will be developed by pressure zone. The ability to provide water from reservoirs to lower zones through PRV stations will be included in the analysis. Nesting of standby and fire flow storage (i.e. using the larger of the two volumes) is acceptable to the Fire Districts served by the Everett water system. Thus, the storage analysis will incorporate nesting of standby and fire flow storage.

Demands in the storage analysis only include Everett's retail customers. Wholesale customers will need to have their own storage capacity and meet the DOH regulations on their own.

4.4.1. Operational Storage

Operational storage is the volume of the reservoir devoted to supplying the water system while, under normal operating conditions; the sources of supply are in "off" status. Operational storage is additive to the other components of storage and provides an additional factor of safety. The volume of operational storage should be sufficient to prevent excess pump cycling. Pumps located at the WFP are controlled by the operators based on their experience, anticipated demands, and water levels in Reservoir No. 3. Pumps in the Evergreen and Casino Pump Stations start and stop based on water levels in Reservoir 6 and the Casino Tank, respectively.

The amount of operational storage in each pressure zone is identified as the amount of surplus volume in each calculation.

4.4.2. Equalizing Storage

Equalizing storage capacity is utilized to meet the daily (diurnal) variations in demand. Peak use periods typically occur during the morning and evening hours, especially during the breakfast and dinner hours. Water is typically withdrawn from storage during these peak demand periods and replenished during low demand periods during late evening and early morning hours.

For systems like Everett that supply water to storage based upon the reservoir water levels (on-call-demand), the DOH guidelines specify that the following equation be used to estimate equalizing storage:

Equalizing Storage (gal) = (PHD – Q_S) (150 minutes) where

PHD = Peak hourly demand (gpm)

Q_S = Source production rate (gpm)

In most cases in Everett, Q_S is greater than the PHD resulting in a negative value for Equalizing Storage. In these cases, a value of ten (10) percent of the Maximum Day Demand is used. At no time is equalizing storage calculated as less than ten percent of MDD.

4.4.3. Standby Emergency Storage

The purpose of standby storage is to provide a measure of reliability should sources fail or when unusual conditions impose higher demands than anticipated. The volume of emergency storage required is dependent upon the reliability of the source of supply and the ability to provide an alternative supply. If the system or zone has multiple sources of supply, placing the larger supply source out of service and calculating the volume of water that could be provided by the remaining supply sources in gallons per connection per day can reduce the standby storage requirement.

For this analysis, the largest source in any pressure zone is taken out of production before the storage volume is calculated. Booster pump stations into a pressure zone are considered a source in this analysis. For pump stations, the capacity of the largest single pump is removed from service during this calculation; the full pump station capacity is not used.

According to DOH, the recommended standby storage should not be less than 200 gallons per equivalent residential units (ERU). For systems with multiple sources the standby storage is based on the following equation:

Standby Storage (gal) = (2*ADD) (N) – t_m (Q_S- Q_L) where

ADD = Average Day Demand/ERU (gpd/ERU)

N = Number of ERUs

Q_S = Sum of all installed and available sources of supply in gpm

QL = the largest capacity source available to the system in gpm

t_m = Time that remaining sources are pumped on the day that the largest source is not available in minutes (assumed as 24 hours)

The larger of the amount calculated in the equation above, or 200 gallons per ERU, is used for Emergency Standby Storage in this analysis.

4.4.4. Fire Suppression Storage

Water systems are required to construct and maintain facilities capable of delivering fire flows in accordance with the determination of the fire flow requirements made by the local fire protection authority while maintaining 20 psi pressure throughout the distribution system. Maximum fire flow requirements for the Everett system has been set at 3,500 gpm for four hours. This is the maximum fire flow and is only required at certain locations within the distribution system. The typical fire flow requirement is 1,000 gpm for two hours, but storage must be based on the highest possible fire flow.

The minimum fire suppression storage for systems is the product of the required flow rate multiplied by the flow duration and is based on the following equation:

Fire suppression storage (gal) = FF (t_m) where

FF = Required fire flow rate

t_m = Duration of fire flow rate

4.4.5. Dead Storage

Dead storage is the volume of stored water not available to all customers at the minimum design pressures. Dead storage is excluded from the volumes provided to meet the effective storage. Dead storage is assumed as that volume which is at an elevation lower than the elevation necessary to provide 20 psi (static) at the meter of the highest customer in any pressure zone. Dead storage has not been directly evaluated in the following tables. When addressing the surplus or deficiency identified in the tables, an allowance for dead storage should be included.

4.4.6. Everett Storage Evaluation

Similar to the source analysis, three separate spreadsheets have been developed to evaluate the storage adequacy of the Everett system. The three spreadsheets evaluate the full system, the Casino Tank Service Area, and the combined Casino Tank and Reservoir 6 Service Areas. The following paragraphs discuss the results of the storage evaluation.

Full System

Current storage is adequate for the full system and will become deficient in approximately 2033 (See Table 4-10). The analysis includes the current planning of the City where the Bridle Park and existing Casino Standpipes will be demolished before 2012 and a new 2.0 MG elevated reservoir will be installed at the Casino site by 2007/2008. At 2050 demands there is a need for an additional 8.1 MG of storage in the Everett distribution system.

Table 4-10 Evaluation of Full System Storage Adequacy for City of Everett Water System

	Year				
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**Max** [8]
Projected ERUs and Demand [1]					
Equivalent Residential Units (ERUs)	66,074	72,870	104,514	140,342	124,764
Projected Demand (mgd)					
Average Day	15.55	17.08	24.64	33.15	29.42
Maximum Day	27.64	30.48	43.71	58.70	52.18
Peak Hour	44.34	48.88	70.06	94.04	83.64
Available Source (mgd) [2]					
Water Filtration Plant (132 MGD)	132.00	132.00	132.00	132.00	132.00
Total Available Source (mgd)	132.00	132.00	132.00	132.00	132.00
Required Storage Calculations					
Standby Storage (MG) [3]	31.10	34.16	49.28	66.30	58.83
Equalizing Storage (MG) [4]	2.76	3.05	4.37	5.87	5.22
Fire Flow Storage (MG) [5]	0.96	0.96	0.96	0.96	0.96
Required Storage Greater than 20 psi at highest meter (MG) [6]	33.86	37.20	53.65	72.17	64.05
Existing Potable Storage (MG) [7]					
Reservoir 1 (West and East)	0.75	0.75	0.75	0.75	0.75
Reservoir 2	20.00	20.00	20.00	20.00	20.00
Reservoir 3	20.00	20.00	20.00	20.00	20.00
Reservoir 6 (North and South)	20.00	20.00	20.00	20.00	20.00
Casino Site	4.00	2.00	2.00	2.00	2.00
Bridle Park Standpipe	0.13	0.00	0.00	0.00	0.00
Upper Ridge Tank	1.00	1.00	1.00	1.00	1.00
Eastmont Tank	0.10	0.10	0.10	0.10	0.10
Olympic Tank	0.20	0.20	0.20	0.20	0.20
Total Existing Storage (MG)	66.18	64.05	64.05	64.05	64.05
Source Surplus/(Deficiency) at 20 psi	32.31	26.85	10.40	(8.12)	0.00
Year Demand Crossover Storage			2033		

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Everett has no multi-source credit since all water is provided from the Water Filtration Plant.
(3) Required standby storage for existing source = greater of (2 times ADD - Multi source credit) or 200 gallons per ERU.
(4) Required equalization storage = Max of DOH equation or 10% MDD
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD = (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH June 1999 WSDM)
(5) Required fire flow storage = Flow * duration (4,000 gpm for 4 hours)
(6) Total required storage greater than 20 psi is equal to the required equalizing storage plus the larger of standby and fire flow storage.
(7) Available storage includes all storage within the system and is not adjusted for minimum pressures.
(8) Maximum ERUs with available storage.

Casino Tank Service Area

Table 4-11 shows the calculation of storage adequacy for the Casino Tank Service Area. This table includes the demolition and rebuilding of the existing Casino Standpipe as

discussed above. Given this schedule there is a deficiency in storage for the Casino Tank Service Area in 2011.

Table 4-11 Evaluation of Storage Adequacy for Casino Tank Service Area

	Year				
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**	**Max** [8]
Projected ERUs and Demand [1]					
Equivalent Residential Units (ERUs)	26,170	31,036	55,753	75,158	27,256
Projected Demand (mgd)					
Average Day	6.16	7.27	13.15	17.75	6.43
Maximum Day	10.95	12.98	23.32	31.43	11.40
Peak Hour	17.63	20.89	37.43	50.42	18.30
Available Source (mgd) [2]					
Casino Pump Station Pump 1 (6,000 gpm)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 2 (6,000 gpm)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 3 (6,000 gpm)	8.64	8.64	8.64	8.64	8.64
Casino Pump Station Pump 4 (6,000 gpm)	0.00	0.00	0.00	0.00	0.00
Total Available Source (mgd)	25.92	25.92	25.92	25.92	25.92
Required Storage Calculations					
Standby Storage (MG) [3]	-	-	-	-	-
Equalizing Storage (MG) [4]	1.09	1.30	2.33	3.14	1.14
Fire Flow Storage (MG) [5]	0.96	0.96	0.96	0.96	0.96
Required Storage Greater than 20 psi at highest meter (MG) [6]	2.05	2.26	3.29	4.10	2.10
Existing Potable Storage (MG) [7]					
Bridle Park Standpipe	0.13	-	-	-	-
Eastmont Tank	0.10	0.10	0.10	0.10	0.10
Casino Site	4.00	2.00	2.00	2.00	2.00
Total Existing Storage (MG)	4.23	2.10	2.10	2.10	2.10
Source Surplus/(Deficiency) at 20 psi	2.17	(0.16)	(1.19)	(2.00)	0.00
Year Demand Crossover Storage			2011		

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Multi-source credit based on one pump being out of service.
(3) Required standby storage is equal to zero based on the existence of substantial storage in Reservoir 6 and emergency generation on Casino Pump Station.
(4) Required equalization storage = Max of DOH equation or 10% MDD
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD = (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH June 1999 WSDM)
(5) Required fire flow storage = Flow * duration (4,000 gpm for 4 hours)
(6) Total required storage greater than 20 psi is equal to the required equalizing storage plus the larger of standby and fire flow storage.
(7) Available storage includes all storage within the system and is not adjusted for minimum pressures. The existing Casino Standpipe and Bridle Park Standpipe are to be demolished after 2005. The Casino Standpipe is to be replaced with a 2.0 MG elevated tank.
(8) Maximum ERUs with available storage.

Note that there is no standby storage calculated for the Casino Tank Service Area. This is due to the fact that the tank is directly served from the Casino Pump Station and Reservoir

6. The Casino Pump Station has on-site generation and can continue to operate (deliver water to the Casino Tank) during a power outage. Storage in Reservoir 6 and the pumping capacity of the Casino Pump Station are assumed to satisfy the storage deficiency in the Casino Service Area as well.

The new Casino Tank will be located at an overflow elevation that is 30-feet higher than the existing standpipe. This will provide for increased pressure in the service area. In addition, the new tanks will be elevated and will contain no dead storage, so the entire volume will be considered usable. The Casino Pump Station will require modifications to account for the 30 foot increase in TDH. The City is aware of this and is currently planning the pump station improvements.

Casino Tank and Reservoir 6 Service Area

The storage adequacy calculation for the combined Casino Tank and Reservoir 6 Service Area is shown in Table 4-12. As with the previous two calculations, storage is currently adequate, but becomes deficient in approximately 2029. This calculation includes the demolition of the existing standpipe and the scheduled building of the new Casino Tank. The total deficit under 2050 demands is approximately 10.5 MG.

Currently, both the City of Everett and Mukilteo Water District (MWD) are engaged in discussions with Alderwood Water and Wastewater District (AWWD) for potential use of AWWD water transmission facilities to deliver water to Everett's and/or MWD service areas. The City is interested in continuing these investigations to help reduce future capital projects and improve water quality.

Table 4-12 Evaluation of Storage Adequacy for Casino Tank and Reservoir 6 Service Area

	Year				
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2026 (Plan Yr 20)	2050	Max [8]
Projected ERUs and Demand [1]					
Equivalent Residential Units (ERUs)	40,909	46,289	73,271	97,902	78,569
Projected Demand (mgd)					
Average Day	9.63	10.85	17.28	23.12	18.56
Maximum Day	17.11	19.36	30.65	40.95	32.86
Peak Hour	27.50	31.10	49.15	65.64	52.71
Available Source (mgd) [2]					
Evergreen Pump Station Pump 1 (2,500 gpm)	3.60	3.60	3.60	3.60	3.60
Evergreen Pump Station Pump 2 (2,500 gpm)	3.60	3.60	3.60	3.60	3.60
Evergreen Pump Station Pump 3 (3,500 gpm)	0.00	0.00	0.00	0.00	0.00
Evergreen Pump Station Pump 4 (3,500 gpm)	5.04	5.04	5.04	5.04	5.04
Evergreen Pump Station Pump 5 (5,000 gpm)	7.20	7.20	7.20	7.20	7.20
Total Available Source (mgd)	19.44	19.44	19.44	19.44	19.44
Required Storage Calculations					
Standby Storage (MG) [3]	8.18	9.26	17.27	28.97	19.83
Equalizing Storage (MG) [4]	1.71	1.94	3.10	4.81	3.47
Fire Flow Storage (MG) [5]	0.96	0.96	0.96	0.96	0.96
Required Storage					
Greater than 20 psi at highest meter (MG) [6]	9.89	11.19	20.37	33.78	23.30
Existing Potable Storage (MG) [7]					
Reservoir 6 (North and South)	20.00	20.00	210.00	20.00	20.00
Casino Standpipe	4.00	2.00	2.00	2.00	2.00
Bridle Park Standpipe	0.13	-	-	-	-
Upper Ridge Tank	1.00	1.00	1.00	1.00	1.00
Eastmont Tank	0.10	0.10	0.10	0.10	0.10
Olympic Tank	0.20	0.20	0.20	0.20	0.20
Total Existing Storage (MG)	25.43	23.30	23.30	23.30	23.30
Source Surplus/(Deficiency) at 20 psi	15.53	12.11	2.93	(10.48)	0.00
Year Demand Crossover Storage			2029		

Notes:
(1) Number of ERUs based on 418 gpd (MDD) per ERU (239 mgd/ERU (ADD) and 1.75 MDD:ADD peaking factor).
(2) Multi-source credit based on one pump being out of service.
(3) Required standby storage for existing source = greater of (2 times ADD - Multi source credit) or 200 gallons per ERU.
(4) Required equalization storage = Max of DOH equation or 10% MDD
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD = (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH June 1999 WSDM)
(5) Required fire flow storage = Flow * duration (4,000 gpm for 4 hours)
(6) Total required storage greater than 20 psi is equal to the required equalizing storage plus the larger of standby and fire flow storage.
(7) Available storage includes all storage within the system and is not adjusted for minimum pressures. The existing Casino Standpipe and Bridle Park Standpipe are to be demolished after 2005. The Casino Standpipe is to be replaced with a 2.0 MG elevated tank.
(8) Maximum ERUs with available storage.

Proposed Mitigation Schedule

Mitigating the storage deficiency of the Casino Tank and Reservoir 6 Service Area will offset a majority of the system-wide deficiency. Table 4-13 lists timing for new storage and the amount that will need to be installed in each service area to mitigate the storage deficiency. New storage could be installed earlier than shown on the table. Table 4-13 does not include the construction of the new Casino Tank since that has already been approved for construction.

Table 4-13 Suggested New Storage Improvement Schedule

	Year			
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**
Existing Storage Surplus/(Deficiency) (MG)				
Casino Tank Service Area	2.2	(0.2)	(1.2)	(2.0)
Casino Tank and Reservoir 6 Service Area	15.5	12.1	2.9	(10.5)
System-wide Surplus/(Deficiency)	32.3	26.8	10.4	(8.1)
New Storage to be Constructed during Interval (MG) (1)				
Casino Tank Service Area				
Casino Tank and Reservoir 6 Service Area				12.5
System-wide Surplus/(Deficiency)				
Total New Storage (MG) (2)				
Casino Tank Service Area	-	-		
Casino Tank and Reservoir 6 Service Area	-	-		12.5
System-wide Surplus/(Deficiency)	-	-		
Storage Surplus/(Deficiency) after Improvements (MG)				
Casino Tank Service Area	2.3	(0.2)	(1.2)	0.0
Casino Tank and Reservoir 6 Service Area	15.5	12.1	2.9	2.0
System-wide Surplus/(Deficiency)	32.3	26.8	10.4	4.4

4.5. Water Right Analysis

A detailed analysis of water rights has been included in Chapter 6 of this CWP. This analysis identifies the maximum number of potable water ERUs that could be served by the existing water rights using both annual and instantaneous water right totals. Both annual and instantaneous water rights have been reduced to allow for the amount of water anticipated to be used for non-potable uses. The calculation assumes that a total of 31,814 ac-ft (28.4 mgd) of water a year and 46.0 cfs (29.7 mgd) of the water right will be taken up by non-potable uses and are unavailable for potable use. The number of ERUs is calculated for potable use only using 239 gpd/ERU ADD and 418 gpd/ERU MDD. Table 4-14 shows the calculation.

Table 4-14 Evaluation of Water Right Adequacy

Total Water Right	
Qa (ac-ft/yr)	168,244
Qi (cfs)	426.1
Water Right set aside for non-potable use (1)	
Qa (ac-ft/yr)	31,814
Qi (cfs)	46.0
Water Right available for potable use	
Qa (ac-ft/yr)	136,430
Qi (cfs)	380.1
Maximum Potable ERU	
ADD	509,575
MDD	587,743

Notes:
1. Based on ADD of 28.4 mgd and MDD of 29.7 mgd
2. ERUs based on 239 gpd/ERU for ADD and 418 gpd/ERU for MDD

4.6. System Capacity

System capacity is based on the analyses completed previously in Section 4.3 through 4.5. In each of the individual analyses, a maximum number of ERUs has been calculated. The totals are summarized in Table 4-15.

Based on this analysis, it appears that the maximum number of ERUs that can be served with the existing facilities and water rights is 124,764 and is limited by storage. This number is a little misleading. The calculation for source adequacy evaluated both retail and wholesale demands and therefore, the number of ERUs reflects all the customers served by the City system. Storage is only required to meet retail demand which is only about 25 percent of the total system-wide demand. Assuming retail is 25 percent of the total demand, the comparable figure for the maximum number of ERUs that can be served by storage is closer to 500,000 ERUs. Thus the capacity of the system is really limited by the existing source at the WFP.

Table 4-15 Summary of Maximum ERU

	Maximum No. of ERUs
Full System	
Source	
Water Rights Qa (Table 4-15)	509,575
Water Rights Qi (Table 4-15)	587,743
WFP Capacity (Table 4-6)	315,601
Storage (Table 4-10)	124,764
Casino Tank Service Area	
Source (Table 4-7)	61,973
Storage (Table 4-11)	27,256
Reservoir 6 Service Area	
Source (Table 4-8)	46,479
Storage (Table 4-12)	78,569

Projects have been developed and are included in the CIP in Chapter 9, to ensure that the projected system demand will be met over the planning period.

5. Conservation Program

5.1. Introduction

This Comprehensive Water Plan Chapter has four purposes: 1) review compliance with conservation planning requirements, 2) describe historical conservation measures, 3) document historical conservation savings, and 4) describe the conservation program that will be implemented in the Everett Water Service Area (EWSA) from 2007 through 2012.

The City of Everett (Everett) has a long-standing commitment to water conservation. Everett's conservation program began in the early 1980's and has evolved significantly since then. Everett administers both a regional conservation program implemented throughout the EWSA, as well as conservation elements that pertain exclusively to the Everett retail service area. The goal of these conservation efforts is to maximize the benefits of the Sultan River resource by encouraging the efficient use of water.

The conservation program initially focused on school education and promotional activities to foster a conservation ethic. Today, the program also includes a wide array of conservation measures aimed at residential and commercial customers.

The first major expansion of the conservation program occurred in 1994, when the Washington State Department of Health began requiring water systems to include conservation plans in their water system plans. Everett compared the cost of various conservation strategies to the system cost of providing water. Based on this "least-cost" analysis, several demand-side activities were added to the conservation program that targeted residential water consumption.

The second major program expansion occurred as part of the 2000 Comprehensive Water System Plan Update, when a more rigorous least-cost analysis was conducted. A committee of Everett staff and wholesale water customers evaluated over 20 conservation strategies. Based on cost effectiveness, market potential, consumer acceptance and other criteria, additional elements were added to the program that significantly strengthened the conservation effort.

A progressive conservation program has been developed for the next six years through a collaborative process involving Everett staff, wholesale water customers, and the Everett City Council. This program builds on the success of the previous conservation efforts and includes a range of conservation measures in Everett's retail and wholesale service areas.

5.2. Objectives/Goals

The City of Everett is in a unique position. The City enjoys an abundance of water with a delivery system that is capable of meeting the near-term water demand in the EWSA with relatively modest capital improvements. Thus, there is little financial motivation for conducting an aggressive water conservation program. However, the City and its' wholesale purveyors also recognize the importance of being prudent stewards of the regional water resource. This includes funding activities that promote water conservation and assist consumers with installing measures that increase water end-use efficiency. The

goal of the 2007-2012 regional water conservation program is to fund about $600,000 a year in regional water conservation activities that will reduce the 2012 demand for water by about 3 percent. The program is also designed to meet, or exceed, the requirements of the new Municipal Water Law.

5.3. Compliance with Conservation Planning Requirements

The conservation planning requirements that must be addressed in water system plans are contained in the following Washington State Department of Health (DOH) documents:

- Conservation Planning Requirements: Guidelines and Requirements for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs (March 1994)
- Water System Planning Handbook (April 1997)
- Municipal Water Law: Interim Planning Guidance For Water System Plan / Small System Management Program Approvals (March 2004)

The State of Washington has recently revised water conservation planning requirements as a result of the 2003 Municipal Water Law. An outgrowth of that law is the Water Use Efficiency Rule (Rule), which was finalized in January 2007. The Rule has several requirements and corresponding compliance dates. This Comprehensive Water Plan is not technically subject to the new requirements, since it is being submitted prior to the compliance dates in the Rule. However, it is anticipated that Everett's conservation program will meet the requirements of the Rule.

Table 5-1 lists the current state conservation guidelines for public water systems of Everett's size (i.e., medium water systems of 1,000 to 25,000 connections) and shows that Everett is in full compliance, except where Everett's flat rate single-family customers (i.e., non-metered customers) allow for only partial compliance. There are three main categories of a conservation plan: 1) data collection, 2) demand forecasting and 3) a conservation program.

Table 5-1 Conservation Requirements and Recommendations for Public Water Systems Serving 1,000 - 25,000 Direct Connections or Regional Systems (1)

Category	Sub-Category	Element	Required or Recommended	Everett In Compliance?
1. Data Collection	a) Production/ Purchases	Production	Required	Yes
		Wholesale Amount Imported	Required	Yes
		Emergency Interties Imported	Required	Yes
		Peak Day / Peak Month	Required	Yes
	b) Sales	Single-Family Sales	Required	Partially (4)
		Multi-Family Sales	Required	Yes
		Commercial, Government, Industrial Sales	Required	Yes
		Agriculture Sales	Required	n/a
		Wholesale Amount Exported	Required	Yes

Category	Sub-Category	Element	Required or Recommended	Everett In Compliance?
		Emergency Interties Exported	Required	Yes
	c) Non-Revenue Water	Accounted For Water	Required	Yes
		Unaccounted For Water	Required	Yes
	d) Connections	Number of Connections and Customers	Required	Yes
	e) Rates	Water Rates	Required	Yes
2. Demand Forecast	a) Demand Forecasts With and Without Conservation		Required	Yes
3. Conservation Program	a) Objectives		Required	Yes
	b) Public Education	School Outreach	Recommended (2)	Yes
		Speakers Bureau	Recommended (2)	Yes
		Program Promotion	Required	Yes
		Theme Shows and Fairs	Recommended (2)	Yes
	c) Technical Assistance	Purveyor Assistance	Recommended	Yes
		Customer Assistance	Recommended	Yes
		Technical Studies	Recommended (2)	Yes
		Bill Showing Consumption History	Recommended (3)	Partially (4)
	d) System Measures	Source Meters	Required	Yes
		Service Meters	Recommended	Partially (4)
		Leak Detection (If Unaccounted Water >20%)	Recommended	Yes
	e) Incentives/Other Measures	Single-Family / Multi-Family Kits	Recommended	Yes
		Nurseries / Agriculture	Recommended	n/a
		Landscape Management / Playfields	Recommended	Yes
		Conservation Pricing	Recommended	Partially (4)
		Utility Financed Retrofit	Recommended (2)	Yes
		Seasonal Demand Management	Recommended (2)	Yes
		Recycling/Reuse	Recommended (2)	Yes

(1) Based on the 1994 DOH Conservation Planning Requirements.
(2) Recommended for regional systems but not "medium" systems (i.e., systems with 1,000-25,000 connections).
(3) Recommended for "medium" systems (1,000-25,000 connections) but not regional systems.
(4) Everett's flat rate single-family customers do not meet these recommendations.

The data collection and demand forecasting information is supplied primarily in Chapter 3, "Planning Data and Demand", although the rate information is provided later in this chapter.

For the conservation program category, there are five sub-categories: objectives, public education, technical assistance, system measures and incentives or other measures. DOH guidelines recommend that Everett evaluate all the measures listed in these subcategories and implement those that are cost effective for the Everett water system. Everett is actively implementing all measures, except where the existence of Everett's flat rate single-family customers (non-metered customers) allows for only partial implementation. Everett's

conservation objectives, the analysis of measures and Everett's implementation plans are discussed in other parts of this chapter.

5.4. Historical Conservation Programs

5.4.1. Overview

A summary of the conservation measures Everett has implemented in the last six years is shown in Table 5-2. For each measure, the table indicates the category type (based on the Washington State Department of Health's conservation program planning requirements), the years it has been implemented, and whether the measure includes Everett's wholesale customers. The details of each measure are discussed in the subsequent sections.

Table 5-2 Conservation Program Overview

Category	Measure	2000	2001	2002	2003	2004	2005	Includes Wholesale Customers?
Public Education	School Outreach	X	X	X	X	X	X	Yes
	Speakers Bureau	X	X	X	X	X	X	No
	Program Promotion	X	X	X	X	X	X	Yes
	Theme Shows & Fairs	X	X	X	X	X	X	No
Technical Assistance	Purveyor Assistance	X	X	X	X	X	X	Yes
	Customer Assistance	X	X	X	X	X	X	No
	Bill Showing Consumption History	X (1)	X (1)	X (1)	X (1)	X (1)	X (1)	No
System Measures	Source Meters	X	X	X	X	X	X	No
	Service Meters	X (2)	X (2)	X (2)	X (2)	X (2)	X (2)	No
	Leak Detection	X	X	X	X	X	X	No
Incentives /Other Measures	Single-Family/ Multi-Family Kits		X	X	X	X	X	Yes
	Landscape Mgmt: Outdoor Kits		X	X	X	X	X	Yes
	Landscape Mgmt: Irrigation Audits & Rebates			X	X	X	X	Yes
	Landscape Mgmt: Lawn Watering Calendar	X	X	X	X	X	X	Yes
	Landscape Mgmt: Demonstration Garden	X	X	X	X	X	X	No
	Conservation Pricing	X (3)	X (3)	X (3)	X (3)	X (3)	X (3)	No
	Utility Financed Retrofits: Indoor and Outdoor Kits		X	X	X	X	X	Yes
	Utility Financed Retrofits: Irrigation Audits & Rebates			X	X	X	X	Yes
	Utility Financed Retrofits: Pre-Rinse Sprayheads						X	Yes
	Utility Financed Retrofits: Commercial Audits & Rebates			X	X	X	X	No
	Seasonal Demand Management	X	X	X	X	X	X	Yes
	Recycling and Reuse						X	No
	Non-Residential Audits			X	X	X	X	No

(1) Partial. Bills for single-family flat rate customers do not show consumption due to lack of meters.

(2) Partial. Single-family flat rate customers are not metered.

(3) Partial. Rate structures contain some elements that encourage conservation and other elements that do not.

5.4.2. Public Education

School Outreach

This measure is defined by DOH as "education programs targeted to increase awareness of local water resources and encourage water conservation practices."

Everett's school outreach program consists of classroom presentations, teacher workshops, and classroom educational materials, all of which are made available throughout the EWSA.

Everett's classroom presentations are facilitated by trained instructors with curriculum designed for elementary, middle school and high school students. The presentations are marketed to teachers through newsletters and other communications. The presentations were redesigned in 2005 to keep the content fresh and relevant. This has resulted in a significant increase in the number of presentations.

Everett offers teacher workshops to assist teachers in educating students about water resource issues, including conservation. Teachers participate in activities, experiments and field trips and can receive continuing education credits or clock hours.

Everett provides teachers with a broad collection of classroom educational materials including books, videos, posters and other supplies.

Speakers Bureau

This measure is defined by DOH as "seeking speaking opportunities and making speakers available to a wide cross-section of service, community, and other groups."

Everett provides staff to groups requesting presentations on water resource issues, including conservation. Everett offers this service exclusively in its retail service area.

Program Promotion

This measure is defined by DOH as "publicizing the need for water conservation through television and radio public service announcements, news articles, public water system bill inserts, or other means."

In addition to program-specific outreach, Everett engages in general program promotion intended to build and reinforce a water conservation ethic among customers throughout the EWSA.

Everett has developed and distributes several educational brochures. For example, the "Everyday Conservation" brochure provides conservation tips for inside and outside the home, the "Smart Watering" brochure contains information on efficient lawn and garden watering techniques, and the "Growing Healthy Soil" brochure has information on how soil can be improved as a means of reducing watering.

In terms of marketing efforts, Everett has used transit advertising to help convey conservation messaging. Billboards promoting various conservation themes have been posted on buses during the summer months when demand peaks. It is estimated these billboards are seen by over 75 percent of the residents of the EWSA each year. Since 2003, Everett has also participated in tri-county (Snohomish, King, and Pierce) water conservation marketing campaigns which utilize radio and/or television messages.

Everett plays an active role in regional organizations that promote water conservation. For over a decade, Everett has been involved in the Water Conservation Coalition of Puget Sound (Coalition). Everett is a founding member of the newly formed Partnership for Water Conservation, which the Coalition recently merged with.

Theme Shows and Fairs

This measure is defined by DOH as “preparing a portable display on water conservation and selected written material.”

Everett exhibits displays, along with other education materials, at a variety of special events within its retail service area.

5.4.3. Technical Assistance

Purveyor Assistance

This measure is defined by DOH as “assistance from wholesale suppliers to aid wholesale customers in developing and implementing conservation programs tailored to their needs, and in carrying out the wholesale suppliers' conservation program.”

Everett staff has led the development and implementation of the conservation program that is utilized throughout the EWSA. This includes the development of informational and promotional materials that can be used by purveyors to promote activities within their individual service areas.

Customer Assistance

This measure is defined by DOH as “providing assistance and information to customers which facilitates water conservation.”

Everett provides technical assistance to its retail customers on an ongoing basis, including leak detection and strategies for reducing water use.

Bill Showing Consumption History

This measure is defined by DOH as “showing the percentage increase or decrease in water use over the same period from the previous year.”

Everett includes consumptive history on customer bills for all retail customers, except for the single-family flat rate customers. It is not possible to provide this information for those customers because they do not have meters.

5.4.4. System Measures

Source Meters

This measure is defined by DOH as “installing master source meters for all sources and maintaining a periodic meter testing and repair program.”

Everett meters its source water at the water filtration plant, including both the raw water entering the facility and the finished water leaving the facility. Everett periodically tests these meters for accuracy.

Service Meters

This measure is defined by DOH as "installing individual meters for all water uses and maintaining a periodic meter testing and repair program."

Since 1991, Everett has required that all new connections are serviced through meters, per municipal codes 14.16.100 Metered Service and 14.16.090 Fixed Rate Service.

Everett does provide service to some unmetered connections that predate the 1991 service meter requirement. All of the unmetered connections are retail single-family accounts. While this represents 54 percent of Everett's total connections, the volume of water estimated for those connections is only 6 percent of the total water supplied by the Everett water system. Therefore, the majority of the water provided by Everett is metered.

Everett has an ongoing meter repair and replacement program.

Leak Detection

This measure is currently defined by DOH as "conducting a regular and systematic program of finding and repairing leaks" and is currently required if unaccounted water is in excess of 20 percent.

Two changes are on the horizon related to this measure. First, the American Water Works Association (AWWA) is moving away from using the term unaccounted water. Second, the draft water use efficiency rule requires calculating the distribution system leakage and requires a water loss control action plan if the leakage number exceeds 10 percent.

As detailed in Sections 3.2.6 and 3.4, Everett's 2005 water balance shows non-revenue water at 5.5 percent of water production. Therefore, the distribution system leakage would be 5.5 percent or less, which is well below the draft rule requirement of 10 percent or less. The percentage of non-revenue water is calculated by subtracting wholesale deliveries and retail sales from total water production at the Water Filtration Plant. This value represents a combination of non-revenue uses and losses in Everett's distribution system and non-revenue losses in the transmission system that serves the entire region (retail plus wholesale). This value does not include non-revenue uses and losses in individual water systems that purchase water from Everett.

Everett is proactive about leak control, even though it is not required to have a water loss control action plan since its leakage is low. Everett relies on system break history, pipeline condition assessments, and future demand needs to identify and prioritize rehabilitation and replacement projects. In addition to these practices, periodic leak detection surveys are conducted to monitor performance of various parts of the system.

5.4.5. Incentives / Other Measures

Single-Family / Multi-Family Kits

This measure is defined by DOH as "distributing kits containing easily installed water saving devices to single-family residential homes and the owners and managers of apartment buildings and condominiums."

Since 2001, Everett has offered free indoor and outdoor water conservation kits to residential customers throughout the EWSA. The kits are marketed through advertisements in local newspapers and bill inserts. From 2001 to 2003, the indoor kits were only distributed to Class A water systems in the EWSA due to the limited number of the kits. Since 2004, the kits have also been distributed to Class B systems.

The indoor conservation kits target homes constructed prior to 1993 and are designed to encourage consumers to upgrade their fixtures to the 1993 efficiency standards. In 1993, the National Plumbing Code of 1991 was adopted in Washington State and increased the efficiency standards for household water fixtures.

The indoor kits include a low-flow showerhead, a kitchen faucet aerator, two bathroom faucet aerators, a toilet tank water displacement bag, toilet leak detection tablets, a gauge to measure losses from household leaks, and a conservation brochure. The indoor conservation kits are estimated to save 34 gallons of water per day. These estimates are conservative and do not attribute any savings to leak reduction or behavioral changes, both of which are likely to occur. Over 34,000 indoor kits have been distributed to date.

The outdoor conservation kits target households with irrigated landscape areas, primarily single-family homes that do not have automatic irrigation systems. The outdoor kits are designed to encourage consumers to reduce watering and other outdoor water use. Studies indicate most households overwater their landscape areas by 15 to 20 percent.

The outdoor kits include an automatic shut-off watering timer, a hose nozzle, a gauge to measure rainfall and/or sprinkler output, a package of hose washers to reduce leaks, and a conservation brochure. The outdoor conservation kits are estimated to save an average of 40 gallons of water per day. Nearly 37,000 kits have been distributed to date.

Landscape Management / Playfields

This measure is defined by DOH as "promoting low water demand landscaping in all retail customer classes."

Everett has several programs that support this measure including residential outdoor conservation kits (described above), school irrigation audits and upgrades, and a residential lawn watering calendar, all of which are offered throughout the EWSA. Additionally, Everett maintains several water conservation demonstration gardens, which target its retail customers.

The school irrigation audit and upgrade program began in 2002 and is targeted at schools with large irrigation demands. Most schools have large sports fields that require significant watering in the summer. The irrigation demand at schools with multiple fields can account for three-quarters of their annual water consumption. The irrigation audits are designed to improve the efficiency of irrigation systems, resulting in significant water savings.

The audits are conducted by a professional irrigation system auditor and identify equipment upgrades and/or operational changes that will result in decreased water use. Average savings are estimated to be 20 to 25 percent of the annual irrigation demand. Financial assistance, in the form of a 50 percent cost share, is available to provide incentives to the schools to follow through on the audit recommendations.

Everett develops a summer watering calendar each year that encourages residential customers to water every third day (staggered, based on their street address). This effort helps to reduce the daily peak demand for water in the summer by reducing the amount of watering that occurs on a given day. Approximately 150,000 calendars are distributed each year in the EWSA.

Everett maintains several water conservation demonstration gardens that showcase and promote the use of native, drought tolerant plants which require minimal to no watering once established.

Conservation Pricing

This measure is defined by DOH as "implementing rate design techniques to provide economic incentives to conserve water."

Everett has differing rate structures in different customer categories. The commodity portion of Everett's current pricing structure is shown in Table 5-3.

Table 5-3 Commodity Portion of Rates

Consumption Block	Single-Family Flat Rate	Standard Residential	Commercial	Irrigation
Up to 600 cubic feet	$15.50 regardless of quantity consumed	$9.30	$9.30	$10.66
600 - 3,000 cubic feet		$1.55 per ccf	$1.55 per ccf	$1.77 per ccf
3,000 - 15,000 cubic feet		$1.55 per ccf	$0.96 per ccf	$0.96 per ccf
Over 15,000 cubic feet		$1.55 per ccf	$0.53 per ccf	$0.82 per ccf

Utility Financed Retrofits

This measure is defined by DOH as "installing water efficient fixtures in existing residences and commercial/industrial facilities."

Everett has several programs that support this measure including residential indoor and outdoor conservation kits (described above), commercial irrigation audits and upgrades (described above), and food service pre-rinse sprayhead retrofits, all of which are implemented throughout the EWSA. Additionally, Everett has a commercial audit and rebate program it offers exclusively in its retail service area.

In 2005, Everett participated in a program to replace pre-rinse sprayheads in food service establishments. The program was a joint effort with Puget Sound Energy and the Snohomish County PUD and was modeled after a similar, successful effort in Seattle/King County. Under the program, a contractor was hired to market the program and install the sprayheads. The contractor also installed aerators on other faucets at the participating

facilities. The program was jointly funded by the three sponsoring agencies. Each sprayhead is estimated to save about 100 gallons of water a day. Each faucet aerator installed is estimated to save 30 gallons of water a day. Through the end of 2005, 1,340 sprayheads and 520 aerators were installed.

Everett has implemented a commercial audit and rebate program since 2002. The program has been modified over the years in an attempt to obtain the highest participation and savings. The program was piloted in 2002, with a professional audit of city owned facilities. 350 fixtures were then replaced that were determined to be cost effective for the City. In 2003, Everett began offering free water audits to selected businesses. Six audits were conducted in 2003 and 11 in 2004 including a hospital, a large laundry operation, a YMCA facility, a hotel and a restaurant. Due to the low number of businesses that implemented the audit recommendations, the program was modified in 2005 to focus on toilet retrofits. Under this program an audit is conducted to verify the flow rate of existing toilets and rebates are calculated based on expected water savings. To date, approximately 400 toilets have been replaced under the program.

Seasonal Demand Management

This measure is defined by DOH as "implementing measures aimed at controlling peak seasonal demand."

Everett has several programs that support this measure including outdoor conservation kits, school irrigation audits and upgrades, and a lawn watering calendar, all of which are implemented throughout the EWSA. Additionally, Everett's water conservation demonstration gardens and conservation pricing elements, applicable to its retail service area, are also aimed at controlling peak seasonal demand. All of these measures have been described above.

Recycling / Reuse

This measure is defined by DOH as "examining opportunities for water reuse and recycling as an approach to providing additional water."

Everett began providing reclaimed water in its retail service area in 2005. Reclaimed water is treated effluent from a wastewater treatment plant that is suitable for certain non-potable uses. Reclaimed water has the potential to substitute for potable or unfiltered water, thereby reducing Sultan River Basin diversions and providing an environmental benefit. Currently, Everett provides reclaimed water to the Kimberly-Clark mill for industrial purposes. This offsets a portion of the unfiltered water historically used by the mill. Section 3.5 discusses reclaimed water including federal and state regulations, distribution, current demand, and projected demand, including noting that Everett's reclaimed water program is currently the largest in the state.

5.5. Historical Conservation Savings

The conservation savings Everett has achieved the past six years are shown in Table 5-4. As of the end of 2005, it is estimated that 2.0 mgd (peak season) have been saved by the regional EWSA conservation program and an additional 0.08 mgd (peak season) in Everett's retail area, for a total of 2.08 mgd peak season savings. These numbers were compiled by Everett staff based on conservation program planning and empirical data.

Table 5-4 Estimated Savings Achieved (Peak Season MGD)

	2001	2002	2003	2004	2005	2006	Total
Regional EWSA Program							
Indoor Conservation Kits	0.04	0.11	0.14	0.17	0.13	0.13	0.70
Outdoor Conservation Kits	0.04	0.05	0.08	0.11	0.10	0.10	0.50
Irrigation Audits & Rebates	0.00	0.02	0.01	0.02	0.02	0.00	0.07
Education & Marketing	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Pre-Rinse Sprayheads	0.00	0.00	0.00	0.00	0.15	0.00	0.15
Subtotal	*0.91*	*1.01*	*1.05*	*1.13*	*1.23*	*1.06*	*2.25*
Everett Retail-Only Program							
Commercial Audits & Rebates	0.05	0.004	0.00	0.02	0.01	0.00	0.08
Subtotal	*0.05*	*0.00*	*0.00*	*0.02*	*0.01*	*0.00*	*0.08*
Total	0.96	1.01	1.05	1.15	1.24	1.06	2.33

5.6. Conservation Program for 2007-2012

5.6.1. Avoided Cost of Supply Analysis

An analysis of the avoided cost of supply was performed to help define the cost-effectiveness of water conservation measures. When water is saved through conservation actions, certain costs associated with the water and wastewater systems are avoided. This can include operational costs such as pumping drinking water and wastewater, as well as capital costs associated with capacity of facilities. Collectively these are termed “avoided costs.” Conservation measures whose cost per unit is below the avoided cost are deemed cost effective.

The results of the avoided cost analysis are shown in Table 5-5. The total avoided cost is $0.35/ccf. A technical memorandum detailing the information gathered, the analysis methodology, and the results of the avoided cost analysis can be found in Appendix 5-1.

Table 5-5 Summary of Avoided Costs from Water Conservation

Item	Description	Relation to Conservation	Avoided Cost ($/CCF)
Water System Operations			
Regional WFP Chemicals	Treatment process chemicals	Direct	$0.02
Regional WFP Energy	Energy use at WFP. Less estimate of costs for heating/lighting.	Direct	$0.01
Local Distr. Pumping	Energy for pumping water in local distribution systems	Direct	$0.08
Local re-chlorination	Chemical additions to maintain Cl residual in wholesale cust. systems	Unknown	$0.00
Subtotal			$0.11
Wastewater System Operations			
Regional WPCF Chemicals	Wastewater treatment process chemicals. Cost based on loading, not volume.	None	$0.00
Regional WPCF Energy	Energy use at WPCF Less estimate of costs for heating/lighting.	Direct	$0.05
Local lift station pumping	Energy for pumping wastewater at local lift stations	Direct	$0.02
Subtotal			$0.07
Water System Capital Facilities			
WFP Improvements - Everett	Phase II Improvements from 2002 WFP Facilities Plan	Direct	$0.02
Transmission Pipelines - Everett	Improvements not tied to capacity needs.	None	$0.00
Local pump stations - Everett	Conservation would likely only delay capacity improvements by a year or two.	None	$0.00
Local storage tanks - Everett	Conservation would likely only delay capacity improvements by a year or two.	None	$0.00
Local water mains - Everett	Main sizing is dictated by fire flow requirements, which conservation does not impact.	None	$0.00
Local improvements - wholesale area	Extrapolation from wholesale customer Water System Plans	Direct	$0.06
Lake Chaplain Reservoir	None identified. Capacity not constrained.	None	$0.00
Jackson Project Reservoir	None identified. Capacity not constrained.	None	$0.00
Subtotal			$0.08
Wastewater System Capital Facilities			
WPCF Improvements	Capacity driven by stormwater and I/I, not base sewage flows	None	$0.00
Conveyance line to outfall	Capacity driven by stormwater and I/I, not base sewage flows	None	$0.00
Local collection pipes - Everett	N. End capacity driven by stormwater. S. end projects not needed until 2020s.	Minimal	$0.01
Local lift stations - Everett	N. End capacity driven by stormwater. S. end projects not needed until 2020s.	Minimal	$0.005
Collection pipes - other systems	Extrapolation from figure for Everett wastewater service area	Partial	$0.03
Lift stations - other systems	Extrapolation from figure for Everett wastewater service area	Partial	$0.02
Subtotal			$0.07
Environmental Benefits			
Estimated Avoided Cost Factor	Assumption: 10% of all other avoided costs	Direct	$0.03
Subtotal			$0.03
Total Avoided Cost			**$0.35**

5.6.2. Conservation Measure Analysis

An analysis of several measures was conducted in order to determine the most appropriate measures for inclusion in the regional conservation program implemented throughout Everett's retail and wholesale service area. The analysis included consideration of demographics, participation, savings, and costs. The analysis covered 18 measures, applied to the single-family, multi-family, and commercial sectors as appropriate, as shown in Table 5-6. It should be noted that this was not an exhaustive analysis of all potential measures, but rather a focused analysis of measures considered applicable to Everett and its wholesale customers.

Table 5-6 Measures Analyzed

#	Measure	Single-Family	Multi-Family	Commercial
1	Toilets - 1.6 gpf ultra low flow toilets (ULFT)	X	X	X
2	Toilets - 1.0 gpf high efficiency toilets (HET)	X	X	X
3	Toilets - leak detection	X	X	X
4	Urinals – 1.0 gpf			X
5	Urinals – 0.5 gpf			X
6	Showerheads - 2.0 gpm	X	X	
7	Faucet aerators bathroom - 1.0 gpm	X	X	
8	Faucet aerators bathroom - 0.5 gpm			X
9	Faucet aerators kitchen - 2.2 gpm	X	X	
10	Hot Water - on demand recirculating systems	X		
11	Clothes washers - residential capacity (in unit)	X	X	
12	Clothes washers - residential capacity (in common areas)		X	
13	Clothes washers - commercial capacity (in laundromat)			X
14	Outdoor Irrigation Kits	X	X	
15	Indoor Audit			X
16	Outdoor Audit			X
17	Irrigation Systems - school audits only			X
18	Irrigation Systems - school audits and financial assistance			X
Number of Measures Per Sector		**9**	**9**	**11**

The measures were analyzed for both the six-year and 20-year planning periods associated with the CWP. A summary of the results for the six-year planning period, which is most applicable to Everett's conservation program for the next six years, is shown in Table 5-7. A technical memorandum discussing data inputs, measure definitions, analysis methodology, and detailed results for both the six-year and 20-year planning periods can be found in Appendix 5-2.

Table 5-7 Summary of Analysis for the 6-Year Planning Period [1]

Conservation Measure		Participants	Savings		Direct Costs	
			Annual GPD at Full Implementation	CCF Over Measure Life	Total Cost Over Plan Period	Cost per CCF Saved During Entire Year Over Measure Life
Single-Family	Toilets - 1.6 gpf ultra low flow toilets (ULFT)	13,619	442,636	755,872	$2,349,278	$3.11
	Toilets - 1.0 gpf high efficiency toilets (HET)	14,519	235,208	2,868,963	$3,339,370	$1.16
	Toilets - leak detection	36,297	289,481	988,670	$105,988	$0.11
	Showerheads - 2.0 gpm	58,632	171,559	1,255,560	$351,792	$0.28
	Faucet aerators bathroom - 1.0 gpm	65,970	316,656	2,317,460	$164,925	$0.07
	Faucet aerators kitchen - 2.2 gpm	0	0	0	$0	N/A
	Hot Water - on demand recirculating systems	2,904	29,040	212,530	$435,600	$2.05
	Clothes washers - residential capacity (in unit)	25,215	368,139	2,335,008	$2,521,500	$1.08
	Outdoor Irrigation Kits	24,739	157,500	537,913	$321,607	$0.60
Multi-Family	Toilets - 1.6 gpf ultra low flow toilets (ULFT)	7,106	206,074	351,904	$959,310	$2.73
	Toilets - 1.0 gpf high efficiency toilets (HET)	8,159	118,317	1,443,176	$1,468,620	$1.02
	Toilets - leak detection	20,398	145,343	496,392	$9,247	$0.02
	Showerheads - 2.0 gpm	39,355	147,581	1,080,079	$177,098	$0.16
	Faucet aerators bathroom - 1.0 gpm	37,339	190,429	1,393,662	$56,009	$0.04
	Faucet aerators kitchen - 2.2 gpm	6,414	30,313	14,790	$6,414	$0.43
	Clothes washers - residential capacity (in unit)	4,292	55,796	353,899	$429,200	$1.21
	Clothes washers - residential capacity (in common area)	4,292	55,796	353,899	$85,840	$0.24
	Outdoor Irrigation Kits	778	9,966	34,036	$10,114	$0.30

Conservation Measure		Participants	Savings		Direct Costs	
			Annual GPD at Full Implementation	CCF Over Measure Life	Total Cost Over Plan Period	Cost per CCF Saved During Entire Year Over Measure Life
Commercial	Toilets - 1.6 gpf ultra low flow toilets (ULFT)	1,012	277,795	474,380	$607,200	$1.28
	Toilets - 1.0 gpf high efficiency toilets (HET)	108	17,496	213,409	$86,400	$0.40
	Toilets - leak detection	252	12,928	44,152	$4,876	$0.11
	Urinals - 1.0 gpf	623	50,463	61,553	$140,175	$2.28
	Urinals - 0.5 gpf	1,084	29,268	285,599	$243,900	$0.85
	Faucet aerators bathroom - 0.5 gpm	584	84,754	41,352	$2,336	$0.06
	Clothes washers - commercial capacity (in laundromat)	5	6,720	42,623	$15,000	$0.35
	Indoor Audit	259	92,651	452,045	$77,700	$0.17
	Outdoor Audit	271	12,767	62,291	$135,500	$2.18
	Irrigation Systems - school audits only	11	3,323	16,215	$8,250	$0.51
	Irrigation Systems - school audits and financial assist.	28	12,463	60,806	$66,500	$1.09

(1) All numbers in the table include free riders.

5.6.3. Final Conservation Program

The regional conservation program for 2007-2012 was developed using the avoided cost of supply and conservation measure analyses discussed above, coupled with other considerations such as conservation drivers and budgetary constraints. The general premise was to select a suite of measures that would: 1) provide assistance to all sectors, 2) stay within a reasonable range of Everett's avoided cost of supply, 3) have annual budgets similar to current conservation expenditures, and 4) contain the minimum number of required measures under the draft conservation Rule for the largest EWUC partner, even though as discussed above this CWP and conservation program is not subject to the new requirements. (Note that under the draft Rule, Everett and its largest EWUC partner Alderwood are both required to implement or evaluate nine measures.)

The conservation program consists of the following eight primary measures:

1. Education
2. Indoor Retrofit Kits

3. Outdoor Irrigation Kits
4. Toilet Leak Detection
5. Toilet Rebates
6. Washer Rebates
7. Commercial Indoor Audits
8. School Irrigation System Audits

Additionally, the conservation program includes continuation of the following nine measures: purveyor assistance, customer assistance, bills showing consumptive history, source meters, service meters, leak detection, conservation demonstration garden, conservation pricing, and reuse. Savings related to the plumbing code will also continue as older non-code fixtures are naturally replaced at the end of their useful life by more efficient models.

A summary of the eight primary measures is provided in Table 5-8. Descriptions of each measure are discussed below and the full original measure analysis can be found in the measure analysis technical memorandum in Appendix 5-2. The focus, and therefore the methodology and calculations, of the measure analysis is different than the focus of the conservation program. The measure analysis focuses on the highest conservation potential for measures, while the conservation program focuses on documenting measure savings and costs for the selected level and schedule of implementation. Therefore, while the conservation program numbers rely heavily on data from the measure analysis, additional analysis was performed to generate the conservation program numbers. The details of this additional analysis can be found in Appendix 5-3.

Table 5-8 Summary of 2007-2012 EWUC Regional Conservation Program

	2007				2008				2009				2010				2011				2012				Total			
	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget	Units	Average Annual Savings (mgd)	Peak Season Savings (mgd)	Budget
Programmatic Measures																												
1. Education (#)	n/a	0.60	0.60	$175,000	n/a	0.61	0.61	$175,000	n/a	0.63	0.63	$175,000	n/a	0.64	0.64	$175,000	n/a	0.66	0.66	$175,000	n/a	0.67	0.67	$175,000	n/a	0.67	0.67	$1,050,000
2. Indoor Retrofit Kits	3,750	0.03	0.03	$20,250	8,250	0.07	0.07	$44,550	8,250	0.07	0.07	$44,550	8,250	0.07	0.07	$44,550	8,250	0.07	0.07	$44,550	8,250	0.07	0.07	$44,550	45,000	0.40	0.40	$243,000
3. Outdoor Irrigation Kits	3,750	0.03	0.08	$49,125	7,500	0.05	0.15	$98,250	7,500	0.05	0.15	$98,250	3,750	0.03	0.08	$49,125	3,750	0.03	0.08	$49,125	3,750	0.03	0.08	$49,125	30,000	0.20	0.59	$393,000
4. Toilet Leak Detection	132,500	0.26	0.26	$115,700	71,640	0.13	0.13	$60,740	10,760	0.02	0.02	$11,480	5,760	0.01	0.01	$4,480	5,760	0.01	0.01	$4,480	5,760	0.01	0.01	$4,480	232,180	0.45	0.45	$201,360
5. Toilet Rebates	0	0.00	0.00	$0	750	0.01	0.01	$84,380	1,610	0.02	0.02	$181,130	1,610	0.02	0.02	$181,130	1,610	0.02	0.02	$181,130	1,620	0.02	0.02	$182,230	7,200	0.08	0.08	$810,000
6. Clothes washer Rebates	0	0.00	0.00	$0	750	0.01	0.01	$84,370	1,610	0.02	0.02	$181,130	1,610	0.02	0.02	$181,130	1,610	0.02	0.02	$181,130	1,620	0.02	0.02	$182,240	7,200	0.11	0.11	$810,000
7. Commercial Indoor Audits	0	0.00	0.00	$0	5	0.002	0.002	$1,880	28	0.01	0.01	$10,500	28	0.01	0.01	$10,500	28	0.01	0.01	$10,500	31	0.01	0.01	$11,620	120	0.04	0.04	$45,000
8. School Irrigation System Audits	0	0.00	0.00	$0	5	0.002	0.01	$4,690	15	0.01	0.02	$14,100	15	0.01	0.02	$14,100	15	0.01	0.02	$14,100	10	0.003	0.01	$9,420	60	0.02	0.06	$56,410
Annual Subtotal	n/a	0.92	0.97	$360,075	n/a	0.89	0.99	$553,860	n/a	0.83	0.94	$716,140	n/a	0.81	0.87	$660,015	n/a	0.83	0.89	$660,015	n/a	0.84	0.89	$658,665	n/a	1.97	2.41	$3,608,770
Cumulative	n/a	0.92	0.97	$360,075	n/a	1.21	1.36	$913,935	n/a	1.43	1.69	$1,630,075	n/a	1.61	1.93	$2,290,090	n/a	1.79	2.17	$2,950,105	n/a	1.97	2.41	$3,608,770				
Plumbing Code (*)																												
Annual	n/a	0.49	0.49	$0	n/a	0.25	0.25	$0	n/a	0.24	0.24	$0	n/a	0.25	0.25	$0	n/a	0.24	0.24	$0	n/a	0.29	0.29	$0	n/a	n/a	n/a	n/a
Cumulative	n/a	0.49	0.49	$0	n/a	0.74	0.74	$0	n/a	0.98	0.98	$0	n/a	1.23	1.23	$0	n/a	1.47	1.47	$0	n/a	1.76	1.76	$0	n/a	1.76	1.76	$0
Grand Total																												
Annual	n/a	1.41	1.46	$360,075	n/a	1.14	1.24	$553,860	n/a	1.07	1.18	$716,140	n/a	1.06	1.12	$660,015	n/a	1.07	1.13	$660,015	n/a	1.13	1.18	$658,665	n/a	n/a	n/a	n/a
Cumulative	n/a	1.41	1.46	$360,075	n/a	1.95	2.10	$913,935	n/a	2.41	2.67	$1,630,075	n/a	2.84	3.16	$2,290,090	n/a	3.26	3.64	$2,950,105	n/a	3.73	4.17	$3,608,770	n/a	3.73	4.17	$3,608,770

Education savings are not cumulative over the six years since a continuous effort must be made to maintain the savings each year.
* Code savings were calculated based on assumptions regarding gradual replacement of older, non-code plumbing fixtures.
SF = Single-Family
MF = Multi-Family

Education

This measure is a continuation of EWUC's current educational efforts as described in Section 5.4.2 Public Education, which includes the distribution of an annual summer lawn watering calendar. The savings are estimated to be one percent of the forecasted demand without conservation for each year. It should be noted that the savings are not cumulative over the six years since a continuous effort must be made in order to maintain the savings each year. The budget is based on historical costs.

Indoor Retrofit Kits

This measure is a modified version of the current single-family / multi-family indoor kits described in Section 5.4.5 Incentives / Other Measures and combines several of the individual measures analyzed in the measure analysis. This measure applies to the single-family and multi-family sectors, both existing and new customers. Different versions of the kit will be distributed to each sector. The single-family kits consist of 2.0 gpm showerheads and 1.0 gpm bathroom faucet aerators. Those flow rates are more efficient than the maximum allowed under the plumbing code. The multi-family kits includes those measures and 2.2 gpm kitchen faucet aerators, which are treated as bringing customers up to code, even though technically the maximum flow rate allowed under the plumbing code is slightly higher at 2.5 gpm. Kitchen faucet aerators are only included in the multi-family kits since the measure analysis concluded that the majority of the single-family sector has already been brought up to code due to natural replacement and distribution of the previous kits, which were targeted primarily to single-family customers.

Outdoor Irrigation Kits

This measure is a version of the current single-family / multi-family outdoor kits described in Section 5.4.5 Incentives / Other Measures. This measure applies to the single-family and multi-family sectors, both existing and new customers. These are free outdoor irrigation kits with devices and information to improve the irrigation efficiency of residential customers that manually irrigate their landscaping. Historically, the kits have included items such as a watering timer and shut-off device, a spring-loaded hose nozzle, a rain gauge, hose washers, and a conservation brochure.

Toilet Leak Detection

This measure is a more comprehensive version of one component of the previous indoor kits. This measure provides free toilet leak detection dye tablets for customers to determine if their toilets leak and provides detailed information on how to fix 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 via flapper leaks.

Toilet Rebates

This is a new measure which provides $100 rebates for customers to replace less efficient toilets with high efficiency toilets (HETs) in tank style toilets. HETs are technically defined as toilets flushing at a maximum of 1.28 gpf. However, a flush volume of 1.0 gpf is used for this measure since most models flush at this volume. HETs include both dual flush toilets

and pressure assist tank style toilets. This measure assumes dual flush toilets are used for the single-family and multi-family sectors and pressure assist toilets for the commercial sector. The target audience is existing and new customers with tank style toilets, in the single-family, multi-family, and commercial sectors. EWUC chose to focus on HET toilets, rather than the standard 1.6 gpf toilets, to obtain higher savings, avoid free riders, and go beyond current code requirements.

Clothes Washer Rebates

This is a new measure which provides $100 rebates for customers to replace less efficient residential-capacity clothes washers with more efficient models. This measure is applied to the single-family and multi-family sectors, both existing and new customers, and commercial laundromats. For multi-family, this measure targets both clothes washers in individual households and common laundry areas. This measure is applied to both existing and new customers. The measure targets customers who are ready to purchase a new machine and is not intended to accelerate replacement before the normal lifespan ends.

Commercial Indoor Audits

This measure is a modified version of the current commercial audit and rebate program described in Section 5.4.5 Incentives / Other Measures. This measure provides free indoor audits to commercial customers to determine efficiencies that could be achieved through hardware improvements or operational changes. The audits are performed by a professional auditor. This measure is applied to the commercial sector, both existing and new customers.

School Irrigation System Audits

This measure is a modified version of the current school irrigation audit and upgrade program described in Section 5.4.5 Incentives / Other Measures. This measure provides free irrigation audits to schools to improve the efficiency of their irrigation systems. Efficiencies can be achieved through hardware improvements or operational changes. The audits are performed by a professional landscape irrigation auditor. This measure is applied to existing customers in the commercial sector.

5.6.4. Conservation Impact on Demand Forecast

The impact of the regional conservation program on the demand forecast is shown in Table 5-9. On a cumulative basis, the potable portion of the demand forecast without conservation is estimated to have a 2.4% reduction in 2007 and grow to a 5.5% reduction by 2012. Those savings estimates include both programmatic savings and code savings and have been incorporated into the demand forecast presented in Chapter 3 Planning Data and Demand.

Table 5-9 Demand Reduction Due to Conservation

	2007	2008	2009	2010	2011	2012
Demand Without Conservation (ADD mgd)	59.8	61.3	62.9	64.4	66.0	67.3
Conservation Savings (avg annual mgd)	1.4	2.0	2.4	2.8	3.3	3.7
Programmatic Component	*0.9*	*1.2*	*1.4*	*1.6*	*1.8*	*2.0*
Code Component	*0.5*	*0.7*	*1.0*	*1.2*	*1.5*	*1.8*
Demand With Conservation (ADD mgd)	58.4	59.4	60.5	61.6	62.7	63.6
Demand Reduction - Individual Year	2.4%	1.9%	1.7%	1.6%	1.6%	1.7%
Programmatic Component	*1.5%*	*1.4%*	*1.3%*	*1.3%*	*1.3%*	*1.2%*
Code Component	*0.8%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*
Demand Reduction - Cumulative	2.4%	3.2%	3.8%	4.4%	4.9%	5.5%
Programmatic Component	*1.5%*	*2.0%*	*2.3%*	*2.5%*	*2.7%*	*2.9%*
Code Component	*0.8%*	*1.2%*	*1.6%*	*1.9%*	*2.2%*	*2.6%*

Conservation savings beyond 2012 have also been included in the demand forecast. While the conservation program outlined above is only for the next six years, it is anticipated that a regional conservation program would continue in the future. Therefore, continued programmatic and code conservation savings are applied to the demand forecast. For the programmatic savings, 3% is subtracted from the demand, which is the cumulative demand reduction for the programmatic portion for the final year of the 2007-2012 conservation program, rounded to the closest full percent. For the code savings, the cumulative code savings increase each year from 2013 until they plateau in 2018, when all fixtures are assumed to be at code.

The anticipated future metering of the flat rate single-family customers would result in some conservation savings. Those savings are not included in this CWP, however they will be incorporated in Everett's next CWP.

6. Water Rights and System Reliability

6.1. Introduction

Since the early part of the 20th Century, the City of Everett has planned, implemented, and administered a complex public water supply system. This system includes an innovative collaboration between the City and the Snohomish Public Utility District (PUD) that provides water supply and hydropower capability. Although population growth, competing water demands, and natural resource constraints make water resource planning increasingly complex for Washington's public water systems, the City of Everett is well positioned to meet the projected water needs of Everett and its wholesale customers through 2050.

This section describes the City's water rights, the safe yield available from Spada Reservoir, and future water supply options for the City. Copies of City of Everett water rights certificates are included in Appendix 6-1.

6.2. Water Rights

The City of Everett currently holds surface and groundwater rights for a total instantaneous quantity (Qi) of 426.1 cubic feet per second (cfs), and an annual quantity (Qa) of 168,244 acre-feet per year (afy). This is equivalent to a maximum production rate of 275 million gallons per day (mgd) and an annual average production volume of 150 mgd. These existing water rights entitle the City to use water from surface water diversions on the Sultan River, one surface water diversion on Chaplain Creek, the lower Snohomish River, and nine groundwater rights for multiple wells. Applications for change were approved by the Washington State Department of Ecology (Ecology) for seven of the City's existing groundwater rights since the completion of the City's 2000 Comprehensive Water Plan. In addition, as a participant in the Snohomish River Regional Water Authority (SRRWA), the City also received approval from Ecology under a change application to use a portion of the Snohomish River surface water right formerly held by the Weyerhaeuser Timber Company. The City has one pending application for a new appropriation of surface water from the Sultan River. Finally, the City holds storage rights for its system reservoirs, including several water rights held jointly with the Snohomish PUD for operation of the Jackson Project. These various water rights are summarized in Table 6-1, and the diversion rights are described in Section 6.2.1.

The City is currently utilizing only its surface water rights on the Sultan River and Chaplain Creek, with no existing uses from its nine groundwater rights.

Table 6-1 City of Everett Water Rights Summary

Certificate			Quantity		Point of Diversion	Purpose of Use	Primary or Supplemental	Place of Use
Number	**Priority**	**Issued**	**Q_i (cfs)**	**Q_a (acre-feet/yr)**				
Surface Water Diversion Rights								
Sultan River								
352	9/14/1917	8/29/1929	20	14,480 (1)	RM 9.4 & 16.5	Municipal	Primary	Area served by the City of Everett
1790	7/31/1924	3/18/1942	50	36,200 (1)	RM 9.4 & 16.5	Municipal	Primary	Area served by the City of Everett
460	2/14/1929	12/17/1930	110	79,640 (1)	RM 9.4 & 16.5	Manufacturing, municipal & domestic	Primary	Area served by the City of Everett
S1-00727	11/29/1929	12/5/1987	200	144,000 (2) (of total, 13,680 is primary)	RM 9.4 & 16.5	Municipal & industrial	Primary: 13,680 acre-feet Supplemental: 130,320 acre-feet	Area served by the City of Everett in Snohomish County
Sultan River Totals			**380**	**144,000**				
Chaplain Creek								
1791	11/20/1940	3/18/1942	15	9,360 (3)	Sec 6, T 28N, R8E	Municipal	Primary	Area served by the City of Everett
Ebey Slough Water Right (Issued to Weyerhaeuser Timber Company but ownership interest now held by Snohomish River Regional Water Authority.								
10617	8/20/1951	2/28/1969	23.3	11,062	Government Lot 1, Sect 4, T 28N, R 5E	Municipal (4)	Primary	Area served by the City of Everett, NUD, WWD and Bothell
Surface Water Rights Totals			**418.3**	**164,422**				

Certificate			Quantity		Point of Withdrawal	Purpose of Use	Primary or Supplemental	Place of Use
Number	**Priority**	**Issued**	**Q_i (cfs)**	**Q_a (acre-feet/yr)**				
Groundwater Rights								
552-D	1/1/1923	6/9/1948	200 gpm	63	Sections 13 & 14, T 28N, R 4E	Municipal	Primary	Area served by the City of Everett
553-D	5/29/1936	6/9/1948	300 gpm	94	Sections 13 & 14, T 28N, R 4E	Municipal	Primary	Area served by the City of Everett
550-D	10/1/1943	6/9/1948	300 gpm	275	Sec 7, T 28N, R 5E	Municipal	Primary	Area served by the City of Everett
554-D	1/1/1944	6/9/1948	300 gpm	94	Sections 13 & 14, T 28N, R 4E	Municipal	Primary	Area served by the City of Everett
594-A	8/4/1947	4/18/1951	250 gpm	200	NE SE NE, Sec. 7, T 28N, R 5E	Municipal	Primary	Area served by the City of Everett
2186-A	12/23/1953		750 gpm	800	Secs.8 & 17, T29N, R5E	Municipal	Primary	Area served by the City of Everett
2579A	8/16/1955	6/5/1956	475 gpm	760	Sections 13 & 14, T 28N, R 4E	Municipal	Primary	Area served by the City of Everett
2811-A	4/23/1956	5/20/1957	585 gpm	936	Sections 13 & 14, T 28N, R 4E	Municipal	Primary	Area served by the City of Everett
3358-A	9/2/1958		350 gpm	600	Secs. 8 & 17, T29N,R5E	Municipal	Primary	Area served by the City of Everett
Groundwater Rights Totals			**3,510 gpm (7.8 cfs)**	**3,822**				
Surface and Groundwater Rights Totals			**426.1 cfs**	**168,244 acre-feet**				
Pending Application S1-13219	12/15/1954		200 cfs	144,000	RM 9.4 & 16.5	Municipal	Primary	Area served by the City of Everett

Certificate				Quantity		Point of Withdrawal	Purpose of Use	Status	Place of Use
Control No.	Number	Priority	Issued	Q_i (cfs)	Q_a (acre-feet/yr)				
Storage Rights									
RI-02520 (Chaplain Reservoir)		2/14/1929	4/17/1946		13,200 (5)		Municipal	Supplemental	Not described but linked to Certificates 352, 1790, 1791, 460 and S1-00727.
Rights Held Jointly with Others									
R1-00733C	R1-00733 (Spada Reservoir)	5/3/1946	10/15/1987		113,700		Power generation and municipal	Primary	Powerhouse and area served by PUD within Snohomish Co.
R1-23397C	R1-23397 (Spada Reservoir)	6/15/1979	10/15/1987		153,260		Power generation and municipal	Primary: 39,560 Supplemental: 113,700	Powerhouse and area served by PUD within Snohomish Co.
S1-23398C	S1-23398C (Sultan River)	6/15/1979	10/15/1987	1,500	506,800	RM 16.5	Power generation and municipal	Primary: 944 cfs Supplemental: 556 cfs	Powerhouse and area served by PUD within Snohomish Co.
S1-00731C	S1-00731C	5/3/1946	10/15/1987	556	250,200	RM 16.5	Power generation	Primary	Powerhouse and area served by PUD within Snohomish Co.

(1) The annual quantity is calculated based on continuous diversion at the authorized rate and 1 cfs equals 724 acre-feet/yr. No annual quantity is specified in the certificate.
(2) The certificate is issued supplemental to existing rights. Since the three prior rights total 130,320 acre-feet/yr, the 144,000 is split between 130,320 supplemental and 13,680 primary.
(3) No quantity is specified in the water right documents. The acre-feet/yr is a calculated number.
(4) An application was filed with Ecology to change the purpose of use from manufacturing to municipal supply and the place of use from the mill site to the service area of the Snohomish River Regional Water Authority. This application was approved by Ecology with the portion available to the City shown in this table, based on Everett's 15/36 share of the SRRWA water right
(5) Some water diverted from the Sultan River and Chaplain Creek under the primary rights is stored in Chaplain Reservoir. The annual diversion is accounted for in the primary rights. For this reason, the storage rights are not additive to the City's primary rights.

6.2.1. Surface Water Diversion Rights

Certificate Number 352. With a priority date of September 14, 1917, this certificate authorizes diversion of 20 cfs from the Sultan River. No annual quantity is stated on this water right certificate. If this diversion is utilized on a continuous basis, the calculated maximum annual volume associated with this right would be 14,480 afy.

Certificate Number 1790. With a priority date of July 31, 1924, this certificate authorizes diversion of 50 cfs from the Sultan River. No annual quantity is stated on this water right certificate. If this diversion is utilized on a continuous basis, the calculated maximum annual volume associated with this right would be 36,200 afy.

Certificate Number 460. With a priority date of February 14, 1929, this certificate authorizes diversion of 110 cfs from the Sultan River. No annual quantity is stated on this water right certificate. If this diversion is utilized on a continuous basis, the calculated maximum annual volume associated with this right would be 79,640 afy.

Certificate Number S1-00727. With a priority date of November 29, 1929, this certificate authorizes diversion of 200 cfs from the Sultan River. The maximum annual volume authorized under this right, together with the preceding three rights on the Sultan River, is 144,000 afy. Based on a total of 130,320 afy from the three previous water rights described above, this right is supplemental to the preceding three rights in the amount of 130,320 afy; an additional primary right for an annual quantity of 13,680 afy was granted under this certificate.

Certificate Number 1791. With a priority date of November 20, 1940, this certificate authorizes diversion of 15 cfs from Chaplain Creek. All of the waters in the Chaplain Creek watershed upstream of Chaplain Reservoir are captured in Chaplain Reservoir and subsequently withdrawn for municipal supply purposes. No annual quantity is stated on this water right certificate. While 15 cfs converts to 10,860 afy if used on a continuous basis, the annual quantity is limited to 9,360 afy based on the maximum annual inflow to Chaplain Reservoir from the tributary watershed over the period from 1935 to 1999. The Chaplain Creek diversion is primary and additive to the City's Sultan River rights.

The total authorization for these five surface water right certificates is 395 cfs and 153,360 afy.

Certificate No. 10617. The City has a Qi of 15 mgd (23.3 cfs) and a Qa of 11,098 afy (9.9 mgd) associated with this water right.

This surface water certificate from Ebey Slough on the Snohomish River was formerly held by the Weyerhaeuser Timber Company for its Kraft Mill site. This certificate was issued in the name of Weyerhaeuser Timber Company for diversion of 56 cfs, with no annual quantity specified on the certificate. The City of Everett plans to use this water right through its participation in the Snohomish River Regional Water Authority (SRRWA). Shortly after the SRRWA was formed in the fall of 1996, the three SRRWA members, the City of Everett, Woodinville Water District (WWD), and Northshore Utility District (NUD), negotiated the purchase of Certificate No. 10617 from the Weyerhaeuser Timber Company. Subsequent to this action, the City, WWD, and NUD executed an interlocal agreement allocating shares of the 36-mgd (56-cfs) instantaneous quantity (Qi) reflected in the water right certificate, and the annual quantity (Qa) of 32,149 afy established through records research. The SRRWA

determined that both the Qi and Qa amounts proposed for change were perfected through beneficial use.

Pursuant to the SRRWA interlocal agreement, the City established an ownership interest in 15/36 or 15 mgd/23 cfs (Qi) and 11.7 mgd/13,181 afy (Qa) of the former Weyerhaeuser Timber Company water right. The City's 15-mgd (Qi) share was largely set by a contractual requirement contained in the SRRWA/Weyerhaeuser Timber Company purchase and sale agreement. The requirement specifically provides that the City of Everett must ensure 15 mgd (Qi) and an appropriate annual quantity (Qa) of water supply remain available to support the future industrial/commercial redevelopment of Weyerhaeuser's Kraft Mill site.

The City, in conjunction with its SRRWA partners and under the name of Snohomish River Regional Water Authority, filed an application in December 1996 to change the purpose of use of this water right from "manufacturing" to "municipal purposes", and the place of use from the Kraft Mill site to the "area served by the Snohomish River Regional Water Authority". This change application was approved by Ecology in a Report of Examination dated June 15, 2001, that based on the information presented, Ecology's tentative determination was that a valid water right existed for a total Qi of 56 cfs and a total Qa of 27,219.5 afy. The approved Qi of 56 cfs (36 mgd) was based on this being the maximum instantaneous pumping capacity to divert water for beneficial use. The approved Qa of 27,219.5 afy (24.3 mgd) was based on the records provided for the highest annual use for the last five complete years of water use from 1987-1991.

Following Ecology's approval of this application for change in June 2001, an appeal was filed to the Pollution Control Hearings Board (PCHB). An Order was issued by the PCHB on April 17, 2002, which affirmed Ecology's approval of the instantaneous quantity of 56 cfs, and modified the approved annual quantity from 24.3 mgd to 23.7 mgd, based on this amount being the highest annual use recorded from 1985-1989. The equivalent annual quantity to 23.7 mgd is 26,458 afy.

The City received 41.7 percent of the approved water right, which equates to a Qi of 15 mgd (23.3 cfs) and a Qa of 11,062 afy (9.9 mgd).

6.2.2. Groundwater Rights

Certificates 552-D, 553-D, 554-D, 2579-A, and 2811-A. The City holds five groundwater certificates for water rights acquired from the Snohomish PUD in conjunction with the City's purchase of the PUD's Beverly Park water system. Applications for change to these certificates were approved by Ecology on December 17, 2004, changing the purpose of use to municipal supply and the place of use to the area served by the City of Everett. In addition, the approved changes authorized changes in the points of withdrawal from the PUD wells to the City's Walter Hall Golf Course and Kasch Park wells, located within Sections 13 and 14, Township 28 North, Range 4 East, respectively, and an additional well or wells within Sections 13 and 14. The five PUD Beverly Park wells have been properly abandoned, and the Walter Hall Golf Course and Kasch Park wells have been drilled. No additional wells have been drilled in Sections 13 or 14 at this time.

The total amounts for these five certificates are 1,860 gallons per minute (gpm) on an instantaneous quantity (Qi) basis and 1,947 afy on an annual quantity (Qa) basis. These total amounts on both a Qi and Qa basis were approved with the applications for change.

Certificates C-2186A and C-3358A. The City holds two groundwater certificates for water rights acquired from the Snohomish PUD that were formerly used to provide water for the

cooling and heating water system at the PUD's former headquarters and warehouse facility. Applications for change were requested from and approved by Ecology on December 27, 2004 to change the points of withdrawal to the Legion Golf Course, the purpose of use to municipal supply, and the place of use to the area served by the City. The total approved Qi for these two water rights is 1,100 gpm and the total approved Qa is 1,400 afy.

Certificates 550-D and 594-A. These two groundwater certificates were acquired from Pinehurst Water District and are for a total Qi of 550 gpm and total Qa of 475 afy. No applications for change to these water rights have been requested at this time.

The City's total authorized water use from these nine water right certificates is 3,510 gpm and 3,822 afy.

6.2.3. Pending Application

On December 15, 1954, the City filed an application with the State for an additional appropriation of Sultan River water. No action has been taken by Ecology or its predecessor agencies. Terms of the application are as follows:

Application No.	13219
Source:	Sultan River
Priority Date:	December 15, 1954
Point of Diversion:	AT RM 16.5 (Culmback Dam)
Flow Rate:	Maximum Instantaneous diversion rate of 200 cfs
Purpose of Use:	Municipal and industrial supply
Supply Status:	Not specified
Place of Use:	City of Everett and vicinity in Snohomish County
Time of Use:	Continuously

6.2.4. Comparison of Water Rights with Water Demand

Using data from Chapter 3, the existing (2005) Average Day Demand (ADD) with conservation and reuse is 84.3 mgd, which equates to 94,428 afy, with a Maximum Day Demand (MDD) of 133.2 mgd, which equates to pumping 206.1 cfs on a continuous basis.

The six-year forecast period (2012) indicates an ADD of 97.6 mgd, which equates to 109,326 afy, with a Maximum Day Demand (MDD) of 158.3 mgd, which equates to pumping 244.9 cfs on a continuous basis.

The 20-year (2026) forecast indicates an ADD of 129.3 mgd, which equates to 144,835 afy, and a MDD of 210.2 mgd, which equates to pumping 325.2 cfs on a continuous basis.

The forecast for 2050 indicates an ADD of 174.9 mgd, which equates to 195,913 afy, and a MDD of 292.9 mgd, which equates to pumping 453.1 cfs on a continuous basis.

The forecast for 2100 indicates an ADD of 217.2 mgd, which equates to 243,295 afy, and a MDD of 368.2 mgd, which equates to pumping 569.6 cfs on a continuous basis.

The water rights data from Table 6-1 shows that the City has a total instantaneous quantity of 426.1 cfs (275 mgd) in existing surface and ground water rights and a total annual quantity of 168,244 afy (150 mgd).

By comparing the City's existing water rights to the existing and projected demands for the typical six-year and 20-year planning periods, it can be seen that the City has adequate existing water rights to meet these projected demands.

It is noted however that for 2050, the projected demand for instantaneous quantity is less than the City's existing water rights and the projected demand for annual quantity exceeds the City's existing water rights by approximately 28,000 acre feet per year. Similarly for 2100, the projected demand of 243,295 afy and 569.6 cfs each greatly exceed the existing water rights of 168,244 afy and 426.1 cfs. This results in a shortfall by 2100 of approximately 144 cfs (93 mgd) Qi and 75,000 afy (67 mgd) Qa. Therefore, Everett will need its pending water right application of 200 cfs (130 mgd) Qi to make-up for this projected shortfall. The City will continue to monitor demands over the next planning horizon to assess the best time to request approval of the pending water right application.

Table 6-2 and Table 6-3 respectively, show a summary of City's existing water rights as compared to the City's existing consumption and the 20-year forecasted demands.

Figure 6-1 shows a comparison of the projected demands from 2006 through 2100 to the City's existing water rights. This figure shows that the projected demands, including conservation and reuse, for ADD and MDD will exceed the City's existing water rights between the years 2035 and 2045.

Table 6-2 Existing Water Right(s) Status

Permit Certificate or Claim #	Name of Rightholder or Claimant	Priority Date	Source/ Name Number	Primary or Supplemental	Existing Water Rights		Existing (2005) Consumption		Current Water Right Status (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr
Certificates										
1. 352	Everett	9/14/1917	Sultan	Primary	20	14,480				
2. 1790	Everett	7/31/1924	Sultan	Primary	50	36,200				
3. 460	Everett	2/14/1929	Sultan	Primary	110	79,640				
4. S1-00727	Everett	11/29/1929	Sultan	Primary Supplemental	200 -----	13,680 (130,320)				
5. 1791	Everett	11/20/1940	Chaplain	Primary	15	9,360				
6. 10617	SRRWA	8/20/1951	Snohomish	Primary	23.3	11,098				
7. Ground water	Everett	Varies	9 rights	Primary	7.8	3,822				
Totals					426.1	168,244 (1)	206.1	94,428	+220	+73,816
Intertie Name/Identifier		Name of Purveyor Providing Water			Existing Limits on Intertie Water Use		Existing Consumption Through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr
1. None(2)										
TOTAL										
Pending Water Right Application	Name on Permit	Date Submitted		Primary or Supplemental	Pending Water Rights					
					Maximum Instantaneous Flow Rate (Q_i) cfs		Maximum Annual Volume (Q_a) acre-feet/yr			
1. S1-13219	N/A	12/15/1954		Primary	200 cfs		Not determined			

(1) Supplemental rights are not included in the total.
(2) The City does not consider any of its supply points/connections to be interties within the context of RCW 90.03.383.

Table 6-3 Forecasted Water Right(s) Status

Permit Certificate or Claim #	Name of Rightholder or Claimant	Priority Date	Source/ Name Number	Primary or Supplemental	Existing Water Rights		Forecasted Water Use From Sources (2026 Year Demand)		Forecasted Water Right Status (Excess/Deficiency – 2026 Year Demand)	
					Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr
Certificates										
1. 352	Everett	9/14/1917	Sultan	Primary	20	14,480				
2. 1790	Everett	7/31/1924	Sultan	Primary	50	36,200				
3. 460	Everett	2/14/1929	Sultan	Primary	110	79,640				
4. S1-00727	Everett	11/29/1929	Sultan	Primary Supplemental	200 -----	13,680 (130,320)				
5. 1791	Everett	11/20/1940	Chaplain	Primary	15	9,360				
6. 10617	SRRWA	8/20/1951	Snohomish	Primary	23.3	11,098				
7. Ground water	Everett	Varies	9 rights	Primary	7.8	3,822				
Total					426.1	168,244 (1)	325.2	144,835	+100.9	+23,409
Intertie Name/Identifier		Name of Purveyor Providing Water			Existing Limits on Intertie Water Use		Existing Consumption Through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr	Maximum Instantaneous Flow Rate (Q_i) cfs	Maximum Annual Volume (Q_a) acre-feet/yr
1. None (2)										
TOTAL										
Pending Water Right Application	Name on Permit	Date Submitted		Primary or Supplemental	Pending Water Rights					
					Maximum Instantaneous Flow Rate (Q_i) cfs		Maximum Annual Volume (Q_a) acre-feet/yr			
S1-13219	N/A	12/15/1954		Primary	200 cfs		Not determined			

(1) Supplemental rights are not included in the total.
(2) The City does not consider any of its supply points/connections to be interties within the context of RCW 90.03.383.

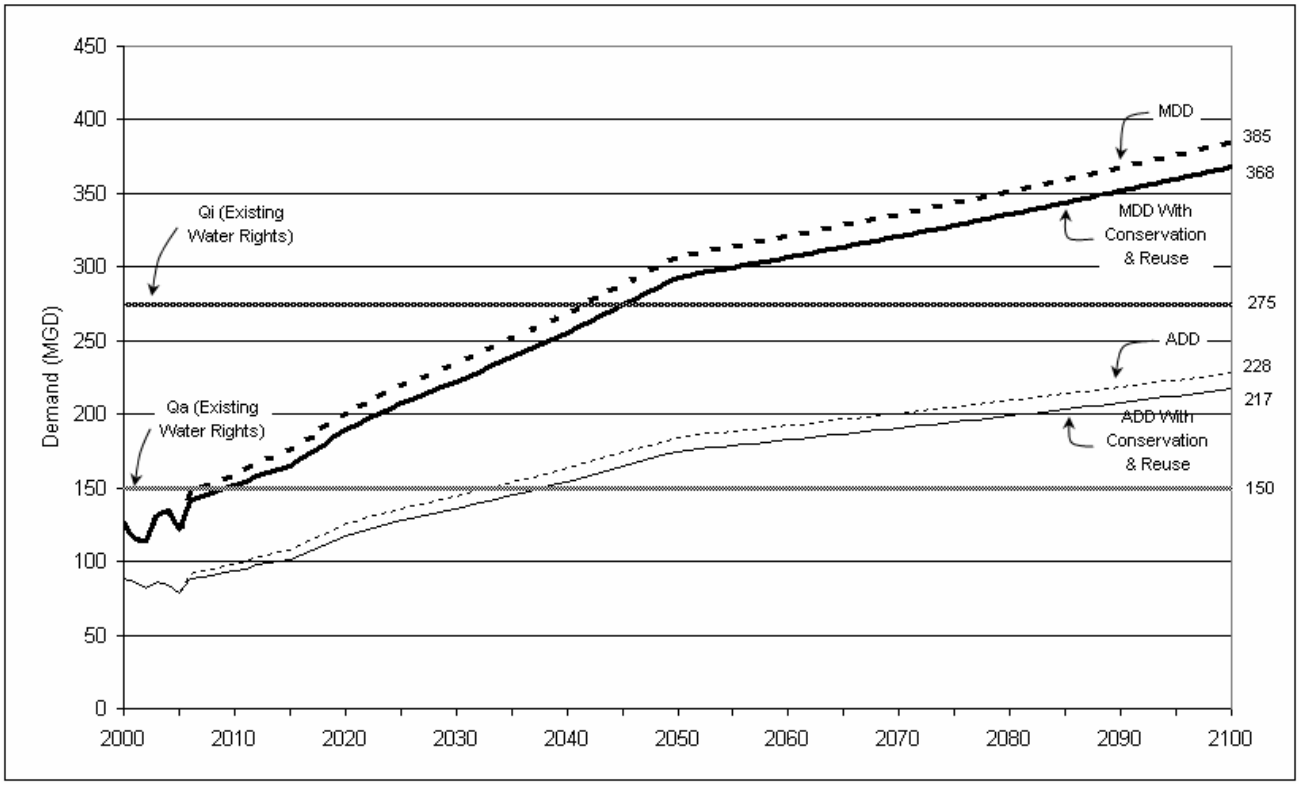

Figure 6-1 Comparison of Projected Demand with Existing Water Rights

6.3. Yield Analysis

As part of the CWP planning effort, Everett determined that the yield analysis conducted as part of Everett's 2000 CWP update needed to be updated and expanded. The report included in Appendix 6-2 describes an evaluation of the potential impacts of global climate change on the watershed yield for Everett's municipal water supply system. In this evaluation, water system modeling was combined with simulated streamflow data developed using down-scaled data from global circulation models to determine the potential impacts of climate change on water supply, hydropower generation, transmission infrastructure, and reservoir storage.

This analysis used climate change models, historical local climate records, and hydrologic modeling to generate streamflow forecasts for future climate change scenarios. These streamflow forecasts were incorporated into the Everett Yield Analysis Model developed by the Civil and Environmental Engineering Department at the University of Washington to simulate municipal water supply, downstream flows for fish, transmission infrastructure, and hydropower generation provided by water from the Spada Reservoir. The safe yield of the water supply was evaluated for three operational scenarios (the first two of which were also evaluated in the 2000 CWP):

- *Unconstrained Yield* – This scenario investigates the amount of water available to Everett if Spada was operated with water supply as the first priority. The yield is constrained by the Sultan River's natural inflows, Spada Reservoir's available storage capacity, and existing instream flow requirements for fish. In this

scenario, Spada Reservoir can be drafted to a water surface elevation of 1,240 feet.

- *Yield Constrained by Transmission Upstream of Chaplain Reservoir* – This scenario also investigates the amount of water available to Everett if Spada was operated with water supply as the first priority. The yield remains constrained by the Sultan River's natural inflows, Spada Reservoir's available storage capacity, and existing instream flow requirements. In addition, the yield is also constrained by the flow capacities of Tunnel #1 (from the Spada Reservoir Diversion Dam to Chaplain Reservoir), return line (from Jackson Powerhouse to Chaplain Reservoir) and Blue Mountain Tunnel (from Jackson Powerhouse). Spada Reservoir can also be drawn down to a water surface elevation of 1,240 feet for this scenario. In this scenario, Blue Mountain Tunnel does not provide flow when Spada Reservoir storage is below 1,380 feet due to current configuration of the Tunnel.
- *Yield Constrained by Hydropower Operations and Spada Minimum Surface Elevation of 1,380 ft*– This scenario investigates the yield to Everett when Spada is operated with hydropower as the first priority. The yield remains constrained by the Sultan River's natural inflows, Spada Reservoir's available storage capacity, existing instream flow requirements, the flow capacities of Tunnel #1, the pipeline to Chaplain Reservoir, and Blue Mountain Tunnel, with a minimum storage surface elevation in Spada Reservoir of 1,380 feet.

This analysis developed five sets of streamflow data and incorporated them into the Everett Yield Analysis Model to reflect potential impacts of a range of climate change scenarios. These streamflow data-sets reflect five different climate conditions:

- **Baseline 2000 forecast –** Altered streamflow data-set developed to reflect the 2000 climate as modeled by a climate model. This data-set provides a basis for evaluating potential impacts of climate change.
- **2050 optimistic forecast –** Altered streamflow data-set developed to reflect modeled 2050 climate conditions. This data-set reflected the smallest climate warming scenario.
- **2050 pessimistic forecast –** Altered streamflow data-set developed to reflect modeled 2050 climate conditions. This data-set reflected the highest climate warming scenario.
- **2100 optimistic forecast –** Altered streamflow data-set developed to reflect modeled 2100 climate conditions. This data-set reflected the smallest climate warming scenario.
- **2100 pessimistic forecast –** Altered streamflow data-set developed to reflect modeled 2100 climate conditions. This data-set reflected the highest climate warming scenario.

This evaluation determined that climate change has the potential to negatively impact Everett's safe yield. Regardless of the Spada Reservoir system scenario or whether the forecast reflected best or worst case conditions, safe yield decreased in comparison to the baseline 2000 safe yield. Figure 6-2 presents the results of model simulations investigating the potential impact of climate change on Everett's municipal and industrial (M&I) safe yield for the present operation. Safe yield was calculated using the demand at which a shortfall in M&I demand or instream flow requirements occurs during no more than two years of a model simulation. Figure 6-2 presents the limits of potential watershed safe yield impacts from climate change by presenting a best case (optimistic forecast) and worst case

(pessimistic forecast) scenario in comparison with Everett's annual water rights for the Sultan River and Chaplain Reservoir combined (137.5 mgd) and for the Average Day Demand projected for 2050 and 2100. The line shown for Average Day Demand reflects linear interpolation between the three years included on the graph and does not reflect the Average Day Demand trend calculated for each year between the given dates.

Figure 6-2 also shows that the safe yield is greater than Everett's existing water right for the constrained by transmission scenario.

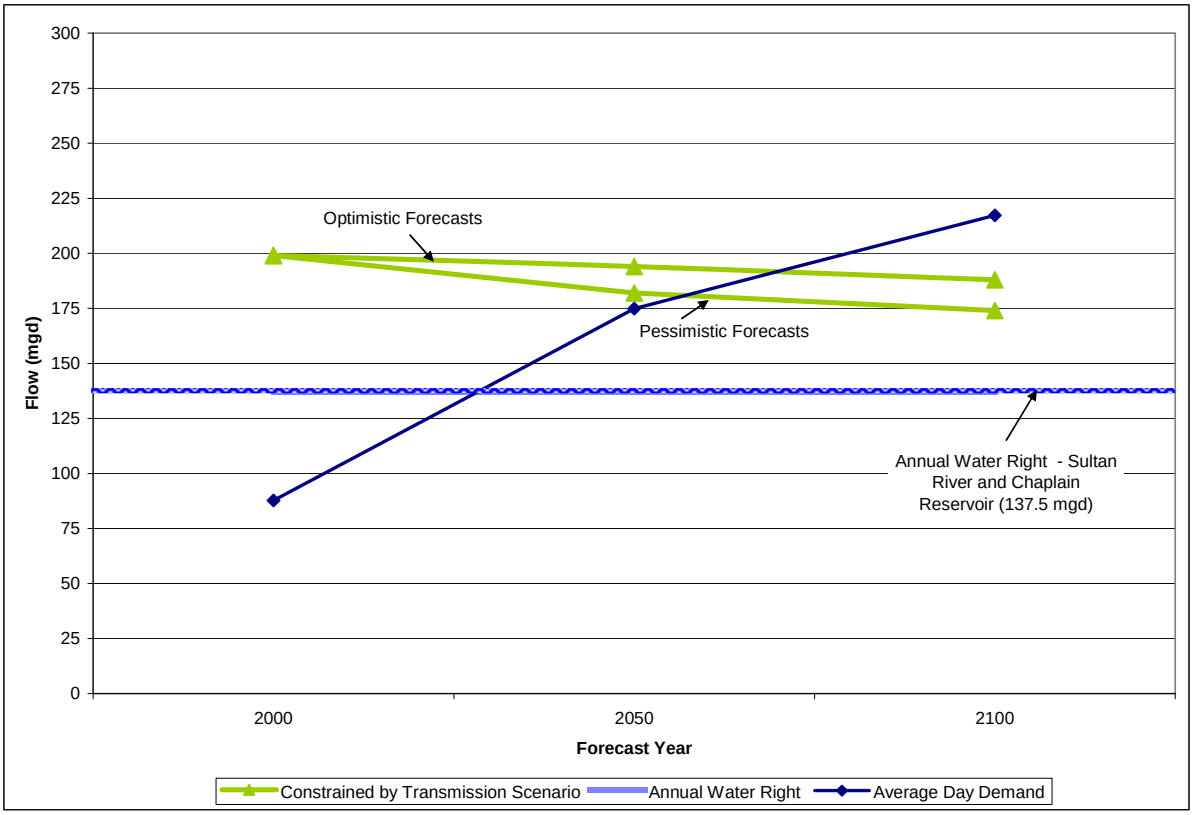

Figure 6-2 Results Safe Annual Average Demand for Each Scenario (MGD)

6.4. Source of Supply Analysis

Although yield analysis projections from 2000 indicate that the Sultan River and Spada Reservoir have sufficient capacity to meet Everett's water needs through 2050, there are source of supply opportunities that the City may consider when evaluating the potential for serving local and regional growth. The City may obtain new supply sources, optimize the use of existing sources already developed, and evaluate other innovative methods to meet water demands.

The source of supply opportunities evaluated for the City includes:

- Snohomish River water,
- Groundwater sources,
- Enhanced conservation, and
- Reclaimed water

Everett is not considering the following source of supply options at this time:

- Artificial recharge and
- Desalination

6.4.1 Snohomish River Water

As discussed earlier, the City has an opportunity to use a former Weyerhaeuser water right (Certificate No. 10617) for diversion from the Snohomish River. The Place of Use that was approved in the Report of Examination for the SRRWA water right is described as follows: "Area served by the RWA within its service area as reflected in the December 1996 Plan of Use document and service area map incorporated in the report of examination under subheading- Proposed Water Use (service area demand)."

Under this approach, the SRRWA would treat some or all of its Snohomish River source water to potable water standards and distribute contracted quantities to the SRRWA members (Everett, Northshore Utility District, and Woodinville Water District). This approach would require the construction of a new treatment plant and related transmission facilities. Should the SRRWA, however, encounter serious cost problems and/or significant regulatory obstacles in implementing this approach, Everett may consider, with the consent of other SRRWA members, retaining the quantities approved for change, and supply Northshore Utility District and Woodinville Water District with treated water from its Sultan Source. It should be noted, however, that this latter approach would, at a minimum require the City of Everett and Snohomish PUD to agree to amend the place of use of Sultan Water, and require the SRRWA to prepare studies and materials relating to a new SEPA action. As of early 2007, none of the above actions have been initiated or are in the process of development.

Everett Status. At this time (early 2006), Everett and the other SRRWA members are not planning capital improvements needed to make use of the Weyerhaeuser water right. As shown in Table 6-1, the City currently has water rights in excess of forecasted demand. The City and SRRWA will continue to evaluate the potential for use of the Weyerhaeuser Water Right.

6.4.2 Groundwater Sources

One potential source of supply is development of Everett's groundwater sources for drinking water supply. As discussed earlier in this chapter, the City currently holds nine ground water rights which are authorized for a maximum instantaneous withdrawal of 3,510 gpm (5.1 MGD) and an average annual withdrawal of 3,822 afy (3.4 MGD).

Everett Status. Everett has drilled wells at three groundwater sites: Walter E. Hall Golf Course, Kasch Park, and Legion Park for irrigation purposes. Everett has no plans to use groundwater available from other available groundwater sources.

6.4.3 Enhanced Conservation

While Washington State public water systems are required to develop and implement conservation programs meeting minimum requirements, some systems do implement conservation measures above and beyond these requirements. This type of program is known as "enhanced conservation."

Everett Status. As described in Chapter 5, Everett has designed a robust regional conservation program for implementation from 2007 to 2012. The conservation program is estimated to save 3.7 mgd by 2012, including both programmatic savings and plumbing code savings.

6.4.4 Reclaimed Water

Due to population growth, uneven distribution of water resources, and periodic droughts, many communities have been forced to search for innovative sources of water supply. As a result, the use of highly treated wastewater effluent for industrial and agricultural applications is becoming more common. With any reclaimed water project, there are several considerations that must be addressed, such as public acceptance, effects on water quality, surface and ground water pollution, and public health concerns. In general, industrial reclaimed water applications are less susceptible to public scrutiny; however, all other considerations previously mentioned must be addressed. Also, treatment processes must be tailored to the particular type of reclaimed water use. Water for reuse that will entail direct human contact will likely require additional treatment.

Everett Status. The City is currently supplying reclaimed water to Kimberly-Clark for cooling purposes, as described in Chapter 3. Everett provides Kimberly-Clark with an average of two million gallons per day and a maximum supply of up to 4 million gallons per day during the peak demand season. This program reduces the amount of water Everett diverts from the Sultan River Basin for water supply purposes to meet base demands and peak day demands. Kimberly-Clark receives “special class” reclaimed water which has been treated to a secondary effluent level from Everett’s WPCF. This water is authorized for use as single-pass, non-contact cooling water at Kimberly-Clark’s heat exchanger in a mill bleach plant.

In addition, a small amount of reclaimed water is used at Everett’s wastewater treatment plant for irrigation and wash down purposes. Everett has identified potential reclaimed water customers, including two city-owned golf courses and one private golf course. However, Everett does not plan to expand reclaimed water service to new customers over the next six years. This is because Everett currently has adequate supply with the necessary treatment and distribution infrastructure in place to meet future demands. It is likely that expanding reclaimed water services would involve qualifying for appropriate permits, adding treatment facilities to treat the wastewater to meet reclaimed water requirements and developing transmission and distribution infrastructure to deliver the reclaimed water to customers.

6.5. Water System Reliability

The Everett Supply System has established a long-term record on system reliability by developing multiple methods of supplying water from the Sultan Basin and Water Treatment Plant.

During the development of the Jackson Project and Water Filtration Plant, alternative operational and diversion strategies from the Sultan River were developed and implemented. The current diversion structures will allow the City to divert water through the Jackson Hydroelectric return line (typical operating procedure) or alternately by reversing the flow in the diversion tunnel to divert drinking water to Chaplain Reservoir and the Water Filtration Plant (same as original diversion system).

However, both diversion systems rely on the Sultan Basin and the Water Filtration Plant as the primary source of water supply for the entire Everett Supply Area.

As the region becomes more reliant on a system of central city or major regional supply systems, the reliability of those systems in terms of major emergency or optimization of supply sources during low flow conditions becomes more important. The existing Everett Supply System is dependent on a single primary supply source and would benefit from an emergency and/or multiple supply management alternatives.

A joint service area has been established through the Snohomish River Regional Water Authority (SRRWA) linking Everett, the Northshore Utility District, and the Woodinville Water District (two King County utilities that currently purchase water from Seattle Public Utilities). The establishment of the SRRWA regional service area reflects a long-term strategy of emergency supply, interbasin supply optimization, and flexibility to phase supply development, consistent with the Cities', Counties', and State's Growth Management needs.

While Everett has many connections along the transmission lines to systems purchasing water from Everett, each of these connections are used solely to convey water from Everett's transmission line to the individual systems. Several of the wholesale systems use other sources of water in addition to water purchased from Everett. It is recommended that Everett investigate the possibility of relying on an intertie with another source during short-term emergency conditions.

As a part of Everett's long-term supply and system reliability program, it is recommended that, at a minimum, Everett consider the necessary steps to fully evaluate and implement a program that will allow Everett and Seattle to develop an emergency intertie between their respective regional systems. Such an emergency intertie could provide Everett with additional redundancy in the system. Currently, Everett and Seattle have participated in informal discussions of the potential for developing an intertie between the two systems. This could provide water to either party. An Everett-Seattle intertie would only provide Everett with additional system reliability if the Intertie were developed in a manner such that it could move water to Everett from Seattle during emergencies.

6.6. City of Everett Water Shortage Response Plan

WAC 246-290-100 (4)(d)(v) stipulates that the City must maintain a Water Shortage Response Plan (WSRP) in the event of unplanned and projected water shortages. City of Everett developed a Drought Response Plan (DRP) to meet this requirement. This section briefly describes the City's DRP; the full WSRP is included as Appendix 6-3.

Everett's DRP establishes procedures for managing water supply during periods of weather-related shortages. During a shortage, the DRP has been developed to meet three goals (giving priority to first two):

1) Ensure an adequate quantity of high quality water is maintained throughout a shortfall event.
2) Ensure adequate instream flows are maintained in the Sultan River for fish and wildlife habitat.
3) Maintain adequate storage for hydropower generation.

The DRP is a general framework of actions that will be tailored to meet the specific needs of drought-related supply situation. The DRP outlines data needs, coordination, internal

operational adjustments, and management of supply and demands. The plan provides a four-stage approach to addressing a shortfall event. Each stage provides an increasingly aggressive set of actions to be implemented as drought conditions become more severe. The four stages are:

- Advisory Stage – The public is informed that a water shortage may occur and is encouraged to use water wisely.
- Voluntary Stage – This stage relies on voluntary cooperation to meet demand-reduction goals. During this stage, the City and its purveyors will implement supply-side actions and recommend voluntary actions for their retail customers.
- Mandatory Stage – The City and its purveyors will implement more aggressive supply-side actions and will limit or prohibit certain retail water use activities.
- Emergency Stage – If supply conditions worsen and the mandatory stage does not meet the required demand reduction, this stage will establish emergency restrictions, which may include rate surcharges.

6.7. Interties with Other Systems

Everett has many connections to other systems for the purpose of providing water to wholesale customers, as described in Chapter 1. However, each of these connections is operated solely to convey water from Everett's transmission system to purchasing customers, not to convey water to Everett. Although no interties with entities that are served solely by a source other than the Sultan River currently exist, water from other sources is still available from some of Everett's wholesale customers. For example, the City of Marysville receives water from local groundwater wells and the Stillaguamish River, as well as from Everett. If Everett were to lose its source of supply, water may still be available from other systems (under emergency conditions) that have multiple source capacity.

6.8. City of Everett Watershed Control Program

WAC 246-290 Sections 135 and 668 require filtered public drinking water systems to develop a watershed control program. The objective of this plan is to protect, and if possible, improve, source waters used by public water systems. Filtered drinking water systems must:

- Exercise surveillance, to the extent possible, over conditions and activities in the watershed affecting source water quality; and
- Develop and implement a DOH-approved watershed control program.

Additionally, drinking water purveyors must conduct comprehensive evaluations of watersheds and update their watershed control programs at least every 6 years. The watershed evaluation must include an assessment of:

- Conditions and/or activities which are adversely impacting source water quality;
- Changes in the watershed since the last watershed evaluation, that could adversely affect source water quality;
- Monitoring program used to assess the adequacy of watershed protection; and
- Recommendations for improved watershed control.

The City, in conjunction with Snohomish PUD, the Washington State Department of Natural Resources, and health authorities, developed and implemented a comprehensive

Watershed Control Program for the Sultan Basin Watershed. This basin includes both Spada and Chaplain Reservoirs. The Watershed Control Program was developed initially in the 1980's and has been periodically updated to reflect changing conditions and water quality requirements.

The Watershed Control Program was updated in 2006 for inclusion in this CWP. The updated program is included in Appendix 6-4. Key features of the program include:

Ownership. The City of Everett owns watershed lands surrounding Lake Chaplain. Watershed lands surrounding Spada Lake and the Sultan River immediately downstream of Spada Lake are primarily owned by three other public agencies: the U.S. Forest Service, Washington State Department of Natural Resources, and Snohomish County Public Utility District No. 1.

Access and Land Use. The watershed lands have restricted access and highly controlled land uses. Management programs in place for these lands are designed to protect the municipal water supply. Virtually all of the watershed lands are forested and managed for wildlife and municipal water supply; or wildlife and low-impact recreation. Public contact with waters of Lake Chaplain is prohibited. Public contact with waters of Spada Lake is highly restricted.

Watershed Patrol. The City has a watershed patrol that monitors activities in the watersheds 365 days a year. The patrol routinely visits all areas accessible by vehicle in the watersheds, and makes regular visits on trails within the Sultan Basin. The patrol keeps unauthorized visitors out of protected areas, prevents prohibited activities on lands accessible to the public, and provides a daily point of contact with the other agencies that manage watershed lands. The patrol also notes problematic activities, when they occur, so they can be quickly resolved.

Water Quality Monitoring. Raw source water quality is monitored at the intake to the Everett Water Filtration Plant and in the supply pipeline flow from Spada Reservoir to Lake Chaplain Reservoir. In addition, a limited amount of limnological and plankton monitoring is conducted by boat on Lake Chaplain. Monitoring frequency is based on regulatory monitoring requirements for various parameters. The City also has the capability to undertake additional monitoring related to any short-duration activities that are deemed to present risks to water quality. Recent water quality data indicates raw water quality remains high and relatively stable from year to year.

The updated watershed control program relies on continued application of the protection programs that have worked effectively for many years. For further information on the watershed control program, see Appendix 6-4.

7. Regulatory Compliance

7.1. Introduction and Approach

This section reviews current state and federal drinking water quality regulations to assess Everett's compliance with these regulations between 2000 and 2005, based on water quality data and information provided by the City. In addition, this section describes Everett's efforts in responding to customer complaints and to conduct additional monitoring for the purpose of customer acceptability. Finally, this section reviews proposed and future possible regulations and Everett's needs in planning for future compliance.

The review includes the following:

- System overview
- Review of source water quality
- Framework for regulating drinking water quality
- Water quality regulations and compliance
- Certified laboratories used for sample analysis
- Response to customer complaints
- Water quality monitoring conducted for customer acceptability
- Regulations in effect after 2005 and anticipated regulations
- Summary of Everett's monitoring requirements
- Recommendations

7.2. System Overview

As its sole source of drinking water, Everett relies on surface water collected from the Upper Sultan River watershed into Spada Reservoir. Everett treats this water at the Water Filtration Plant (WFP) through coagulation, direct filtration, and addition of chlorine (to provide disinfection and a disinfectant residual in the transmission and distribution systems), sodium carbonate (to adjust pH levels), and fluoride (for dental health). As of 2006, Everett serves a population of more than 94,900 within Everett's retail service area and sells water to 66 wholesale customers.

7.3. Source Water Quality

Everett's source of supply is of very high quality. Additionally, the quality varies very little from season to season and from year to year. Table 7-1 presents untreated water quality data for 2004, which is representative for the period covered by this Comprehensive Water Plan (CWP).

Table 7-1 2004 Everett Water Filtration Plant Influent Raw Water Quality

Month	Turbidity	Temperature	pH	Alkalinity	Hardness	Conductivity	Aluminum	Iron	Manganese	Lead	Copper	Antimony	Fecal coliform*	Total coliform*	Total organic carbon	*Giardia*	*Cryptosporidium*
	NTU	deg C	s.u.	mg/L ($CaCO_3$)	mg/L ($CaCO_3$)	umhos /cm	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	CFU/100mL	CFU/100mL	mg/L	cysts /L	oocysts /L
January	6	7	6.5	8	10	23	0.319	0.338	0.015	ND	6	ND	ND:1	ND:4	NS	0.00	0.000
February	5	7	6.4	8	9	22	0.254	0.243	0.011	ND	9	ND	ND	ND:3	0.97	0.00	0.000
March	3.5	8	6.5	8	9	24	0.257	0.222	0.01	ND	ND	ND	ND	ND:2	NS	0.00	0.000
April	2.2	10	6.5	10	10	26	0.095	0.081	0.005	NS	NS	NS	ND	ND:2	NS	0.00	0.000
May	1.2	13	6.5	8	10	26	0.066	0.067	0.004	NS	NS	NS	ND	ND:2	0.73	0.00	0.000
June	0.7	15	6.4	9	9	24	0.029	0.036	0.003	ND	ND	ND	ND	ND:6	NS	0.00	0.000
July	0.5	17	6.5	9	9	25	0.020	0.038	0.004	NS	NS	NS	ND:1	1:5	0.85	0.00	0.000
August	0.6	19	6.4	8	10	27	0.009	0.062	0.005	NS	NS	NS	ND:9	ND:7	NS	0.00	0.000
September	1.5	17	6.3	8	9	31	0.031	0.068	0.006	NS	NS	NS	ND:5	ND:4	NS	0.00	0.000
October	0.9	15	6.3	8	10	28	0.020	0.039	0.007	ND	13	ND	ND	ND:4	0.92	0.00	0.000
November	0.7	13	6.4	9	10	27	0.024	0.050	0.011	NS	NS	NS	ND	ND:9	0.96	0.09	0.000
December	2.2	10	6.4	9	10	27	0.055	0.094	0.05	NS	NS	NS	ND:1	ND:10	1.07	0.00	0.092
Maximum	6.0	19	6.5	10	10	31	0.319	0.338	0.05	NA	13	NA	9	10	1.07	0.09	0.092
Minimum	0.5	7	6.3	8	9	22	0.009	0.036	0.003	NA	ND	NA	ND	ND	0.73	0.00	0.000
Average	2.1	13	6.4	9	10	26	0.098	0.112	0.011	NA	5.6	NA	1.2	2	0.92	0.01	0.008

NS – Not Sampled
ND – Not Detected
NA – Not Applicable
* Fecal and total coliform are reported as Minimum: Maximum for each month.

7.4. Drinking Water Regulatory Framework

Washington State drinking water suppliers are subject to both federal and state drinking water regulations. At the federal level, the Safe Drinking Water Act (SDWA) (1974) and SDWA Amendments (1986 and 1996) give the United States Environmental Protection Agency (USEPA) the responsibility of developing and administering national standards for drinking water quality. Table 7-2 presents a list of federal drinking water regulations that have been developed as part of the SDWA and amendments that were in effect between 2000 and 2005, which is the period under review for this CWP update. Additional regulations have recently become effective (such as the Stage 2 Disinfectants and Disinfection By-Products (D/DBP) and the Long Term 2 Enhanced Surface Water Treatment (LT2ESWT Rules) and are discussed later in this section.

Table 7-2 Effective Federal Drinking Water Regulations Applicable to Everett (1)

Rule and Date Rule Became Effective	Parameters Regulated
National Primary Drinking Water Requirements (1976)	Physical and chemical
Radionuclides Rule (1976)	Gross alpha and beta emitters, radium-226, and radium-228
Total Trihalomethane Rule (1979) (2)	Trihalomethanes
Phase I (VOCs) and Phase II and Phase V (IOCs and SOCs) - 1989 and 1993, respectively	Volatile organic chemicals (VOCs), inorganic chemicals (IOCs), and synthetic organic chemicals (SOCs)
Surface Water Treatment Rule (1990)	Turbidity, disinfection, viruses, *Giardia lamblia*, and disinfectant residual
Total Coliform Rule (1990)	Coliform bacteria
Epichlorohydrin/Acrylamide Treatment Technique Rule	Epichlorohydrin Acrylamide
Lead and Copper Rule (1992) and Lead and Copper Rule Minor Revisions (2000)	Lead and copper and treatment for corrosion control
Consumer Confidence Rule (1998)	Water quality compliance reporting to customers
Interim Enhanced Surface Water Treatment Rule (1999)	Turbidity and *Cryptosporidium*
Unregulated Contaminant Monitoring Rule (2000)	Monitoring for contaminants included on assessment and screening lists
Public Notification Rule (2000)	Notification of public after water quality violation
Filter Backwash Recycling Rule (2001)	Filter backwash
Stage 1 Disinfectants/Disinfection By-Products Rule (2002)	Disinfectant residual, total trihalomethanes, and haloacetic acids
Radionuclides Rule (2003)	Radionuclides

(1) These regulations were in effect between 2000 and 2005.
(2) Replaced by the Stage 1 Disinfectants/Disinfection By-Products Rule in 2002.

The Washington State Department of Health (DOH) is the primacy agency responsible for ensuring that drinking water laws are implemented and enforced. Washington State must adopt laws at least as stringent as federal regulations. When a federal drinking water law has yet to be included in state drinking water codes, drinking water suppliers are responsible for meeting federal regulatory requirements as put forth by the USEPA.

The Washington State law incorporating federal drinking water requirements is Washington Administrative Code (WAC) 246-290 - Group A Public Water Systems. Everett is a Group A system: a drinking water system that provides water to 15 or more service connections used by year-round residents for 180 or more days within a calendar year, or regularly serving at least 25 year-round residents.

7.5. Overview of Drinking Water Regulations and Everett's Compliance

The regulations listed in Table 7-2 have been incorporated into WAC 246-290. The descriptions of these regulations have been organized to reflect how they apply to Everett's drinking water processes:

- Treatment Regulations – Surface Water Treatment Rules, Epichlorohydrin/Acrylamide Rule, and Filter Backwash Recycling Rule.
- Finished Water Regulations – Phase I, II, and V Rules (including asbestos which is monitored in the distribution system), Radionuclides Rule, and Unregulated Contaminant Monitoring Rule.
- Distribution System Regulations – Total Coliform Rule, Lead and Copper Rule, and Stage 1 Disinfectants/Disinfection By-Products Rule.
- Consumer Confidence and Public Notification – Consumer Confidence Rule and Public Notification Rule.

The following sub-sections describe Everett's compliance with state and federal regulations between 2000 and 2005.

7.5.1. Treatment Regulations

The Surface Water Treatment, Epichlorohydrin/Acrylamide, and Filter Backwash Recycling Rules apply to drinking water treatment processes. Compliance with these regulations is based on treatment techniques instead of Maximum Contaminant Levels (MCLs).

Surface Water Treatment Rules

Regulatory Requirements:
The Surface Water Treatment Rule (SWTR) was issued in 1989 and applies to water systems using surface water or groundwater under the influence of surface water (GUI). The SWTR uses filtration and disinfection as treatment techniques to regulate the presence of turbidity, *Giardia lamblia,* viruses, *Legionella*, and disinfectant levels in finished drinking water. In addition to treating water to meet removal/inactivation requirements for *Giardia* and viruses, systems must meet performance criteria for turbidity and disinfection. With respect to turbidity, systems must produce water with a turbidity of less than 0.5 nephelometric turbidity units (NTUs) in 95 percent of the samples collected each month. To meet disinfection performance criteria, systems must provide at least 0.2 milligrams per liter

(mg/L) of residual disinfectant at the distribution system entry point and a detectable level of disinfectant must be present throughout the distribution system. WAC 246-290-654 provides compliance guidance pertinent to the SWTR, and includes operating requirements for direct filtration treatment plants (coagulation, flocculation, and filtration). Finally, the SWTR and WAC 246-290-668 require purveyors to develop and implement a DOH-approved watershed control program.

The Interim Enhanced Surface Water Treatment Rule (IESWTR) was issued in 2001 and builds upon the SWTR without replacing it. The IESWTR requires disinfection profiling and benchmarking for systems serving more than 10,000 customers with total trihalomethane (TTHM) levels of more than 64 micrograms per liter (µg/L) or haloacetic acid (HAA5) levels of 48 µg/L. In addition, the IESWTR establishes a maximum contaminant level goal of zero for *Cryptosporidium* and requires 2-log *Cryptosporidium* removal. The IESWTR strengthened filtration requirements for combined filter effluent turbidity performance, requiring turbidity to be less than 0.3 NTU in at least 95 percent of turbidity measurements per month. The maximum allowable finished water turbidity was established as 1.0 NTU. Finally, the IESWTR requires systems to conduct monitoring of individual filter effluent in addition to combined filter effluent monitoring, and all new finished water storage facilities to be covered. The Long-Term 1 Enhanced Surface Water Treatment Rule applies IESWTR requirements to systems serving fewer than 10,000 customers.

Under these regulations, filtration systems are required to operate such that they provide at least a 2.0-log removal of *Giardia* and *Cryptosporidium* and 1.0-log removal of viruses.

Everett Status:

Everett demonstrates treatment effectiveness for *Giardia lamblia* cyst and *Cryptosporidium* oocysts removal by filtration using the turbidity reduction method specified in WAC 246-290-654. This method requires systems to demonstrate either 1) an 80% reduction in source water turbidity based on an average of daily turbidity reductions for each calendar month; or 2) an average daily filtered turbidity less than or equal to 0.1 NTU. Due to Everett's low turbidity source water and analytical limitations, Everett operates their filtration plant to meet the 0.1 NTU criterion. This ensures that Everett easily meets the IESWTR turbidity requirement of less than 0.3 NTU in 95 percent of measurements each calendar month for systems with direct filtration and has not exceeded the maximum allowable turbidity level of 1.0 NTU. A review of turbidity performance summaries from 2000 to 2005 shows that average finished water turbidity is typically less than 0.06 NTUs. Everett receives a 2.5-log removal credit for *Giardia* and *Cryptosporidium* for filtration at a rate up to 8 gallons per minute per square foot (gpm/ft^2).

With respect to disinfection requirements, total *Giardia* inactivation ratio must always be greater than one (1). Everett's disinfection performance summaries confirm compliance. Table 7-3 summarizes Everett's *Giardia* inactivation ratios for WFP effluent between 2000 and 2005.

Table 7-3 City of Everett *Giardia* Inactivation Ratios

Year	Average Ratio	Maximum Ratio	Minimum Ratio
2000	1.8	2.1	1.5
2001	1.7	2.1	1.4
2002	1.6	1.8	1.4
2003	1.7	2.0	1.4
2004	1.7	2.0	1.5
2005	1.8	2.8	1.3

With respect to disinfectant residual, Everett continuously monitors chlorine residual at the distribution system entry point to ensure it stays above 0.2 mg/L, and at sites throughout the distribution system to ensure the presence of a disinfectant residual. Between 2000 and 2005, Everett's disinfectant residual sampling, which was conducted at the same sites and times as total coliform monitoring, has indicated the presence of a disinfectant residual in all samples.

Everett had no treatment technique violations between 2000 and 2005 and is in compliance with the Surface Water Treatment Rules. Everett was not required to conduct disinfection profiling because disinfection byproduct (DBP) levels in Everett's system were below 64 µg/L and below 48 µg/L for total trihalomethanes and haloacetic acids, respectively.

Epichlorohydrin / Acrylamide

Regulatory Requirements:

Epichlorohydrin and acrylamide are added to Everett's drinking water during the filtration process. An epichlorohydrin-based polymer is used as an aid to coagulation. A non-ionic acrylamide-based polymer is added to the effluent of the flocculation basin as a filter aid.

Section 141.111, subpart K of 40 Code of Federal Regulations (CFR) requires each public water system to certify annually in writing to the State (using third party or manufacturer's certification) that when epichlorohydrin and acrylamide are used in drinking water systems, the combination of dose and monomer level does not exceed the levels specified:

- Epichlorohydrin – 0.01 percent monomer dosed at 20 parts per million (ppm) polymer (or equivalent).
- Acrylamide – 0.05 percent monomer dosed at 1 ppm polymer (or equivalent).

In Washington State, systems using these chemicals in treatment are required by WAC 246-290 to use polymers certified by ANSI/NSF Standard 60/61, which is equivalent to the Subpart K requirements, as being safe for use in drinking water. DOH has required Everett to retain copies of all polymer monomer content certificate of analysis reports that Everett receives from the vendors of these chemicals. In addition, Everett is required to include polymer usage on its chemical use report to DOH and include polymer usage on an annual chemical usage summary report. All of these materials must be available to DOH upon request.

As of April, 2006, DOH changed reporting requirements associated with this regulation, requiring systems to annually complete a certification form for each polymer applied. Systems must also report to DOH when chemical usage changes. The new DOH report form includes details such as manufacturer, monomer percentage, and maximum dosage.

Everett's Compliance Status:
As required, Everett reports usage of epichlorohydrin and acrylamide on a monthly and annual basis to DOH. Everett requires vendors to provide certification that these chemicals meet the ANSI/NSF standards. Everett is in compliance with this treatment requirement and will continue to be in compliance with the new reporting requirements.

Filter Backwash Recycling Rule

Regulatory Requirements:
The concern associated with recycling filter backwash water is the potential increase or reintroduction of certain contaminants to the treatment plant effluent. Potential recycle contaminants of concern are disinfection-resistant pathogens such as *Cryptosporidium*, *Giardia*, *Cyclospora*, *Toxoplasma*, and *Microsporidia*; also total and assimilable organic carbon, and metals such as manganese, aluminum, and iron. In order to be recycled, backwash water must be returned to the system prior to the treatment processes. The water cannot be released to the filter effluent line without first receiving treatment. Under the rule, direct filtration plants are also required to collect information on their filtration and backwash recycling systems and maintain a file of that information for potential review by DOH.

Everett's Status:
As required, Everett's backwash water is recycled to the influent of the WFP. During normal operating conditions, the backwash water is pumped from the settling pond to the screen house or siphon line (whichever is in use) directly upstream of the pre-chlorination chlorine injection points. The plant staff maintains files of filter and backwash system information and performance data. The performance data are stored in the plant SCADA system.

7.5.2. Finished Water Regulations

The Phase I, II, and V, Radionuclides, and Unregulated Contaminant Monitoring Rules apply to drinking water after it has been treated (except for asbestos, which is regulated under Phase II and is actually monitored in the distribution system). With the exception of the Unregulated Contaminant Monitoring Rule, these regulations establish Maximum Contaminant Levels (MCLs) for inorganic chemicals, synthetic and volatile organic chemicals, and radionuclides.

Phase I, II, and V Rules

Regulatory Requirements:
Monitoring requirements and MCLs for inorganic (IOC), synthetic organic (SOC), and volatile organic (VOC) chemicals are addressed by federal Organic, Synthetic Organic and Inorganic Chemicals Phases I, II, and V Rules and WAC 246-290-300. Under Phases II and V, MCLs are set for 16 inorganic, 30 synthetic, and 21 volatile organic contaminants. Required testing is determined by DOH based on a vulnerability assessment. WAC 246-290-300 requires monitoring of IOCs, VOCs, and SOCs at each source on 12- to 36-month sampling cycles, depending on the contaminant and source type.

Table 7-4 presents a list of the inorganic chemicals (except asbestos) that Washington systems must monitor for each year and the MCL for each parameter. These parameters are monitored after treatment, before entering the distribution system. Systems that have a significant amount of asbestos-cement piping must monitor for asbestos once every 9 years. Nitrate and nitrite are measured each year and monitoring cannot be waived.

With respect to SOCs, systems are required to conduct monitoring twice every 3 years after treating the water and before it enters the distribution system, unless DOH issues waivers. Table 7-5 lists the SOCs and MCLs.

Table 7-6 presents a list of the VOCs and MCLs. These samples are collected once per year after treatment and before the water enters the distribution system.

Everett's Compliance Status:

Everett's monitoring results for inorganic chemicals from 2000 to 2005 are compared to regulatory requirements in Table 7-4. Everett monitors each of these parameters at a quarterly frequency, more often than required in WAC 246-290. The table presents the range of sample results for each parameter between 2000 and 2005. As shown, none of these parameters exceeded the MCL. With respect to asbestos, Everett conducted monitoring in December 2001 and will conduct the next round of monitoring in December 2010.

Everett has waivers for seven SOCs through December 2007. These compounds, which Everett last monitored for in 2002, are not used or produced in the Sultan Basin watershed. Everett is required to monitor for the remaining SOCs during two consecutive quarters every 3 years. Everett's last round of monitoring occurred in 2004. As shown in Table 7-5, SOCs were not detected during monitoring. Everett will need to conduct the next round of SOC monitoring in 2007.

Everett has conducted the required annual VOC monitoring at its source. As shown in Table 7-6, all samples have had undetectable levels of VOCs.

Table 7-4 Primary Inorganic Chemicals (2000 – 2005)

Parameter	MCL	Units	Everett's Monitoring Results - Range Shown for 2000 – 2005
Antimony	6	µg/L	ND
Arsenic	50	µg/L	ND
Asbestos	7	million fibers/liter (longer than 10 microns)	ND
Barium	2	mg/L	ND – 0.005 mg/L
Beryllium	4	µg/L	ND
Cadmium	5	µg/L	ND
Chromium	0.1	mg/L	ND
Cyanide	0.2	mg/L	ND
Fluoride	4.0	mg/L	0.22 – 1.62
Mercury	2	µg/L	ND -0.0001
Nickel	0.1	mg/L	ND
Nitrate	10.0	mg/L (as N)	0.016 – 0.5
Nitrite	1.0	mg/L (as N)	ND
Selenium	50	µg/L	ND
Sodium (1)	NA	mg/L	4 – 9.9
Thallium	2	µg/L	ND

ND = Not detected

(1) 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 7-5 Synthetic Organic Chemicals

Parameter	MCL (mg/L)	Everett's Monitoring Results - Range Shown for 2000 – 2005
Alachlor (Lasso)	0.002	ND
Aldicarb (Temik) (2)	NA	ND
Aldicarb sulfone (2)	NA	ND
Aldicarb sulfoxide (2)	NA	ND
Atrazine	0.003	ND
Benzo[a]pyrene	0.0002	ND
Carbofuran (1)	0.04	ND
Chlordane	0.002	ND
2,4-D	0.07	ND
Dalapon	0.2	ND
Di(2-ethylhexyl)adipate	0.4	ND
Di(2-ethylhexyl)phthalate	0.006	ND
Dibromochloropropane (1)	0.0002	ND
Dinoseb	0.007	ND
2,3,7,8-TCDD (Dioxin) (1)	$3x10^{-8}$	ND
Diquat (1)	0.02	ND
Endothall (1)	0.1	ND
Endrin	0.002	ND
Ethylene dibromide (1)	0.00005	ND
Glyphosate[1] (Rodeo, Round-up)	0.7	ND
Heptachlor	0.0004	ND
Heptachlor epoxide	0.0002	ND
Hexachlorocyclopentadiene	0.05	ND
Hexacholorbenzene	0.001	ND
Lindane (BHC-gamma)	0.0002	ND
Methoxychlor	0.04	ND
Oxamyl (Vydate)	0.2	ND
Pentachlorophenol	0.001	ND
Picloram	0.5	ND
Polychlorinated biphenyls	0.0005	ND
Simazine	0.004	ND
Toxaphene	0.003	ND
2,4,5-TP (Silvex)	0.05	ND

NA = Not applicable
ND = Not detected
(1) Waived until December 2007.
(2) Everett is required to monitor for these VOCs. However, the USEPA has placed a stay on the MCL included in the Phase II Rule.

Table 7-6 Volatile Organic Chemicals

Parameter	MCL (mg/L)	Everett's Monitoring Results - Range Shown for 2000 – 2005
1,1 – Dichloroethylene	0.007	ND
1,1,1-Trichloroethane	0.2	ND
1,1,2-Trichloroethane	0.005	ND
1,2,4-Trichlorobenzene	0.07	ND
1,2-Dichloroethane	0.005	ND
1,2-Dichloropropane	0.005	ND
Benzene	0.005	ND
Carbon tetrachloride	0.005	ND
cis-1,2-Dichloroethylene	0.07	ND
Dichloromethane (methylene chloride)	0.005	ND
Ethylbenzene	0.7	ND
Monochlorobenzene (chlorobenzene)	0.1	ND
o-Dichlorobenzene	0.6	ND
p-Dichlorobenzene	0.075	ND
Styrene	0.1	ND
Tetrachloroethylene	0.005	ND
Toulene	1	ND
trans-1,2-Dichloroethylene	0.1	ND
Trichloroethylene	0.005	ND
Vinyl chloride	0.002	ND
Xylenes (total)	10	ND

ND = Not detected

Radionuclides

Regulatory Requirements:

Regulatory requirements for radionuclides changed between 2000 and 2005. The original Radionuclides Rule, which went into effect in 1978, was revised in December 2000, with these revisions becoming effective during December 2003. Before 2003, WAC 246-290 required systems to monitor gross alpha particle activity, radium-226, and radium-228. Systems were required to conduct monitoring every 4 years for four consecutive quarters. If a system could demonstrate that gross alpha activity was below 5 picocuries per liter (pCi/L), then the system did not need to conduct monitoring for radium-226 and radium-228.

The new rule includes MCLs for the sum of radium-226 and radium-228 (5 pCi/L), adjusted gross alpha emitters (15 pCi/L), gross beta and photon emitters (4 millirems per year [mrem/year]), and uranium (0.03 mg/L). Systems are required to conduct initial monitoring

between 2003 and 2007, unless earlier radionuclide data can be used as grandfathered data. Under the new rule, monitoring for radionuclides must be conducted at each entry point to the distribution system. The required monitoring frequency will depend on system contaminant levels seen during initial monitoring.

Everett's Compliance Status:
Everett sampled for radionuclides in 2002 and 2004. As required under the previous requirements, Everett collected quarterly samples for gross alpha and gross beta emitters and radon in 2002. In 2004, Everett conducted initial monitoring for compliance with the Radionuclides Rule, sampling for gross alpha and gross beta emitters and radium -226 and radium-228 during two quarters, as required. All samples have indicated that these parameters are not detectable in Everett's system. Because the level of gross alpha emitters was below 15 pCi/L, Everett was not required to monitor uranium levels.

Everett will be required to sample for radionuclides sometime between 2007 and 2015, based on DOH's determination of Everett's status with respect to the Radionuclides Rule.

Unregulated Contaminant Monitoring Rule

Regulatory Requirements:
The USEPA issued the Unregulated Contaminant Monitoring Rule (UCMR1) in 1999, with requirements that were effective from 2000 through 2005. The UCMR required systems to conduct monitoring for specified contaminants to investigate their occurrence. Multiple revisions to the UCMR were promulgated to establish analytical methods for contaminants and direct data reporting. The regulation did not set MCLs. The UCMR1 accomplished the following:

- Established three lists of contaminants, categorized by available analytical methods.
- Required that large Public Water Systems (PWSs) and some small PWSs monitor for List 1 contaminants.
- Required that selected large and small PWSs monitor List 2 contaminants.
- Required systems to submit data to the USEPA and the State.
- Required systems to include detected contaminants in the Consumer Confidence Report (CCR).

The USEPA did not require List 3 monitoring under the UCMR1 since analytical methods were not established before 2005.

Everett Status:
Everett was required to conduct monitoring for 13 contaminants on List 1 and for *Aeromonas*, a List 2 contaminant. Everett conducted 1 year of quarterly monitoring for List 1 contaminants in 2002. In 2003, Everett conducted monitoring for *Aeromonas* every 2 months. Everett met the compliance requirements of the UCMR1 and no further actions are required as part of the UCMR1.

7.5.3. Distribution System Regulations

The Total Coliform, Stage 1 Disinfectant/Disinfection By-products, and Lead and Copper Rules apply primarily to the quality of drinking water present in the distribution system.

These regulations establish monitoring, MCLs, Maximum Residual Disinfectant Levels (MRDLs), and action levels for regulated parameters.

Total Coliform Rule

Regulatory Requirements:

The Total Coliform Rule (TCR) requires systems to monitor their distribution system for coliforms, which are bacteria used to indicate the presence of potentially harmful bacteria, such as *E. coli O157:H7*. Under this rule, there are two types of violations: acute and non-acute. An acute MCL violation for coliform is the presence of fecal coliform or *E. coli* in a repeat sample, or, coliform presence in a repeat sample collected as a follow-up to a sample indicating the presence of fecal coliform or *E. coli*. A non-acute MCL violation for coliform occurs when a system that collects 40 or more coliform samples per month has more than 5.0 percent of the routine samples taken in 1 month test positive for the presence of total coliform.

Everett Status:

As a system that serves a population of about 94,913 customers, Everett is required to collect 90 samples at sites throughout the distribution system each month. To ensure compliance with this Rule, Everett collects 105 samples each month.

Everett's Coliform Monitoring Plan was most recently updated in 2003 and covers the following topics:

- Overview of water system, including hydraulic operations
- Compliance details, including number of samples, sampling schedule, locations, and procedures
- Repeat sample procedures
- Reporting procedures
- Relevant system maps

Everett has been in compliance with the TCR for the 2000 to 2005 period. Within this 6-year period, there were 9 positive total coliform samples, two of which occurred in the same month. In this case, the two positive coliform samples represented 1.9 percent of the total monthly coliform samples Everett collected. Between 2000 and 2005, approximately 0.1 percent of coliform samples were positive. Everett's monitoring plan meets DOH requirements with respect to content included in the plan.

Everett intends to update the Coliform Monitoring Plan in 2007 to reflect changes to monitoring locations associated with annexation of the Silver Lake area and a sampling site that has become unavailable since the last update. Everett's plan may need to be updated within the next six years to reflect increases in population. According to population projections, the population of Everett's retail service area will exceed 96,001 by 2007. Additionally, DOH has requested that the estimate of Everett's retail service population used for TCR compliance include both the full-time residential population and an estimate of regular non-residential users. Regular non-residential users are people who regularly have access to drinking water from Everett's system, but do not live within Everett's retail service area, such as students, employees, and children in day care. Everett plans to develop an estimate of regular non-residential users in 2007. Everett's current practice of collecting 105 samples per month is adequate for a system serving a population of up to 130,000 (including both residential and regular, non-residential users). If Everett's estimate of

population served exceeds 130,000 it will be necessary to increase coliform monitoring to 120 samples per month and the Monitoring Plan will need to reflect this change.

Stage 1 Disinfectant and Disinfection By-Products Rule

Regulatory Requirements:

Disinfection byproducts (DBPs) result from the reaction of natural organic matter (NOM) and various inorganic precursors with chemical disinfectants. Some DBPs, such as trihalomethanes, have been shown to cause cancer and negative reproductive health effects. Until 2002, Everett was required to sample quarterly for Total Trihalomethanes (TTHMs) under the TTHM Rule, which is the summation of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The Maximum Contaminant Level (MCL) for TTHMs was 100 µg/L based on a running annual average of samples collected within the distribution system.

In 2002, the federal Stage 1 Disinfectant/Disinfection By-Product Rule came into effect for surface water systems with more than 10,000 customers, making the previous requirements for TTHMs no longer applicable. The TTHM MCL was reduced from 100 to 80 µg/L and an MCL was added for the total of five haloacetic acids (HAA5) at 60 µg/L. The HAA5 MCL applies to the summation of five HAAs: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, bromoacetic acid, and dibromoacetic acid. Both MCLs are based on a running annual average of quarterly samples collected within the distribution system. Systems are required to collect samples based on water system type (surface or groundwater) and number of treatment plants, and are required to develop a DBP monitoring plan.

Finally, the Stage 1 DBP Rule established a maximum residual disinfectant level (MRDL) for chlorine of 4.0 mg/L, to be sampled at the same locations and frequency as TCR sampling. As adopted in WAC 246-290, the Stage 1 DBP requirements were applied only to systems that add a disinfectant to the drinking water supply.

Everett Status:

As a system relying on a single surface water treatment plant and adding a disinfectant, Everett is required to collect four DBP samples each quarter within the distribution system. Table 7-7 summarizes Everett' DBP monitoring results. As the table indicates, Everett's DBP levels are significantly less than the MCLs.

Table 7-7 City of Everett DBP Monitoring

Parameter	MCL (µg/L)	4th Quarter Running Annual Average					
		2000 (µg/L)	2001 (µg/L)	2002 (µg/L)	2003 (µg/L)	2004 (µg/L)	2005 (µg/L)
TTHMs	80	32.1	29.1	34.3	36.3	36.5	37.4
HAA5	60	29.4	30.1	29.3	30.1	28.1	26.4

In addition, Everett conducts chlorine residual monitoring at total coliform sites, as required, to ensure that chlorine residual does not exceed the MRDL. Samples collected between

2000 and 2005 indicate that the maximum chlorine residual during this period was 1.1 mg/L, well below the MRDL.

Everett developed a Stage 1 Disinfectants/Disinfection By-products Rule Monitoring Plan in March 2002. This plan describes Everett's Stage 1 compliance monitoring efforts, including:

- Disinfectant and DBP monitoring locations
- Monitoring parameters
- Monitoring frequency
- Sample collection procedures
- Compliance calculations
- Reporting requirements

Everett's DBP sampling results indicate that Everett is in compliance with the Stage 1 DBP Rule and complied with the TTHM Rule prior to 2002. Additionally, Everett's Stage 1 sampling plan meets requirements.

Lead and Copper Rule

Regulatory Requirements:

Lead and copper are metals that may be found in household plumbing materials and water service lines. Lead can cause a variety of negative health impacts, including delaying physical and mental development in infants and children. Copper can cause aesthetic issues in addition to short-term and long-term negative health impacts. The Lead and Copper Rule establishes action levels, monitoring, and compliance requirements for lead and copper levels at customers' taps. To meet the established action levels, 90 percent of all samples must have lead levels equal to or less than 0.015 mg/L and copper levels equal to or less than 1.3 mg/L. If these action levels cannot be met, systems must implement public education and a corrosion control treatment strategy for meeting these levels.

Everett Status:

DOH has considered Everett's corrosion control treatment process to be optimized since 1998. As part of making this determination, DOH established an optimal treatment performance water quality parameter that requires the pH to be at least 7.4 at the point of entry to the distribution system. In 1999, DOH approved reduced Lead and Copper Rule (LCR) compliance monitoring at the tap and for the distribution system water quality parameters, pH, temperature, and alkalinity.

In cooperation with DOH, Everett and its Class A wholesale customers established a regional monitoring plan for compliance with the LCR in 1992. The purpose of conducting this monitoring on a regional basis was to:

- Obtain representative tap and water quality monitoring data for Everett and most of the systems it serves. Everett's corrosion treatment processes can be evaluated for effectiveness over the entire service area.
- Reduce the overall monitoring and reporting burden and simplify compliance for Everett, its consecutive systems, and DOH.
- Standardize sample collection procedures and parameter analysis across the systems, providing for less variability in LCR sample results.

In 2000 and 2003, the regional group of systems was required to collect 125 lead and copper tap samples and 25 water quality parameter samples within the consolidated

distribution systems during each round of monitoring. In 2006, DOH approved a reduction in the number of required samples to 100 while requiring the same number of water quality parameter samples (25) as before. This revision was made to establish a consolidated regional sample total based on the sample quantity requirements in the LCR. In addition, DOH also revised management of the plan by making system eligibility to participate in the regional program Everett's responsibility. In August and September 2006, the regional program completed another round of LCR tap monitoring.

Tap sample results collected by Everett and its wholesale customers in 2000, 2003, and 2006 are presented in Table 7-8. This table demonstrates that Everett is in compliance with LCR requirements.

Table 7-8 Lead and Copper Tap Monitoring Results

Parameter	Action Level (1) (mg/L)	Regional Tap Monitoring Results			Everett Tap Monitoring Results		
		2000	2003	2006	2000	2003	2006
Lead	0.015	0.003	0.003	0.003	0.003	0.004	< 0.002
Copper	1.3	0.130	0.068	0.072	0.118	0.073	0.05

(1) The 90th percentile of samples must be at or below this level.

7.5.4. Consumer Confidence and Public Notification Rules

The Consumer Confidence and Public Notification Rules require systems to provide customers with water quality information on an annual basis, and when a regulatory violation occurs.

Regulatory Requirements:
Under the Consumer Confidence Report (CCR) Rule promulgated in 1998, community water systems are required to provide an annual CCR on the source of their drinking water and levels of any contaminants found. The annual report must be supplied to all customers and must include:

- Information on the source of drinking water.
- A brief definition of terms.
- If regulated contaminants are detected, the maximum contaminant levels goal (MCLG), the maximum contaminant level (MCL), and the level detected.
- If an MCL is violated, information on health effects.
- If the USEPA requires it, information on levels of unregulated contaminants.

While the CCR provides an annual "state-of-the-water" report, the Public Notification Rule (PNR) directs utilities in notifying customers of acute violations when they occur. The PNR was revised in May 2000 and outlines public notification requirements for violations of MCLs, treatment techniques, testing procedures, monitoring requirements, and violations of a variance or exemption. If violations have the potential for "serious adverse effect," consumers and the State must be notified within 24 hours of the violation. The notice must explain the violation, potential health effects, corrective actions, and whether consumers need to use an alternate water source. Notice must be made by appropriate media or

posted door-to-door. Less serious violations must be reported to consumers within 30 days in an annual report, or by mail or direct delivery service within 1 year, depending on the severity of the violation.

Everett Status:
Everett had a minor violation of the CCR Rule in 2003. Although the required CCR was sent to customers before the regulatory deadline; a letter to DOH certifying that the report was sent to Everett's customers was not sent before the deadline for certification.

Everett did not have any MCL violations and has not needed to issue a public notification during the period of 2000 to 2005.

7.6. Labs Used for Everett's Sample Analyses

Everett uses five laboratories to perform water quality testing, including a City of Everett laboratory. Except for Lab/Cor, Inc. and Analytical Services, Inc., these laboratories are certified by the DOH drinking water laboratory certification program for analyses methods. Lab/Cor, Inc. and Analytical Services, Inc. have EPA approval for conducting EPA Method 1623 for *Giardia* and *Cryptosporidium* analysis. The contact information is listed below.

Everett Environmental Laboratory
City of Everett
3200 Cedar St.
Everett, WA 98201
Phone: 425-257-8230

EDGE Analytical
11525 Knudson Rd.
Burlington, WA 98233
Phone: 800-755-9295

Lab/Cor, Inc.
7619 6th Ave. NW
Seattle, WA 98117
Phone: 888-522-2674

Analytical Services, Inc.
PO Box 515
130 Allen Brook Lane
Williston, VT 05495
Phone: 800-723-4432

State of Washington Department of Health Radiation Laboratory
PO Box 550501
1610 NE 150th St.
Shoreline, WA 98155
Phone: 206-361-2896

7.7. Drinking Water Regulations in Effect After 2005

The regulations listed in Table 7-9 have been recently finalized and/or will become effective in the near future. None of these regulatory requirements were in effect between 2000 and 2005.

Table 7-9 Drinking Water Regulations in Effect After 2005

Regulation	Date	Regulated Parameters
Arsenic Rule	Final: 2001 Effective: January 2006	Arsenic
Stage 2 D/DBP Rule	Final: January 2006 Effective: March 2006	TTHMs, HAA5
Long Term 2 Enhanced Surface Water Treatment Rule	Final: January 2006 Effective: March 2006	Cryptosporidium

Arsenic Rule

The original arsenic MCL of 0.05 mg/L was established as part of the 1975 National Interim Primary Drinking Water Regulations. After years of additional health effects research and cost/benefit analysis, the USEPA published the final Arsenic Rule in January 2001. The rule, which became effective January 2006, revises the arsenic MCL downward to 0.010 mg/L and identifies several best available treatment technologies (BATs) for compliance. Compliance with the new MCL is based on the running annual average of monitoring results at each entry point to the distribution system. The rule makes arsenic monitoring requirements consistent with monitoring for other IOCs regulated under the Phase II/V standardized monitoring framework. However, if arsenic is detected above the MCL in any individual sample, the system must increase the frequency of monitoring at that sampling point to quarterly monitoring.

Everett Status:
Everett's IOC monitoring has not found detectable levels of arsenic in Everett's source of supply. Compliance with the lower arsenic MCL should not present a problem.

Stage 2 Disinfection/Disinfection By-Products Rule

The final Stage 2 DBP Rule was promulgated on January 4, 2006. The Stage 2 D/DBP Rule has been developed by the USEPA to further reduce exposure to DBPs linked to bladder, rectal, and colon cancers. This rule applies to community water and nontransient, noncommunity water systems that serve drinking water treated with a primary or secondary disinfectant other than ultraviolet (UV) treatment. The Stage 2 Rule does the following:

- Changes the method of calculating DBP regulatory compliance to a locational running annual average (LRAA) of quarterly samples, in which the system calculates a running annual average for each DBP monitoring location instead of calculating a running annual average for the entire system.
- Re-establishes the location and number of DBP monitoring sites. The rule requires systems to conduct an Initial Distribution System Evaluation (IDSE) to

select Stage 2 DBP monitoring locations in areas of the distribution system with elevated DBP levels. Additionally, the final Stage 2 DBP Rule requires systems to determine monitoring requirements based on retail population.

- Establishes DBP operational evaluation levels. Systems are to calculate a system-specific operational evaluation level which provides early warning, indicating a system could exceed the MCL within the next year. A system with an operational evaluation level greater than the MCL is required to conduct an operational evaluation, i.e., evaluating their distribution system operations to determine ways to reduce DBP levels. The system is required to notify the State of an operational evaluation level exceedance and submit evaluation results within 90 days of the exceedance.
- Consecutive systems that purchase drinking water carrying a disinfectant are required to implement Stage 2 DBP requirements on the same schedule as the largest water system in their combined distribution system.

The first step in complying with the Stage 2 D/DBP Rule is conducting an IDSE. The goal of the IDSE is to identify areas that have routinely higher DBP concentrations than other areas in the distribution system and use this information to select monitoring locations for long-term Stage 2 D/DBP compliance monitoring. The IDSE requirement can be met in four ways:

1. *Very Small System Waiver* – Systems serving less than 500 customers that qualify for this waiver are exempt from IDSE requirements.
2. *40/30 Certification* – This approach allows systems to meet the IDSE requirement by certifying that all individual Stage 1 total trihalomethanes (TTHM) and haloacetic acids (HAA5) compliance monitoring results or equivalent DBP data collected over a specified 2-year period have met the following criteria:

   $$\text{TTHM} \leq 40\ \mu g/L$$
   $$\text{HAA5} \leq 30\ \mu g/L$$

   Systems must submit the required documentation to the primacy agency.

3. *Standard Monitoring Program (SMP)* – Systems conduct 1 year of monitoring in the distribution system to identify high DBP locations. Systems must submit an SMP plan and IDSE report to the primacy agency as part of the IDSE process.
4. *System Specific Study (SSS)* -
   - SSS Using Existing Monitoring Data - Systems can meet IDSE requirements using existing monitoring data. The USEPA has established criteria that the existing data must meet in order to be used to meet the SSS requirement. Systems must submit an SSS plan and/or IDSE report to the primacy agency as part of the IDSE process.
   - SSS Using Hydraulic Model - Systems can meet IDSE requirements using a water distribution system hydraulic model. The USEPA has established criteria that the hydraulic model must meet in order to be used for IDSE compliance. Systems must submit an SSS plan and IDSE report to the primacy agency as part of the IDSE process.

Systems that are consecutive systems, purchasing some or all of their water from another system, and systems that sell water wholesale must comply with the Stage 2 Rule on the same *schedule* based on the largest system in the combined distribution system. A combined distribution system consists of the interconnected wholesale systems and

consecutive systems that receive finished water from those wholesale system(s). However, Stage 2 *sampling requirements* are based on the retail population served by each individual system, not on the combined distribution system.

Everett Status:
Everett does not meet the criteria for the Very Small System Waiver or 40/30 certification due to Everett's system size and DBP monitoring results, respectively. As a system that is part of a combined distribution system with another utility serving a retail population greater than 100,000 customers (Alderwood Water District), Everett has met and will continue to meet the compliance schedule shown in Table 7-10.

Table 7-10 Timeline for Everett's Stage 2 DBP Compliance

Milestone	Date
Final Stage 2 DBP Rule is issued	January 4, 2006
IDSE Plan due to primacy agency	October 1, 2006
Primacy agency reviews plan	Completed by October 1, 2007
Meet IDSE requirements	September 30, 2008
Submit IDSE Report	January 1, 2009
Submit Stage 2 Compliance Monitoring Plan	April 1, 2012

Compliance with the Stage 2 DBPR will be a complex process and will likely require significant planning and resources. Everett selected the standard monitoring plan (SMP) approach for the IDSE requirements of the rule and submitted its IDSE monitoring plan to EPA in September, 2006. EPA currently has the plan on file and may review it by October 1, 2007. Unless EPA requires revision, Everett will begin implementation of IDSE monitoring in mid-October 2007.

Long Term 2 Enhanced Surface Water Treatment Rule

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) was promulgated in January 2006 and became effective on March 6, 2006. This regulation applies to public water systems using surface water or groundwater under the influence of surface water sources. This rule was developed to protect drinking water consumers from microbiological pathogens, especially *Cryptosporidium*. *Cryptosporidium*, which can be found in surface water supplies, is of particular concern because it can cause cryptosporidiosis, a gastrointestinal illness that can have severe impacts on people with weakened immune systems. Additionally, *Cryptosporidium* is resistant to chlorination.

The LT2 Rule establishes the following types of requirements:

- Two distinct rounds of source water monitoring for *Cryptosporidium* and *E. coli*
- Profiling and benchmarking requirements
- Treatment technique requirements
- Microbial toolbox for meeting inactivation requirements
- Covering finished water storage facilities
- Sanitary surveys

Filtered water systems will be classified into one of four treatment categories, or bins, based on the *Cryptosporidium* monitoring results from grandfathered data or from the first two-year round of monitoring. Systems in bins associated with a higher risk for *Cryptosporidium* will be required to provide additional treatment for removal of *Cryptosporidium*. Systems may be required to add treatment to provide up to 2.5-log removal of *Cryptosporidium*, based on the requirements associated with the bin. Systems select appropriate treatment or source water management activities from the USEPA's Microbial Toolbox.

Systems that store water in open reservoirs after treatment will be required to either cover these reservoirs or provide treatment at the reservoir effluent to provide inactivation of viruses, *Giardia lamblia*, and *Cryptosporidium*.

Finally, systems will be required to conduct disinfection benchmarking when making significant changes to disinfection practices. Benchmarking aims to ensure continued compliance with both LT2 and Stage 2 Rules after implementing any necessary changes.

Systems that are consecutive systems, purchasing some or all of their water from another system, and systems that sell water wholesale must comply with the LT2 Rule on the same *schedule* based on the largest system in the combined distribution system. A combined distribution system consists of the interconnected wholesale systems and consecutive systems that receive finished water from those wholesale system(s).

Everett Status:

For the past several years, Everett has been conducting monitoring for *Cryptosporidium* and *Giardia* on a monthly basis at a tap on the plant influent sampling system. The samples were collected and analyzed using USEPA method 1623. To date, *Cryptosporidium* has been detected at low levels in only 2 of 78 samples. Originally, the monitoring was conducted to determine whether Everett would need to add any treatment under the proposed LT2. The monitoring was continued to develop data that could be grandfathered for compliance with the initial monitoring requirement of the LT2 Rule. In addition, Everett has also monitored *Cryptosporidium* and *Giardia* at the clearwell effluent and the recycled backwash water. Neither *Cryptosporidium* nor *Giardia* have been detected in the finished water or recycled backwash water samples.

Everett is currently working with the EPA and DOH to determine whether Everett's plan to convert the existing gas chlorination disinfection system to sodium hypochlorite will be considered a significant change in disinfection, per the LT2 Rule. If this is considered a significant change, Everett will be required to conduct disinfection profiling.

As a Schedule 1 system, Everett submitted to EPA and DOH in June 2006 intent to grandfather existing data, meeting the July 1, 2006 deadline. Everett submitted the grandfathered data to DOH in October 2006 and received approval of the submittal from DOH in November 2006. Everett must submit a formal bin calculation based on this data to DOH by April 1, 2009.

Table 7-11 provides a schedule of the LT2 Rule requirements for Everett.

Table 7-11 Timeline for Everett's LT2 Compliance

Milestone	Date
Final LT2 Rule is issued	January 4, 2006
Submit sample planning information or intent to use grandfathered data	July 1, 2006
Begin 24 months of monitoring (if necessary)	October 2006
Submit grandfathered data	December 1, 2006
Submit bin classification	April 1, 2009
Begin second round of monitoring	April 2015

7.8. Anticipated Drinking Water Regulations

Table 7-12 presents a list of anticipated regulations, dates (some anticipated) of regulatory milestones, and regulated parameters. In addition to these anticipated regulations, the City can track potential regulations by keeping up-to-date with the Contaminant Candidate List (CCL). The CCL is the primary source used by the USEPA for establishing priority contaminants that may face future regulation. In February 2005, the USEPA issued the second CCL, which is comprised of 51 contaminants (9 microbial and 42 chemical) included on the previous list. The CCL-2 includes at least three parameters that the drinking water industry anticipates will be regulated in the future: atrazine, methyl-t-butyl ether (MTBE), and perchlorate.

Table 7-12 Recently Promulgated Drinking Water Regulations

Regulation	Anticipated Date	Parameters
Radon Rule	Proposed: 1999 Final: 2007 or 2008	Radon
Unregulated Contaminant Monitoring Rule 2	Proposed: 2005 Final: mid-2006 Effective: 2007	Various parameters
Lead and Copper Rule Revisions	Proposed: Mid 2006	Affects how systems implement monitoring and other activities
Revised Total Coliform Rule/Distribution System Rule	Proposed: 2007	Total Coliforms Fecal Coliforms E. coli Potentially other distribution system contaminants and sources

Radon Rule

A proposed Radon Rule was released in October 1999 that provides two options for the maximum level of radon that is allowable in community water supplies. The SDWA has

directed the USEPA to propose and finalize an MCL for radon-222 in drinking water, but also to make available a higher alternative MCL (AMCL) accompanied by a multimedia mitigation (MMM) program to address radon risks in indoor air. The proposed MCL is 300 pCi/L and the proposed AMCL is 4,000 pCi/L. The drinking water standard that would apply to the City depends on whether or not the State develops an MMM program. This Rule is scheduled to be final in 2007 or 2008.

Everett Status:
Everett has conducted a significant amount of radon-222 sampling in the past to prepare for the anticipated regulation and to provide customers with information on the presence of radon-222 in Everett's drinking water supply. Between 2000 and 2005, Everett conducted radon-222 monitoring in 2001 and 2002. As would be expected for a Cascade water supply, the presence of radon-222 has not been detected in Everett's drinking water supply.

Unregulated Contaminant Monitoring Rule 2

In August 2005, the USEPA proposed a second Unregulated Contaminant Monitoring Rule (UCMR2), which includes two lists of contaminants for which some systems will be required to monitor. All public water systems serving more than 10,000 people (including both retail and wholesale customers) will be required to conduct assessment monitoring at distribution system entry points for 11 contaminants on the Assessment Monitoring List. Systems serving more than 100,000 people (including both retail and wholesale customers) and selected smaller systems will be required to conduct screening monitoring for 15 contaminants on the Screening Survey List. This list includes contaminants that will be monitored at distribution system entry points and within the distribution system. This monitoring will be required during a 12-month period between 2007 and 2009.

Everett Status:
As a system that supplies more than 500,000 retail and wholesale customers, Everett will be required to conduct monitoring for both lists for 12 months during 2007 to 2009.

Anticipated Lead and Copper Rule Revisions

The USEPA initiated a review of the LCR implementation across the nation in 2004. This effort was focused on determining whether national lead levels are increasing in the US. As a result of this effort, the USEPA identified changes to the existing regulation that would be beneficial. The minor revisions will:

- Provide limited monitoring relief for some systems that consistently have little or no lead and copper occurring at consumers' taps;
- Allow greater flexibility in the delivery of public education for systems serving 3,300 and fewer people;
- Eliminate a few system reporting requirements;
- Clarify the requirements for maintaining optimal corrosion control;
- Eliminate the LCR's rebuttable presumption that the water system controls the entire length of the lead service line; and
- Revise the information States are required to report to EPA concerning the LCR.

The minor revisions final rule also will address the issue of the continued exclusion of transient non-community water systems from LCR requirements.

Table 7-13 lists the nine areas that will be revised, according to the proposed Rule that was issued in July, 2006.

Table 7-13 Proposed Areas of LCR Revisions

Activity	Proposed Rule Revision
Monitoring	To address confusion about sample collection, the Agency is proposing to: • clarify language in the rule that speaks to the number of samples required and the number of sites from which samples should be collected. • modify definitions for monitoring and compliance periods to make it clear that all samples must be taken within the same calendar year. • revise the reduced monitoring criteria that would prevent water systems above the lead action level to remain on a reduced monitoring schedule.
Treatment Processes	The Agency is proposing a change to the rule that would require water systems to provide advanced notification to the primacy agency of intended changes in treatment or source water that could increase corrosion of lead. The state primacy agency must approve the planned changes using a process that will allow the states and water systems to take as much time as needed for systems and states to consult about potential problems.
Customer Awareness	While many water utilities indicate that they provide the results of monitoring to customers, there is no requirement in the regulations for them to do so. To address this issue, the Agency is proposing changes to the regulation that require utilities to provide a notification of tap water monitoring results for lead to owners and/or occupants of homes and buildings that are part of the utility's sampling program.
Public Education	EPA is proposing to still require water systems to deliver public education materials after a lead action level exceedance. EPA is proposing to change, however, the content of the message to be provided to consumers, how the materials are delivered to consumers, and the timeframe in which materials must be delivered. The changes to the delivery requirements include additional organizations that systems must partner with to disseminate the message to at-risk populations as well as changes in the ways information is disseminated to ensure water systems reach consumers when there is an action level exceedance. In addition to the changes in public education for the Lead and Copper Rule, EPA is proposing to modify requirements for educational statements about lead in drinking water in the annual Consumer Confidence Report.
Lead Service Line Replacement	The current regulations allow utilities to consider lead service lines that test below the action level as "replaced" for the purposes of compliance. The Agency is proposing revisions to the rule that would require these utilities to reconsider previously "tested-out" lines when resuming lead service line replacement programs.

Source: USEPA 2006. Revisions to the Regulations Controlling Lead in Drinking Water Fact Sheet http://www.epa.gov/safewater/lcrmr/fs_lcr_2006_pro-rule.html. Site updated August 24th, 2006.

Everett Status:
It is likely that the largest of the proposed revisions to Everett will be related to public notification and consumer awareness. Everett should follow developments under the proposed rule and be prepared to comply with revisions published in the final rule.

Anticipated Revised Total Coliform Rule / Distribution System Rule

As part of its 6-year review of existing regulations, the USEPA has determined the need to revise the TCR. Revisions may include requirements to address finished water quality in the distribution system as well as to evaluate additional or alternative monitoring strategies that would be more cost-effective and maintain or improve public health. As part of the USEPA's process for determining the appropriate revisions to this rule and the need for a future Distribution System Rule, a series of white papers were developed by the USEPA and other groups in 2002 to describe potential health risks in the distribution system. These papers cover the topics of:

- Intrusion
- Cross-connection control
- Aging infrastructure and corrosion
- Permeation and leaching
- Nitrification
- Biofilms and bacterial growth
- Covered storage
- Decay in water quality over time
- New or repaired water mains

In addition, the USEPA and the American Water Works Association (AWWA) are currently preparing 10 issue papers related to the development of revisions to the current TCR. These papers will cover the distribution system topics of:

- Indicators of water quality
- Effectiveness of disinfectant residuals
- Compliance with the existing TCR
- Assessment of distribution systems
- Optimization of monitoring strategies
- Hazard analysis and control strategies
- Accumulation of inorganic contaminants
- Nutrient availability
- Causes of contaminant events and positive coliform samples
- Total coliform sample invalidation

The date for a proposed revised TCR and/or Distribution System Rule is currently 2007. However, a delay is likely.

Everett Status:
It is likely that any developments with either rule will have an impact on Everett. It is quite possible that these rules will include the use and documentation of best management practices within the distribution system. Cross-connection control may be a primary focus. Everett will need to closely follow the development of these rules and should begin preparations for these revisions after the rules are proposed.

7.9. Summary of Regulatory Status

A review of Everett's monitoring and compliance procedures and water quality monitoring results indicates that Everett was in full compliance with all State and Federal regulations (with the exception of an administrative requirement associated with the Consumer Confidence Rule) during the review period. Table 7-14 summarizes Everett's regulatory status from 2000 to 2005, including regulatory requirements and recommendations for continued compliance.

Table 7-14 Summary of Applicable Regulations and Compliance Status

Regulation	Requirements	Status	Compliance?	Recommendations
Surface Water Treatment Rules	Operate treatment such that removal credit requirements are met. Meet turbidity performance criteria Monitor chlorine residuals throughout the distribution system. Maintain Watershed Control Plan.	Everett operates the Water Filtration Plant in a manner to meet removal requirements. Everett has met turbidity and chlorine requirements. Everett has a documented watershed control program.	Yes	Continue with existing monitoring. Maintain an updated watershed control plan (2006 update included in Comprehensive Water Plan Appendices).
Epichlorohydrin/ Acrylamide	Provide certification that chemicals meet ANSI/NSF Standards. Report usage to DOH.	Everett reports chemical usage to DOH and provides certificates upon request.	Yes	Prepare for changes in reporting requirements.
Filter Backwash Recycling Rule	Recycled filter backwash water must receive treatment. System must collect data on backwash water quality.	Everett's filter backwash water receives treatment. Everett maintains related filter performance data.	Yes	Continue with existing monitoring.
Phase I, II, V Rules	Monitor finished water for IOCs, SOCs, and VOCs. Monitor distribution system for asbestos.	Conducted required monitoring.	Yes	Continue with existing monitoring.

Regulation	Requirements	Status	Compliance?	Recommendations
Radionuclide Rule	Monitor for regulated radionuclides.	Conducted required monitoring	Yes	Monitor per requirements established by DOH.
Unregulated Contaminant Monitoring Rule 1	Monitor for listed contaminants.	Conducted monitoring as required.	Yes	No longer effective.
Total Coliform Rule	Written Plan; Monitoring.	Conducted required monitoring and has plan.	Yes	Update Total Coliform Monitoring Plan in 2007 to reflect changes in estimated population served.
Total Trihalomethane Rule (1)	Monitoring.	Monitored at two distribution system locations. Met MCL.	Yes	No longer effective.
Stage 1 D/DBP Rule	Written Plan; Monitoring.	Monitors at four distribution system locations quarterly, has levels below MCL, and has developed a plan.	Yes	Continue with existing monitoring.
Lead and Copper Rule	Written Plan; Monitoring.	Monitors as part of regional program. Meets action levels.	Yes	Continue working with DOH to gain approval of consolidated monitoring plan. Conduct monitoring per approved plan.
CCR and Public Notification Rules	Annual Reports. Reporting as needed.	Consumer Confidence Reports published annually.	Yes, with the exception of an administrative violation of CCR certification requirement in 2003.	Provide annual report to wholesale customers by April 1 of each year. Provide annual report to retail customers and DOH by July 1 of each year. Certify report information before October 1 of each year.

(1) This regulation was replaced with the Stage 1 D/DBP Rule in 2002.

In addition, Everett will need to continue implementation of monitoring or reporting for compliance with the Stage 2 D/DBP and LT2ESWTR rules. Once the one year revision period for EPA has passed, Everett will need to begin IDSE monitoring in October 2007. The bin calculation based on the grandfathered *Cryptosporidium* data must be reported to DOH by April 1, 2009.

Everett will need to track the progress of anticipated drinking water regulations that will affect Everett's regulatory compliance activities in the future, especially the UCMR2, Lead and Copper Rule Revisions, and the Total Coliform Rule Revisions/Distribution System Rule.

7.10. Summary of Everett's Monitoring Requirements

Table 7-15 presents a summary of water quality monitoring requirements. The table includes the parameters to be monitored, sampling location, and frequency for existing and applicable future regulations.

Table 7-15 Summary of Monitoring Requirements

Parameter	Regulatory Requirement	Location	Frequency
Existing Regulations			
Turbidity	Surface Water Treatment Rule	Before and after treatment	Continuously
Giardia lamblia inactivation	Surface Water Treatment Rule	Treatment process	Continuously
Cryptosporidium and *E. coli*	LT2 Enhanced Surface Water Treatment Rule	Prior to treatment	24 consecutive months
Chlorine Residual	Surface Water Treatment Rule	Distribution system entry point	Continuously
Chlorine Residual	Surface Water Treatment Rule and Stage 1 D/DBP	Throughout distribution system	Monthly
Filter Backwash Water Quality	Filter Backwash Recycling Rule	Treatment process	During Backwash water return
Inorganic chemicals – except asbestos	Phase II, V Rules	After treatment	Annually
Asbestos	Phase II Rule	In distribution system	Once every 9 years
Synthetic organic chemicals	Phase II, V Rules	After treatment	Every 3 years (except for waived SOCs)
Volatile organic chemicals	Phase I, II, V Rules	After treatment	Annually
Radium-226, Radium-228, gross alpha emitters, and gross beta emitters	Radionuclides Rule	After treatment	Between 2007 and 2015, per established DOH requirements
Total coliform	Total Coliform Rule	Throughout distribution system	Monthly

Parameter	Regulatory Requirement	Location	Frequency
Disinfection By-Products (TTHMs and HAA5)	Stage 1 D/DBP	Throughout distribution system	quarterly
Disinfection By-Products (TTHMs and HAA5)	Stage 2 D/DBP – IDSE requirement Stage 2 Compliance	Throughout distribution system Throughout distribution system	Depends on selected IDSE compliance approach Based on IDSE findings
Lead and copper	Lead and Copper Rule	Customers' taps throughout the distribution system	Every 3 years
pH, alkalinity, and temperature	Lead and Copper Rule	Customers' taps throughout the distribution system	Every 3 years (coinciding with tap samples)
pH	Lead and Copper Rule	Distribution system entry point	Daily
Future Regulations (known parameters)			
Radon	Radon Rule	Distribution system entry point	Annually
Assessment List Screening Survey List	UCMR2	Distribution system entry point and within distribution system (depending on parameter)	Quarterly for 1 year

8. Operations and Maintenance

8.1. Introduction

This section summarizes the operations and maintenance programs used by Everett Public Works Department to ensure performance and reliability of the potable water supply system. Updating the water operation and maintenance program is an ongoing process and formal reviews of the program have been completed as part of this CWP update.

8.2. Water Related Organization Structure and Responsibilities

The City of Everett Public Works Department is responsible for water, sewer, drainage, construction inspection, and street functions. The areas of responsibility are divided among five managers who report to the Director. Each manager has responsibilities for more than one area. For the purposes of this plan, emphasis is placed upon each position's responsibilities for the public water supply system.

8.2.1. Department Director

The Director oversees, directs, and coordinates the various activities and programs within the Public Works Department including the City's services for water, sewers, drainage, and streets and the financial and public information aspects of these services. The position also oversees the City's role in re-licensing the Jackson Project.

8.2.2. Engineering Superintendent

The Engineering Superintendent plans, organizes, staffs and manages the Engineering Division. Responsibilities involve directing projects and programs relating to engineering, planning, project management, construction management, resource management services, and GIS and records management.

8.2.3. Operations Superintendent

The Operations Superintendent plans, organizes, staffs and manages the Operations Division, consisting of the water filtration plant and associated operations. The position also oversees and manages the wastewater treatment plant. This position has direct oversight of the water quality monitoring programs, water quality compliance, addressing water quality complaints, the environmental laboratory, environmental data generation and storage, watershed protection, and water filtration plant operations and the planning/scheduling of applicable capital improvements.

8.2.4. Maintenance Superintendent

The Maintenance Superintendent plans, organizes, staffs and manages the Maintenance Division. This position is responsible for the operations, repair and maintenance of the water transmission and distribution systems including conveyance devices, reservoirs, right-of-ways, pumping systems, and the cross-connection control program.

8.2.5. Utilities Finance Manager

The Utilities Finance Manager manages and supervises the Department's financial operations, which include the utility billing department, financing and funding projects, and evaluating and proposing utility rates.

8.2.6. Public Works Information and Education Manager

The Public Works Information and Education Manager manages customer and employee communications and education programs. The position oversees the preparation of the consumer confidence report and also the water conservation program.

8.2.7. Maintenance and Operations Supervisors

Two Maintenance and Operations Supervisors (both water-related positions) report to the Maintenance Superintendent. One position focuses on construction and repair/replacement of components of the transmission and distribution systems including system piping, service connections, and other hardware. The other Maintenance and Operations Supervisor focuses more on operating the systems but also oversees some maintenance activities. This position oversees the Department's electromechanical systems including communications, instrumentation and control, and water pumping stations. The cross connection and main flushing programs are also supervised in this work group.

8.2.8. Plant Manager and Senior Water Treatment Plant Operator

The Water Filtration Plant is managed by a Plant Manager and a Senior Water Treatment Plant Operator who provide administrative management support for the water treatment facility. The facility is in operation 24 hours a day, 7 days a week. The Senior Operator meets all state requirements for supervision at a water treatment facility (DOH Class IV) and is responsible for all water treatment plant operations. The Principal Engineer oversees the plant, including the facility maintenance and capital improvement planning and implementation.

8.3. Operator Certification

The City of Everett fully complies with all laws and regulations regarding staff certification and training. All employees in responsible charge of the filter plant and distribution system

possess the required levels of DOH certification, as do most all other water-related staff members. Table 8-1 at the end of this chapter is a summary of personnel certifications and experience in water system operations and also lists our current staff responsibility. Most Water Treatment Plant Operators (WTPO) have DOH certification as Water Distribution Managers (WDM). The City requires Operators-in-Training (OIT) to achieve WTPO-1 certification within 1 year as a condition of employment. The current Senior Water Treatment Plant Operator is certified as WTPO-4 and WDM-4. All personnel are actively encouraged to achieve the highest levels of certification possible.

The City has a continuing education program to assist in the further education of its employees, which includes initial college degrees and higher levels of education. Certified employees, working in positions requiring specific certification, are required to maintain that certification. Employees are supported and encouraged to meet continuing education (CEU) requirements by attending work related classes, refresher courses, safety training, regional and national conferences and professional organization meetings. The City accomplishes this with a specific line item devoted to training in the annual operations and maintenance (O&M) budget.

8.4. System Operations

8.4.1. Source of Supply

The source of supply system includes Spada Reservoir and the associated watershed, Culmback Dam, the Power Tunnel, Sultan River Diversion Dam and Tunnel 1, the Snohomish PUD return line, and Chaplain Reservoir. Since the completion of Stage 2 of the Jackson Project, Snohomish PUD has diverted water from Spada Reservoir to the powerhouse for electrical power generation. A portion of the water used for generation is then diverted to Chaplain Reservoir and the Sultan River for water supply and maintenance of minimum in-stream flows. The Snohomish PUD is responsible for control of the water levels in Spada Reservoir and Chaplain Reservoir, based upon drinking water and power generation needs.

During normal operations, water from Spada Reservoir is held in Chaplain Reservoir prior to treatment and delivery. The Chaplain Reservoir storage volume is approximately 4.5 billion gallons. This volume provides Everett with operational flexibility in the event of complications with the Jackson Project operations or supply problems in Spada Reservoir, which prevent water from being supplied to Chaplain Reservoir. Water can be delivered to the filtration plant intake from either Chaplain Reservoir (normal operation) or by direct delivery from the Jackson Project water return line to the plant prior to entering the Chaplain Reservoir (this practice is referred to as Lake Chaplain–"PUD bypass" operations). Water can also be routed to Chaplain Reservoir from Spada Reservoir by direct release of water from Culmback Dam via the upper Sultan River through the City's river diversion facilities and to Chaplain Reservoir. This matter is discussed more fully in the Draft Water Filtration Plant Operations and Maintenance Manual (Everett Public Works, 2000) and the Everett Water System Emergency Response Program (City of Everett, 2000). Both of these documents are available at the City for review.

The primary goal of the Everett Watershed Control Program (see Appendix 6-4), as required by the Surface Water Treatment Rule and WAC 246-290-668, is protection of the high

quality Sultan Basin (Spada) and Chaplain Reservoir waters for municipal, industrial, and fish habitat uses. The Watershed Control Program identifies landowners, stakeholders, legal mechanisms for protection, pollution control measures, water quality monitoring programs, and potential threats to water quality.

The City maintains two watershed patrol positions that are responsible for monitoring activities in the Sultan Basin throughout the year. The watershed patrol focuses on activities in the watershed that have the potential to impact water quality. The patrolmen coordinate their activities closely with the Washington State Department of Natural Resources, the Washington State Department of Fish and Wildlife, the U.S. Forest Service and the Snohomish PUD. Chaplain Reservoir and all City properties in the vicinity are monitored and maintained by Everett Public Works Department personnel.

As Jackson Hydroelectric Project co-licensees, the City of Everett and Snohomish County Public Utility District No. 1 (PUD) work together to protect the Sultan Basin. Special emphasis is placed on water quality protection as specified in the Federal Energy Regulatory Commission (FERC) license. A City-PUD operating agreement addressing operation, maintenance and financial responsibilities for those Jackson Project facilities used for both water supply and hydropower production, is currently being updated.

8.4.2. Treatment Operations

The City's direct-filtration water treatment facility at Chaplain Reservoir is capable of producing peak flows of approximately 140 MGD. However, DOH has authorized Everett to operate the plant at no more than 132 MGD (as measured on a peak-hourly-flow basis). The plant is staffed 24-hours a day, 7 days a week by certified water treatment plant operators. These employees also receive after-hours calls and serve as backup to normal Public Works dispatch personnel during emergencies.

All chemical system feed rates are routinely checked and calibrated, either volumetrically or gravimetrically during each shift, when there is a change in feed rate, and when a process variable changes. Turbidity measurements and particle counting are the primary indicators of the coagulant chemical feed systems and filtration process performance. On-line turbidity meters are installed on each filter and on the clearwell effluent. On-line particle counters are installed on each filter. Streaming current monitors on the gravity and siphon-influent lines are used to monitor and adjust coagulant feed rates. Turbidity and particle counting devices are checked several times each shift by analyzing grab samples. Chlorine concentrations at the plant and clearwell effluent are monitored with on-line chlorine analyzers and by grab sample checks at least once every four hours. An auto-dialer is on-line 24 hours a day which dials the Senior Operator and the Plant Manager if the clearwell effluent chlorine residual drops below 0.4 mg/L. Fluoride levels in the clearwell effluent are monitored with an on-line analyzer and by checking finished-water grab samples once every four hours. The addition of soda ash for corrosion control is controlled by monitoring finished water pH with an on-line analyzer and grab samples four times per shift. The Draft Water Filtration Plant Operations and Maintenance Manual (Everett Public Works, 2000) provides a detailed discussion of the process and chemical feed controls and is available at the City for review.

8.4.3. Transmission Operations

The instrumentation and control systems employed at the filter plant are integrated with (rely on information from) transmission and distribution system operations. Specifically, the plant controls rely on information from key withdrawal and operating points on the transmission lines and at the transmission line terminal reservoirs. This allows for remote operation of all water transmission line flows by treatment plant operators. Transmission and distribution system personnel perform most field operations and coordinate closely with treatment plant operators. The operations and maintenance of the transmission and distribution systems are per the Everett Water Transmission and Distribution System Operations and Maintenance Manual (City of Everett and EES, 2002), which is available at the City for review.

8.4.4. Distribution System Operation

Integration of the City's wide area network (WAN), extensive water system telemetry and Wonderware allows plant operators and distribution system staff to monitor and control flows into the main distribution reservoirs and to track and store system operating information.

Water Quality Control Operators, Utility Maintenance Technicians and Pump Maintenance Mechanics conduct daily inspections and perform preventative and corrective maintenance on pump stations, reservoirs, PRVs, and other system components. These employees coordinate closely with the treatment plant operator regarding distribution system operations. Procedures follow those outlined in the Everett Water Transmission and Distribution System Operations and Maintenance Manual (City of Everett and EES, 2002).

Due to security considerations, the Everett Water Transmission and Distribution System Operations and Maintenance Manual for the distribution and transmission system is not available as a public document and is not included as part of the CWP.

The City conducts a year round (weather dependent) water main flushing program. Dead ends, zone valves, and certain known trouble areas are systematically flushed on a scheduled basis or more frequently if customer complaints indicate a need. The entire distribution system is flushed approximately every three years. Details of the flushing program are per the Everett Water Transmission and Distribution System Operations and Maintenance Manual (City of Everett and EES, 2002).

All drinking water distribution reservoirs and tanks are inspected during routine daily operating checks. Reservoir cleaning and maintenance are performed on an as-needed basis. The need is indicated when a water quality problem has been identified and/or when the routine daily and more rigorous semi-annual inspections find to a significant layer of sediment; or other debris in the reservoir. In addition, if it appears that the reservoir integrity has been compromised or a significant concern or maintenance effort is necessary the affected reservoir is then inspected more closely with a diver, or drained and inspected. All reservoirs and tanks received a thorough maintenance, structural, and safety-related inspection and evaluation in 1998 and 1999.

Since bringing the filter plant on line in 1983, and covering the distribution reservoirs in 1987, the rate of sediment accumulation in distribution reservoirs has greatly decreased. Consequently, the need for reservoir cleaning is primarily driven by maintenance and repair or reservoir integrity issues discovered during inspections.

In 1999 Everett conducted a trial cleaning of Reservoir 2 and the Upper Ridge tank using surface supplied diving teams experienced with reservoir and clean-water requirements. Everett will continue to use this approach where practical in the future.

8.4.5. Safety

The Everett Public Works Department aggressively promotes workplace health and safety and has a full time safety professional who manages the program. Additionally, each work group has a designated safety representative. Employees affected by Washington Industrial Safety and Health Act (WISHA) safety regulations are required to attend weekly tailgate safety meetings. Department and City-wide safety meetings are held monthly. Proceedings of all meetings are recorded. State and federally mandated safety training is provided for necessary employees. Special emphasis is placed on issues such as:

- Confined space entry,
- Trenching and shoring,
- Chlorine safety,
- Hazardous materials communication ("Right to Know" regulations, MSDS tracking), safe handling of hazardous materials,
- Driver education,
- Hearing testing,
- First aid/CPR,
- Heavy equipment operation,
- Working in public right of ways and traffic control,
- Use of personal protection gear, and
- Flagging and barricading.

In 1999 the Everett Public Works completed the requirements to comply with the EPAs Process Safety Management Program and Risk Management Plan.

8.4.6. Emergency Response Operations

Emergency response operations for the Everett water system are specified in a separate document entitled Everett Water System Emergency Response Program, which is available at the City for review. The program is updated continually as needed, and addresses the following elements:

- Emergency Planning and Vulnerability Analysis
- Earthquake Response
- Dam Safety and Dam Failure Emergency Action Plan
- Water Quality Emergencies
- Drought Response Plan (see Appendix 6-3)
- After Hours Call-Back Program
- Emergency Power
- Specific Emergency Operations SOPs
- Coordination with Other Agencies

Everett Public Works has assigned an FTE for emergency planning and preparedness. Everett also is an active member of a County wide emergency planning group and also has mutual aid agreements with a number of local agencies.

Current Emergency Response Plans have been issued to specific Public Works personnel. The plan includes call-out lists, emergency operations and shut down procedures, notification procedures, and contingent operation plans. The plan is not submitted with the CWP and is not available for public review.

8.5. Design and Construction Standards

Everett Public Works conducts all construction of water mains and appurtenances in accordance with City standards (Appendix 8-1), applicable American Water Works Association (AWWA) specifications and Section 7-11 of the WSDOT/APWA Standard Specifications.

These requirements are intended to meet or exceed the design and construction standards referenced in WAC 246-290. This material is intended to meet the requirements of the DOH Submittal Exception Process for distribution main construction. By qualifying for this process and following the approved procedures and standards, the City is provided a waiver from the requirement of DOH approval of individual projects.

8.6. Water Quality Operations

8.6.1. Water Quality Monitoring

Water quality monitoring is discussed in Chapter 7.

8.6.2. Backflow Prevention and Cross Connection Program

The Everett Water System Backflow Prevention Program describes the annual inspection and testing of backflow prevention devices located within the City. Public Works staff coordinates with the Building and Planning Departments, the City Clerk's Office and Industrial Pretreatment personnel to review proposed development and businesses to determine if backflow prevention is needed, and to specify and inspect the appropriate backflow prevention systems. The City also owns more than 150 backflow prevention devices (e.g. at Parks Department irrigation systems or water supplies at PW sewer lift stations) which are tested and inspected by DOH certified Public Works or Parks Department personnel.

There are approximately 4,200 privately-owned backflow prevention devices in Everett's service area. These devices are tested by private, DOH-certified, backflow assembly testers (BATs). Everett has a computerized backflow prevention device tracking system that is used to generate reminder letters to inform owners when their device is due for its annual inspection and testing. Reminders are also generated when a response is not received in the allowable time period. Failure to have the device tested can result in termination of water service. The Everett Water System Backflow Prevention Program is described in

detail in the Everett Water Transmission and Distribution System Operations and Maintenance Manual (City of Everett and EES, 2002) and is briefly summarized according to the ten minimum elements required by WAC 246-290-490 as follows:

Element 1 – Legal Authority for Cross-Connection Control Program

This element requires that a water purveyor adopt a local ordinance, resolution, code, bylaw, or other written instrument that:

1. Establishes the purveyor's legal authority to implement a CCP;
2. Describes the operating policies and technical provisions of the CCP; and
3. Presents the corrective actions that can be used to ensure customers' compliance with the CCP.

City of Everett Cross-connection Control Ordinances are in Council Files No. 14.16.470 (1988); 14.16.480 (1986); 14.16.530 (1986); and 14.20.010 through 14.20.060.

Element 2 – Evaluation of New and Existing Service Connections

This element requires each purveyor to develop and implement procedures and schedules for evaluating new and existing service connections. These evaluations must assess the degree of hazard posed by connections to the purveyor's system and property owners must be notified of the results in a timely manner. Once an initial evaluation has been conducted, service connections must be re-evaluated periodically according to a schedule acceptable to DOH and whenever there is a change in use of the premises.

The Everett Public Works Department evaluates premises for degree of hazard in accordance with the following:

1. Table 9 of WAC 246-290-490
2. Subsections (4) (d, e, and f) of WAC 246-290-490
3. The *Cross Connection Control, Accepted Procedure and Practice Manual* (most current edition), published by the Northwest Section of the American Water Works Association.

The Everett Public Works Department reviews the following for evidence of potential cross-connection issues:

- Water service applications,
- Construction plans
- Requests for water/sewer estimates
- Applications for business licenses
- Other documents which may indicate that a requirement for cross-connection control exists

Consultations with customers are conducted to help assure that all City and State requirements are met and to minimize retrofits and revisions. Water service is not provided to new construction until all cross-connection control requirements are addressed.

Element 3 - Cross-Connection Elimination, Control, and Prevention

This element requires that cross connections be eliminated whenever possible or, where they cannot be eliminated, that approved backflow assemblies commensurate with the degree of hazard be properly installed.

The Everett Public Works Department prioritizes elimination wherever practical. The type of assembly required is based on degree-of-hazard, and proper installation is required. These activities are based on the following:

- Table 8 of WAC 246-290-490
- Subsection 6 of WAC 246-290-490
- The *Cross Connection Control, Accepted Procedure and Practice Manual* (most current edition), published by the Northwest Section of the American Water Works Association
- Related sections and drawings in the most current edition of the City of Everett's Design and Construction Standards and Specifications

Element 4 - Cross Connection Control Personnel

This element requires the purveyor to ensure that personnel are provided to develop and implement the backflow prevention program. At least one must be a certified cross connection control specialist (CCS).

The Everett Public Works Department has a dedicated, full-time cross-connection control specialist (CCS). Additional personnel assist the CCS.

Element 5 – Backflow Preventer Inspection and Testing

The water purveyor must ensure that approved backflow preventers are inspected and tested for proper operation in accordance with subsection (7) of WAC 246-290-490.

The Everett Public Works Department manages inspection and testing activities in accordance with subsection (7) as required. The CCS mails testing notices to customers that own backflow preventers after initial installation and then annually. Customers are responsible for hiring a certified (private) backflow assembly tester (BAT) and to maintain their own devices. Test results must be submitted to the Everett Public Works Department.

The CCS inspects, tests, and maintains the backflow prevention devices owned by the City. The CCS inspects and approves those on vehicles that withdraw water from City of Everett fire hydrants.

Element 6 – Quality Control Assurance Program

The water purveyor is required to develop and implement a quality-control assurance program for the testing of backflow-prevention assemblies. Certified BATs are required to take steps to control the quality and reliability of their work and purveyors, such as the Everett Public Works Department, are required to assure that they do so. The program must include, at a minimum, documentation of tester certification and test kit calibration, standard

requirements for the contents of test reports, and requirements for submitting completed test reports in a timely manner.

The Everett Public Works Department manages quality assurance of testing activities in accordance with subsection (7) of WAC 246-290-490.

The CCS conducts and annual query of backflow assembly testers for copies of their certification cards before they are placed on the City of Everett's local list. The CCS further ensures that all test reports contain the required information, such as test-kit calibration dates, line pressure readings, and the presence of a pressure-regulating valve upstream of the backflow preventer.

Element 7 – Backflow Incident Response

The water purveyor is required to develop and implement procedures for responding to backflow incidents.

The Everett Public Works Department has developed such procedures. Activities include but are not limited to the following:

- The CCS organizes an in-field investigation and determines, cause, extent, need for isolation, need for public notification, method of resolution.
- Notification of management, related City departments, and regulators including the Snohomish County Health District and the Washington State Department of Health.
- Restoration of service protocols.

Element 8 – Consumer Education

This element requires a water purveyor to educate consumers about cross-connections. The Code recognizes that purveyors must have a broader public-education program and requires that the information on cross-connections be a part of it. Examples of educational materials include bill inserts, pamphlet distribution, and consumer confidence reports.

The Everett Public Works Department disseminates information on cross-connection control through consumer confidence reports and public service announcements, and, generally, as part of its larger public-education program. The following is used as a guideline:

- Cross-connection Control Program Administration, first edition, 1988 (Chapter 14); by the Cross-connection control committee of the Pacific Northwest Section of the American Water Works Association.

Element 9 – Record-keeping

This element requires purveyors to keep up-to-date records documenting cross connection efforts and information, including:

- A master list of service connections where backflow preventers are installed, as well as the assessed hazard level for the premises and the type (category) of backflow preventer(s) required for each.

- Detailed information on each individual air gap, back-flow assembly, and atmospheric vacuum breaker, including (as applicable):
  - Location
  - Date of installation
  - History of inspections with results and inspector's name
  - Product-specific data including model, size and serial number
- CCP summary reports and backflow incident reports per WAC 246-290-490.

The Everett Public Works Department maintains both paper and electronic records that contain the essential and historical information for all premises where a backflow prevention device is installed. The Information Management System also includes premises that have the potential for high-hazard conditions but no current device; documentation explains why backflow prevention is (currently) waived.

The Everett Public Works Department produces an annual cross-connection control program annual report that includes the content and forms required by the DOH. Backflow incident reports are completed for every backflow incident known to have contaminated the public water system or the potable water system within the customer's premises. Incident reports are included as part of the annual report.

Element 10 - Reclaimed Water

Under this element, purveyors that distribute and/or have facilities that receive reclaimed water within their service area must abide by additional cross connection control requirements that are imposed by the DOH under a permit issued in accordance with Chapter 90.46 RCW (reclaimed water use permits).

Currently Everett distributes reclaimed water (treated effluent from Everett's wastewater treatment plant) to the Kimberly-Clark pulp mill for use as non-contact cooling water. The volume of use varies from 0 to 8 MGD. The reuse system operates under a fully separated delivery system from Everett's potable delivery system.

By policy, Everett requires any facility receiving both reclaimed water and potable water from the Everett Public Works Department distribution system to have an air gap or reduced-pressure backflow assembly isolating it from the public system.

8.6.3. Customer Water Quality Inquiries

Everett has several staff members involved in responding to customer complaints. Water quality specialists evaluate the complaints and any patterns of complaints for indications of systemic problems, and help formulate responses. Other staff members involved include receptionists and dispatch operators, water crews, supervisors, managers and customer service specialists.

The Environmental Monitoring and Compliance group (EMC) is primarily responsible for responding to customer water quality complaints. A computerized tracking system is used, to generate a service request that documents each complaint. The request is then assigned to the EMC (for a Water Quality Technician or Analyst) for initial response and documentation. If further action is necessary the EMC will detail the necessary follow-up action on a service request and the appropriate work group supervisor will follow through.

The service request is not closed until the problem is fully resolved. All steps are tracked in a computerized maintenance management system (9RJN-CassWorks).

From January 2000 through August 2005, 870 water quality complaints and inquiries were documented. Fifty-seven percent of these calls were related to dirty water, and 20 percent were related to taste and odor problems. The remaining 23 percent were related to customers seeking specific water quality information.

Many dirty water complaints are caused by customer plumbing issues such as worn out hot-water tanks. Most dirty water and taste and odor complaints related to water system conditions are rectified by flushing the affected area. A significant number of taste and odor complaints are related to residual concentrations of free chlorine. Table 8-2 at the end of this chapter summarizes the number and nature of these customer complaints and queries.

8.7. Supplies and Equipment

8.7.1. Water Treatment Chemicals

Storage facilities for liquefied chlorine gas, liquid aluminum sulfate, polyelectrolyte coagulant aid and hydrofluorosilicic acid are sufficient for a 1- to 2-month supply. Currently, soda ash storage bins hold about two weeks of material. Longer term storage of soda ash is not recommended as the condition of the material degrades and becomes extremely difficult to handle.

8.7.2. Emergency Power Generators

The City of Everett has emergency power generation available at critical facilities in the event of an extended power failure. Details regarding emergency power generation for City staff are provided in the Everett Emergency Response Plan, which is currently on file at the City of Everett.

8.7.3. Spare Parts

Spare parts, such as valves, pipe fittings, electrical and electronic parts are kept in good supply. Most critical systems can be repaired from in-house stores. A computerized inventory system (9RJN-Cassworks) is employed to track materials usage and maintain specified stocking levels. The City of Everett Water System Emergency Response Program includes an inventory list.

8.7.4. Tools and Equipment

Common tools and equipment, such as hand tools, power tools, pumps, compressors, potable generators and shoring are kept in inventory. Most maintenance requirements can be met with stock items. The Everett Public Works Department maintains accounts with area vendors so that tools and equipment not on hand can be quickly purchased.

8.7.5. Heavy Equipment

Heavy equipment, such as backhoes, dump trucks, graders, and bulldozers, are either owned by the Public Works Department, or leased from local suppliers. Supervisors keep a list of supplier telephone numbers in the event a special piece of heavy equipment is required after normal working hours.

8.8. Maintenance

8.8.1. Maintenance Management

The administration, scheduling, tracking, evaluation and general management of the Public Works maintenance is handled with a computerized maintenance management system (9RJN-Cassworks). This system is used to document and track labor, materials, equipment, customer billings, water quality inquiries, preventive maintenance scheduling and corrective maintenance history.

8.8.2. Valve Maintenance

The water main valve maintenance program locates and ensures proper operation of the valves in Everett's distribution system. There are approximately 8,100 isolation valves in the distribution system. Procedures for maintaining valves are described in the Everett Water Transmission and Distribution System Operations and Maintenance Manual (City of Everett and EES, 2002).

8.8.3. Hydrant Maintenance

The fire hydrant maintenance program inspects and maintains hydrants for fighting fires. There are approximately 3,200 hydrants in the Everett distribution system. The Everett Fire Department has operated hydrants annually to check for proper operation and drainage. The Everett Public Works Department will perform this task starting in 2007. The Everett Public Works Department also performs repair, maintenance or replacement of hydrants as needed. Computerized records of all hydrants include: identification codes, location, manufacturer, date of installation, and static pressure. The hydrant maintenance histories recorded prior to computerization are maintained by the Public Works Department in maintenance log books. Older "scissor" style hydrants are gradually being replaced with the center stem style hydrants.

8.8.4. PRV Maintenance

Everett has 48 PRV Stations located throughout the in-city distribution system. Preventative maintenance and inspection of each PRV is performed every 12 months. The inspection includes a visual and operational check, pressure test, cleaning of the Y strainer, and adjustment and replacement of minor parts as needed. Spare parts for the PRVs are kept in inventory. PRVs are repaired when they fail.

8.8.5. Meter Maintenance/Replacement

Increasing water and sewer rates have underscored the need for more accurate and dependable water meters. This matter is most applicable for water meters 3 inches and larger. To address the need, Everett expanded its meter testing and replacement program. Up to several hundred thousand dollars per year are reserved in the O&M budget for this work. The goal of the program is to have all meters, 3 inches and larger, meet the following specifications:

- Accommodate remote and electronic reading
- Accommodate “in the ground” testing
- Possess high accuracy and dependability
- Easy to change out

To make this program more efficient, Everett purchased a water meter test van in 1999 to supplement the existing fixed base testing facility and provide for field testing of water meters.

The meter program also includes upgrading meters and meter registers with a radio frequency compatible system. Approximately 10,500 (as of October 2006) meters are capable of being read by radio; this conversion is planned to continue to capture most, if not all, of the 1-inch or smaller meters.

8.9. Information and Records Management

Everett maintains a fully equipped and staffed Information Management System (IMS). The Public Works Department supports a Wide Area Network with over 200 personal computers. The IMS is used to support maintenance management functions, GIS, CAD, SCADA, records and a mapping program.

Coliform reports from routine distribution system monitoring are kept for 10 years. Most other types of water system operating records are kept for an indefinite period. These records include, but are not limited to, the following:

- Water quality monitoring
- Records of action taken to correct maximum contaminant level (MCL) violations
- Sanitary survey data
- Records regarding a variance or exemption
- Records concerning public notification
- Treatment plant operating records
- Water quality complaints
- Flushing
- Backflow prevention records
- Maintenance and construction records
- System charts and drawings
- Vendor O&M manuals
- Personnel and legal records

8.10. O&M Improvements

O&M improvements identified below are budgeted in the O&M section of the water utility budget. Any O&M improvements that need to be capitalized appear in the CIP.

- Complete incorporation of water quality data into the new Laboratory Information Management System. This will improve record keeping, report writing and general storage/retrieval needs.
- Improve objective criteria and formal inspection schedule to determine frequency of tank and reservoir cleaning;
- Streamline dechlorination procedures, and improve equipment to reduce flushing efforts;
- Continue distribution wide “uni-directional” flushing where possible;
- Coordinate maintenance needs with capital projects; and
- Improve use of asset management program for distribution maintenance activities, such as hydrant maintenance histories.

Table 8-1

For Table 8-1, please contact the City.

Table 8-2 Water Quality Complaints 2000-2005

Year	Type of complaint	Month												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2000	*Dirty*	5	13	3	2	3	4	8	9	2	3	5	17	74
	T&O	0	2	1	5	6	6	0	3	2	2	0	2	29
	Other	5	1	6	2	4	1	3	2	3	4	3	1	35
2001	*Dirty*	10	8	23	7	5	1	7	6	89 (*)	6	9	6	177
	T&O	2	4	0	2	2	2	2	2	2	1	2	2	23
	Other	2	3	2	1	3	5	2	1	4	6	4	2	35
2002	*Dirty*	10	1	9	11	6	6	8	5	17	5	0	2	80
	T&O	10	1	3	2	3	6	3	8	1	4	4	3	48
	Other	4	1	4	2	7	5	10	2	1	4	1	3	44
2003	*Dirty*	8	7	4	15	5	3	5	4	2	5	8	5	71
	T&O	2	1	2	3	2	4	0	2	2	5	10	3	36
	Other	2	3	3	2	0	4	1	5	1	1	3	1	26
2004	*Dirty*	3	4	5	3	4	5	6	3	2	3	2	3	43
	T&O	3	4	2	1	0	5	2	3	1	4	1	2	28
	Other	4	4	3	2	4	4	3	0	3	1	5	2	35
2005	*Dirty*	6	5	9	7	3	14	3	3	0	0	0	0	50
Jan-Aug	*T&O*	0	1	0	1	1	5	0	0	0	0	0	0	8
	Other	0	0	2	0	2	5	0	4	0	0	0	0	13

(*) 87 calls recorded attributed to non routine water system operations for the bypass of Reservoir 2 for liner replacement on 9/4/01. Dispatch indicated possibly over 200 dirty water calls received associated with that incident.

9. Capital Improvement Plan

9.1. Proposed Improvements

This section discusses the proposed Capital Improvements needed to mitigate system deficiencies in source, booster pumping, storage, transmission, and distribution. Capital Improvement Plan (CIP) items discussed in this Section include those that the City of Everett has already identified and are currently included in their 20-year CIP listing as well as those identified during the analysis for the Plan. Projects needed to mitigate deficiencies which will occur within the next 6 years have been noted.

9.1.1. Source and Booster Pumping Improvements

Source and booster pumping deficiencies in Everett's water system were identified in Section 4.3. The existing surplus in source is projected to be used by 2013. Additional source of approximately 45 mgd will be needed by 2025. The City of Everett has begun the process to determine how to increase the capacity of the existing Water Filtration Plant (WFP).

Booster pumping at the Evergreen and Casino Pump Stations are currently deficient (Evergreen) or will be deficient by 2020. A schedule for increased pumping capacity is included in Section 4.3 and repeated here in Table 9-1.

Table 9-1 Suggested New Source and Booster Pumping Improvement Schedule

	Year					
	2007 (Plan Yr 1)	2012 (Plan Yr 6)	2013	2020	2026 (Plan Yr 20)	2050
Existing Source Surplus/(Deficiency) (mgd)						
Casino Tank Service Area	8.7	6.6	5.8	0.3	(4.50	(14.8)
Casino Tank and Reservoir 6 Service Area	(3.9)	(6.3)	(7.1)	(13.1)	(18.3)	(30.8)
System-wide Surplus/(Deficiency)	17.5	3.4	(0.3)	(26.3)	(48.5)	(131.1)
New Source and Booster Pumping Construction during interval (mgd) (1)						
Casino Tank Service Area	-	-	-	4.6	10.2	-
Casino Tank and Reservoir 6 Service Area	6.4	-	7.0	5.0	12.4	-
System-wide Surplus/(Deficiency)	-	-	26.3	26.3	78.6	-
Total New Source and Booster Pumping (mgd) (2)						
Casino Tank Service Area	-	-	-	4.6	14.8	14.8
Casino Tank and Reservoir 6 Service Area	6.4	6.4	13.4	18.4	30.8	30.8
System-wide Surplus/(Deficiency)	-	-	-	26.3	52.6	131.2
Source Surplus/(Deficiency) after Improvements (mgd)						
Casino Tank Service Area	8.7	6.6	5.8	4.9	10.3	0.0
Casino Tank and Reservoir 6 Service Area	2.5	0.1	6.3	5.3	12.5	0.0
System-wide Surplus/(Deficiency)	17.5	3.4	26.0	26.3	82.7	0.1

Notes:

(1) The year identified for new source or booster pumping is the latest in which it must be provided. New facilities could be constructed at an earlier time, if desired.

(2) The amount listed is a running total of the amount of new capacity, not the amount that needs to be added each year.

9.1.2. Storage Improvements

Storage deficiencies were identified in Section 4.4. This analysis assumes that the proposed modifications to the existing Casino Standpipe (demolition of the existing standpipe and installation of a new 2.0 MG elevated tank in 2007/2008) will be completed on schedule. New storage volume is needed in the Reservoir 6 Service Area outside of the 20 year planning horizon and prior to 2050. The location of the new storage has not been determined; it can be located in any of the pressure zones that have been assigned to either the Casino Tank or Reservoir 6 Service Area. Table 9-2 lists the volume of new storage and the latest year of construction.

Table 9-2 Suggested New Storage Improvement Schedule

	Year			
	2007 (Plan Yr 1)	**2012** (Plan Yr 6)	**2026** (Plan Yr 20)	**2050**
Existing Storage Surplus/(Deficiency) (MG)				
Casino Tank Service Area	2.2	(0.2)	(1.2)	(2.0)
Casino Tank and Reservoir 6 Service Area	15.5	12.1	2.9	(10.5)
System-wide Surplus/(Deficiency)	32.3	26.8	10.4	(8.1)
New Storage to be Constructed during Interval (MG) (1)				
Casino Tank Service Area	-	-	-	-
Casino Tank and Reservoir 6 Service Area	-	-	-	12.5
System-wide Surplus/(Deficiency)	-	-	-	-
Total New Storage (MG) (2)				
Casino Tank Service Area	-	-	-	-
Casino Tank and Reservoir 6 Service Area	-	-	-	12.5
System-wide Surplus/(Deficiency)	-	-	-	
Storage Surplus/(Deficiency) after Improvements (MG)				
Casino Tank Service Area	2.3	(0.2)	(1.2)	0.0
Casino Tank and Reservoir 6 Service Area	15.5	12.1	2.9	2.0
System-wide Surplus/(Deficiency)	32.3	26.8	10.4	4.4

9.1.3. Distribution Improvements and Projects

The hydraulic model has been used to evaluate Everett's water system and develop CIP projects for the distribution system. New piping has been identified to mitigate low pressures within the system during either peak hour demand or maximum day demand with fire flow conditions.

Table 9-3 shows the recommended CIP improvements for the Everett water system for the six year planning horizon. The distribution pipeline projects identified during the system analysis for the existing system and the six year planning horizon are shown graphically in Figure 9-1 and Figure 9-2, respectively. For easier viewing, the Everett water system has been divided into a grid, with twelve maps for each year of CIP projects presented (for years 2005-Existing Yr, 2012-Plan Yr 6 and 2026-Plan Yr 20). A map key is shown in the title block and the area covered in the figure is shaded orange. Each of the twelve grids is shown for each year, even if projects are not identified within that particular area of the system.

The CIP projects recommended for Yr 7 (2013) through Yr 20 (2026) are presented in Table 9-4. Figure 9-3, also at the end of this chapter, present the twenty year CIP projects

graphically. The CIP tables include construction and total project costs for distribution pipeline, transmission pipeline, source and/or treatment, pump station, PRV, reservoir storage and other projects.

Table 9-3 Capital Improvement Program - Yr 1 (2007) through Yr 6 (2012)
($ are in millions)

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
I-1	585 - 17th Ave SE, 74th St SE, Wetmore Ave, 75th St SE	Distribution Improvement	Fireflow	2006	$1.15						$0.94	$1.15	Costs are in 2006 dollars.
I-2	585 - Gold Way	Distribution Improvement	Fireflow	2006	$0.18						$0.15	$0.18	Costs are in 2006 dollars.
I-3	585 - N of 92nd Pl	Distribution Improvement	Fireflow	2006	$0.21						$0.17	$0.21	Costs are in 2006 dollars.
I-4	585 - 24th Ave SE, 96th Pl SE, 21st Dr SE	Distribution Improvement	Fireflow	2006	$1.02						$0.83	$1.02	Costs are in 2006 dollars.
I-5	585 - 91st St SE, 31st Ave SE	Distribution Improvement	Fireflow	2006	$1.14						$0.94	$1.14	Costs are in 2006 dollars.
I-6	585 - Florida Dr	Distribution Improvement	Fireflow	2006	$0.35						$0.29	$0.35	Costs are in 2006 dollars.
I-7	585 - 92nd Pl SE	Distribution Improvement	Fireflow	2006	$0.42						$0.35	$0.42	Costs are in 2006 dollars.
I-8	585 - W of 19th Ave SE	Distribution Improvement	Fireflow	2006	$0.18						$0.15	$0.18	Costs are in 2006 dollars.
I-9	585 - 60th St SE, Manor Pl	Distribution Improvement	Fireflow	2006	$0.34						$0.28	$0.34	Costs are in 2006 dollars.
I-10	585 - Fowler Ave	Distribution Improvement	Fireflow	2006	$0.43						$0.35	$0.43	Costs are in 2006 dollars.
I-11	585 - Cady Rd	Distribution Improvement	Fireflow	2006	$0.86						$0.71	$0.86	Costs are in 2006 dollars.
I-12	585 - 75th St SE	Distribution Improvement	Fireflow	2006	$0.38						$0.31	$0.38	Costs are in 2006 dollars.
I-13	Bridle Park - 52nd Pl SW, 56th St SW, 3rd Ave W	Distribution Improvement	Fireflow	2006	$0.73						$0.60	$0.73	Costs are in 2006 dollars.
I-14	Bridle Park - Viewcrest Dr, 23rd Ave W	Distribution Improvement	Fireflow	2006	$0.75						$0.61	$0.75	Costs are in 2006 dollars.
I-15	Bridle Park - Sound Ave	Distribution Improvement	Fireflow	2006	$0.58						$0.48	$0.58	Costs are in 2006 dollars.
I-16	Claremont - Madison St	Distribution Improvement	Fireflow	2006		$1.18					$0.97	$1.18	Costs are in 2006 dollars.
I-17	Claremont - Lombard Ave	Distribution Improvement	Fireflow	2006		$0.40					$0.33	$0.40	Costs are in 2006 dollars.
I-18	Claremont - Wetmore Ave	Distribution Improvement	Fireflow	2006		$0.70					$0.57	$0.70	Costs are in 2006 dollars.
I-19	Claremont - 63rd St SE	Distribution Improvement	Fireflow	2006		$0.13					$0.11	$0.13	Costs are in 2006 dollars.
I-20	Claremont - 71st Pl SE	Distribution Improvement	Fireflow	2006		$0.03					$0.02	$0.03	Costs are in 2006 dollars.
I-21	Claremont - Columbia Ave	Distribution Improvement	Fireflow	2006		$0.31					$0.26	$0.31	Costs are in 2006 dollars.
I-22	Claremont - 42nd St SW	Distribution Improvement	Fireflow	2006		$0.34					$0.28	$0.34	Costs are in 2006 dollars.
I-23	Claremont - W of Tulalip Dr	Distribution Improvement	Fireflow	2006		$0.42					$0.34	$0.42	Costs are in 2006 dollars.
I-24	Claremont - Colby Ave	Distribution Improvement	Fireflow	2006		$0.70					$0.57	$0.70	Costs are in 2006 dollars.
I-25	Claremont - Rucker Ave	Distribution Improvement	Fireflow	2006		$1.04					$0.85	$1.04	Costs are in 2006 dollars.
I-26	Claremont - College Ave	Distribution Improvement	Fireflow	2006		$0.12					$0.09	$0.12	Costs are in 2006 dollars.
I-27	Claremont - Alpine Dr	Distribution Improvement	Fireflow	2006		$0.17					$0.14	$0.17	Costs are in 2006 dollars.
I-28	Claremont - 47th St SE	Distribution Improvement	Fireflow	2006		$0.62					$0.51	$0.62	Costs are in 2006 dollars.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
I-29	Claremont - N of 46th St SE, Fowler Ave	Distribution Improvement	Fireflow	2006		$0.44					$0.36	$0.44	Costs are in 2006 dollars.
I-30	Dogwood - Seahurst Ave	Distribution Improvement	Fireflow	2006			$0.23				$0.19	$0.23	Costs are in 2006 dollars.
I-31	Dogwood - 10th Pl W, 9th Ave W	Distribution Improvement	Fireflow	2006			$0.52				$0.42	$0.52	Costs are in 2006 dollars.
I-32	High - S of W Casino Rd	Distribution Improvement	Fireflow	2006			$0.01				$0.00	$0.01	Costs are in 2006 dollars.
I-33	High - N of E Casino Rd	Distribution Improvement	Fireflow	2006			$0.23				$0.19	$0.23	Costs are in 2006 dollars.
I-34	High - Silver Way, 116th St SE, 7th Ave SE	Distribution Improvement	Fireflow	2006			$1.01				$0.83	$1.01	Costs are in 2006 dollars.
I-35	High - Kossuth Ave	Distribution Improvement	Fireflow	2006			$0.36				$0.29	$0.36	Costs are in 2006 dollars.
I-36	High - 119th St SE, 117th St SE	Distribution Improvement	Fireflow	2006			$0.36				$0.30	$0.36	Costs are in 2006 dollars.
I-37	High - 100th Pl SE	Distribution Improvement	Fireflow	2006			$0.19				$0.16	$0.19	Costs are in 2006 dollars.
I-38	High - S of W Casino Rd	Distribution Improvement	Fireflow	2006			$0.87				$0.71	$0.87	Costs are in 2006 dollars.
I-39	High - S of Veralene Way SW	Distribution Improvement	Fireflow	2006			$0.04				$0.03	$0.04	Costs are in 2006 dollars.
I-40	High - S of W Casino Rd	Distribution Improvement	Fireflow	2006			$0.54				$0.44	$0.54	Costs are in 2006 dollars.
I-41	High - Cascade Dr, Rainier Dr	Distribution Improvement	Fireflow	2006			$0.86				$0.70	$0.86	Costs are in 2006 dollars.
I-42	High - 13th Ave W	Distribution Improvement	Fireflow	2006			$0.60				$0.49	$0.60	Costs are in 2006 dollars.
I-43	High - S of E Casino Rd	Distribution Improvement	Fireflow	2006			$0.37				$0.30	$0.37	Costs are in 2006 dollars.
I-44	High - 75th St SW, Upper Ridge Rd	Distribution Improvement	Fireflow	2006			$0.58				$0.48	$0.58	Costs are in 2006 dollars.
I-45	High - 73rd St SW	Distribution Improvement	Fireflow	2006			$0.25				$0.20	$0.25	Costs are in 2006 dollars.
I-46	High - Tyee Rd	Distribution Improvement	Fireflow	2006			$0.43				$0.35	$0.43	Costs are in 2006 dollars.
I-47	High - 74th St SW	Distribution Improvement	Fireflow	2006			$0.24				$0.20	$0.24	Costs are in 2006 dollars.
I-48	High - 75th Pl SW	Distribution Improvement	Fireflow	2006			$0.21				$0.17	$0.21	Costs are in 2006 dollars.
I-49	High - 87th St SE, 10th Ave SE, 85th St SE	Distribution Improvement	Fireflow	2006			$0.47				$0.39	$0.47	Costs are in 2006 dollars.
I-50	High - 9th Ave SE	Distribution Improvement	Fireflow	2006			$0.33				$0.27	$0.33	Costs are in 2006 dollars.
I-51	Intermediate - Res 1 to Int Zone	Distribution Improvement	Fireflow	2006				$0.08			$0.07	$0.08	Costs are in 2006 dollars.
I-52	Intermediate - 35th St	Distribution Improvement	Fireflow	2006				$0.26			$0.22	$0.26	Costs are in 2006 dollars.
I-53	Intermediate - Friday Ave, Friday Ave/38th St	Distribution Improvement	Fireflow	2006				$0.64			$0.53	$0.64	Costs are in 2006 dollars.
I-54	Intermediate - Grand Ave, 42nd St SE	Distribution Improvement	Fireflow	2006				$0.59			$0.49	$0.59	Costs are in 2006 dollars.
I-55	Intermediate - 44th St SE, Hoyt Ave, W of Colby Ave	Distribution Improvement	Fireflow	2006				$0.41			$0.33	$0.41	Costs are in 2006 dollars.
I-56	Intermediate - Earl Ave	Distribution Improvement	Fireflow	2006				$0.10			$0.08	$0.10	Costs are in 2006 dollars.
I-57	Low - Tulalip Ave	Distribution Improvement	Fireflow	2006				$0.23			$0.19	$0.23	Costs are in 2006 dollars.
I-58	Low - Smith Ave	Distribution Improvement	Fireflow	2006				$0.98			$0.80	$0.98	Costs are in 2006 dollars.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
I-59	Low - Oakes Ave	Distribution Improvement	Fireflow	2006				$0.32			$0.26	$0.32	Costs are in 2006 dollars.
I-60	Low - N of 9th St	Distribution Improvement	Fireflow	2006				$0.01			$0.01	$0.01	Costs are in 2006 dollars.
I-61	Low - McDougall Ave	Distribution Improvement	Fireflow	2006				$0.62			$0.51	$0.62	Costs are in 2006 dollars.
I-62	Low - Rainier Ave, Jade Ave	Distribution Improvement	Fireflow	2006				$0.63			$0.52	$0.63	Costs are in 2006 dollars.
I-63	Low - Baker Ave	Distribution Improvement	Fireflow	2006				$0.30			$0.25	$0.30	Costs are in 2006 dollars.
I-64	Low - W of Alverson Blvd	Distribution Improvement	Fireflow	2006				$0.70			$0.58	$0.70	Costs are in 2006 dollars.
I-65	Low - 26th St	Distribution Improvement	Fireflow	2006				$0.18			$0.14	$0.18	Costs are in 2006 dollars.
I-66	Low - 25th St	Distribution Improvement	Fireflow	2006				$0.14			$0.11	$0.14	Costs are in 2006 dollars.
I-67	Low - 24th St, State St	Distribution Improvement	Fireflow	2006				$0.33			$0.27	$0.33	Costs are in 2006 dollars.
I-68	Low - Butler St, Pilchuck Path	Distribution Improvement	Fireflow	2006				$0.23			$0.19	$0.23	Costs are in 2006 dollars.
I-69	Low - Butler St	Distribution Improvement	Fireflow	2006				$0.17			$0.14	$0.17	Costs are in 2006 dollars.
I-70	Lowell - S 3rd Ave, S 4th Ave	Distribution Improvement	Fireflow	2006	$0.35						$0.29	$0.35	Costs are in 2006 dollars.
I-71	Lowell - S 2nd Ave	Distribution Improvement	Fireflow	2006	$0.76						$0.62	$0.76	Costs are in 2006 dollars.
I-72	Madison - Highland Rd	Distribution Improvement	Fireflow	2006	$0.53						$0.43	$0.53	Costs are in 2006 dollars.
I-73	Madison - Beverly Ln	Distribution Improvement	Fireflow	2006	$0.95						$0.78	$0.95	Costs are in 2006 dollars.
I-74	Madison - Pecks Dr, East Dr, 58th St SE	Distribution Improvement	Fireflow	2006	$1.45						$1.19	$1.45	Costs are in 2006 dollars.
I-75	Madison - East Dr	Distribution Improvement	Fireflow	2006	$0.63						$0.52	$0.63	Costs are in 2006 dollars.
I-76	Madison - West Dr	Distribution Improvement	Fireflow	2006	$0.48						$0.39	$0.48	Costs are in 2006 dollars.
I-77	Valley View - I-5 Crossing	Distribution Improvement	Fireflow	2006		$0.15					$0.13	$0.15	Costs are in 2006 dollars.
I-78	Valley View - Heather Way	Distribution Improvement	Fireflow	2006		$0.52					$0.43	$0.52	Costs are in 2006 dollars.
I-79	Valley View - Heather Way	Distribution Improvement	Fireflow	2006		$0.25					$0.21	$0.25	Costs are in 2006 dollars.
I-80	Valley View - Sunrise Dr, Juniper Dr	Distribution Improvement	Fireflow	2006		$0.62					$0.51	$0.62	Costs are in 2006 dollars.
I-81	Valley View - Panaview Blvd, Ridgewood Dr	Distribution Improvement	Fireflow	2006		$0.37					$0.30	$0.37	Costs are in 2006 dollars.
I-82	Valley View - Timber Hill Dr	Distribution Improvement	Fireflow	2006		$0.47					$0.38	$0.47	Costs are in 2006 dollars.
I-83	Valley View - Larlin Dr, Hamlet Ln	Distribution Improvement	Fireflow	2006		$0.44					$0.36	$0.44	Costs are in 2006 dollars.
I-84	Valley View - E of Hamlet Ln	Distribution Improvement	Fireflow	2006		$0.07					$0.06	$0.07	Costs are in 2006 dollars.
I-85	View Drive - S of 52nd St SE, Broadway	Distribution Improvement	Fireflow	2006			$0.34				$0.28	$0.34	Costs are in 2006 dollars.
I-86	View Ridge - 33rd Ave W	Distribution Improvement	Fireflow	2006			$0.09				$0.07	$0.09	Costs are in 2006 dollars.
I-87	View Ridge - Alki Dr	Distribution Improvement	Fireflow	2006			$0.26				$0.21	$0.26	Costs are in 2006 dollars.
I-88	View Ridge - Chinook Dr	Distribution Improvement	Fireflow	2006			$0.20				$0.16	$0.20	Costs are in 2006 dollars.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
I-501	585 - 74th St SE	Distribution Improvement	Fireflow	2011				$1.25			$1.02	$1.25	Costs are in 2006 dollars.
I-502	585 - College Ave	Distribution Improvement	Fireflow	2011				$0.15			$0.13	$0.15	Costs are in 2006 dollars.
I-503	Bridle Park - E of Seaview Way	Distribution Improvement	Fireflow	2011				$0.10			$0.08	$0.10	Costs are in 2006 dollars.
I-504	Bridle Park - Hillside Ln	Distribution Improvement	Fireflow	2011				$0.20			$0.16	$0.20	Costs are in 2006 dollars.
I-505	Claremont - McDougall Ave	Distribution Improvement	Fireflow	2011				$0.35			$0.28	$0.35	Costs are in 2006 dollars.
I-506	Claremont - Jefferson Ave/75th St SE	Distribution Improvement	Fireflow	2011				$0.70			$0.58	$0.70	Costs are in 2006 dollars.
I-507	Claremont - Crescent Ave	Distribution Improvement	Fireflow	2011				$0.73			$0.59	$0.73	Costs are in 2006 dollars.
I-508	Claremont - 50th St SE, Claremont Way, Rucker Ave	Distribution Improvement	Fireflow	2011				$0.94			$0.77	$0.94	Costs are in 2006 dollars.
I-509	Claremont - Maryland Ave	Distribution Improvement	Fireflow	2011				$0.30			$0.24	$0.30	Costs are in 2006 dollars.
I-510	Claremont - 73rd St SE, Colby Ave	Distribution Improvement	Fireflow	2011				$0.95			$0.78	$0.95	Costs are in 2006 dollars.
I-511	Claremont - Jefferson Pl	Distribution Improvement	Fireflow	2011				$0.10			$0.09	$0.10	Costs are in 2006 dollars.
I-512	Claremont - E of College Ave, 48th St SE, Fowler Ave	Distribution Improvement	Fireflow	2011				$1.35			$1.11	$1.35	Costs are in 2006 dollars.
I-513	Claremont - Fowler Ave, E of Federal Ave	Distribution Improvement	Fireflow	2011				$0.43			$0.35	$0.43	Costs are in 2006 dollars.
I-514	Claremont - 70th Pl SE	Distribution Improvement	Fireflow	2011				$0.12			$0.10	$0.12	Costs are in 2006 dollars.
I-515	Dogwood - PRV AV296/AV492	Distribution Improvement	Fireflow	2011					$0.04		$0.03	$0.04	Costs are in 2006 dollars.
I-516	Dogwood - PRV AV296/AV492, 13th Ave W	Distribution Improvement	Fireflow	2011					$0.34		$0.27	$0.34	Costs are in 2006 dollars.
I-517	Dogwood - 13th Ave W, Harbor Ln	Distribution Improvement	Fireflow	2011					$1.43		$1.17	$1.43	Costs are in 2006 dollars.
I-518	Dogwood - 54th St SW	Distribution Improvement	Fireflow	2011					$0.12		$0.10	$0.12	Costs are in 2006 dollars.
I-519	High - 110 Pl SE	Distribution Improvement	Fireflow	2011					$0.02		$0.02	$0.02	Costs are in 2006 dollars.
I-520	High - S of Barbara Ln	Distribution Improvement	Fireflow	2011					$0.01		$0.01	$0.01	Costs are in 2006 dollars.
I-521	High - E of Hardeson Rd	Distribution Improvement	Fireflow	2011					$1.17		$0.96	$1.17	Costs are in 2006 dollars.
I-522	High - 1st Ave SE, 110th Pl SE, 1st Dr SE	Distribution Improvement	Fireflow	2011					$0.62		$0.51	$0.62	Costs are in 2006 dollars.
I-523	High - 10272, Xavier Way	Distribution Improvement	Fireflow	2011					$0.86		$0.71	$0.86	Costs are in 2006 dollars.
I-524	High - Bruskrud Rd	Distribution Improvement	Fireflow	2011					$0.40		$0.33	$0.40	Costs are in 2006 dollars.
I-525	High - SE Everett Mall Way	Distribution Improvement	Fireflow	2011					$0.49		$0.40	$0.49	Costs are in 2006 dollars.
I-526	Intermediate - 39th St	Distribution Improvement	Fireflow	2011					$0.15		$0.12	$0.15	Costs are in 2006 dollars.
I-527	Lake - 129th St SE	Distribution Improvement	Fireflow	2011					$0.11		$0.09	$0.11	Costs are in 2006 dollars.
I-528	Lake - 131st St SE, 10th Dr SE	Distribution Improvement	Fireflow	2011					$0.93		$0.77	$0.93	Costs are in 2006 dollars.
I-529	Lake - 8th Pl SE	Distribution Improvement	Fireflow	2011					$0.52		$0.42	$0.52	Costs are in 2006 dollars.
I-530	Lake - 124th St SE, 5th Ave SE	Distribution Improvement	Fireflow	2011					$0.60		$0.49	$0.60	Costs are in 2006 dollars.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
I-531	Lake - 10th Dr SE	Distribution Improvement	Fireflow	2011					$0.37		$0.30	$0.37	Costs are in 2006 dollars.
I-532	Lake - 12th Pl SE, SR 96	Distribution Improvement	Fireflow	2011					$0.50		$0.41	$0.50	Costs are in 2006 dollars.
I-533	Lake - Andrew Slater Rd	Distribution Improvement	Fireflow	2011					$0.31		$0.26	$0.31	Costs are in 2006 dollars.
I-534	Low - E of Chestnut St	Distribution Improvement	Fireflow	2011						$0.72	$0.59	$0.72	Costs are in 2006 dollars.
I-535	Low - Hoyt Ave	Distribution Improvement	Fireflow	2011						$0.85	$0.70	$0.85	Costs are in 2006 dollars.
I-536	Low - Highland Ave, 21st St	Distribution Improvement	Fireflow	2011						$1.48	$1.21	$1.48	Costs are in 2006 dollars.
I-537	Low - W Marine View Dr	Distribution Improvement	Fireflow	2011						$0.07	$0.06	$0.07	Costs are in 2006 dollars.
I-538	Low - 16th St	Distribution Improvement	Fireflow	2011						$0.00	$0.00	$0.00	Costs are in 2006 dollars.
I-539	Lowell - S 2nd Ave	Distribution Improvement	Fireflow	2011						$3.24	$2.66	$3.24	Costs are in 2006 dollars.
I-540	Lowell - Lowell Main St	Distribution Improvement	Fireflow	2011						$0.06	$0.05	$0.06	Costs are in 2006 dollars.
I-541	Madison - W Beech St, Gateway Terrace	Distribution Improvement	Fireflow	2011						$0.24	$0.20	$0.24	Costs are in 2006 dollars.
I-542	Madison - W Magnolia Ave	Distribution Improvement	Fireflow	2011						$0.29	$0.24	$0.29	Costs are in 2006 dollars.
I-543	View Ridge - PRV AV60, Harbor Lane	Distribution Improvement	Fireflow	2011						$0.97	$0.79	$0.97	Costs are in 2006 dollars.
I-544	View Ridge - Lamar Dr	Distribution Improvement	Fireflow	2011						$0.23	$0.18	$0.23	Costs are in 2006 dollars.
I-545	View Ridge - Sound Ave	Distribution Improvement	Fireflow	2011						$0.40	$0.33	$0.40	Costs are in 2006 dollars.
I-546	View Ridge - W Mukilteo Blvd	Distribution Improvement	Fireflow	2011						$0.21	$0.18	$0.21	Costs are in 2006 dollars.
I-547	View Ridge - Gibson Pl	Distribution Improvement	Fireflow	2011						$0.12	$0.10	$0.12	Costs are in 2006 dollars.
I-548	View Ridge - Crown Dr	Distribution Improvement	Fireflow	2011						$0.81	$0.67	$0.81	Costs are in 2006 dollars.
I-549	View Ridge - England Ave	Distribution Improvement	Fireflow	2011						$0.26	$0.21	$0.26	Costs are in 2006 dollars.
I-550	View Ridge - Seahurst Ave	Distribution Improvement	Fireflow	2011						$0.70	$0.58	$0.70	Costs are in 2006 dollars.
I-551	View Ridge - E View Ridge Dr	Distribution Improvement	Fireflow	2011						$0.48	$0.39	$0.48	Costs are in 2006 dollars.
I-552	View Ridge - W Mukilteo Dr	Distribution Improvement	Fireflow	2011						$0.39	$0.32	$0.39	Costs are in 2006 dollars.
				SUBTOTAL	$13.87	$9.49	$9.59	$14.59	$8.99	$11.52		$28.18	
D-401	112th Street Improvements	Distribution Project	Demand	2009	$0.70	$0.10	$0.75					$1.55	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
D-402	Water Dist System Improvements "G" (EMVD)	Distribution Project	Demand	2009	$0.50	$0.95	$0.82					$2.27	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
D-403	Water Main Replacement "J" (UP 3263)	Distribution Project	Demand	2008		$0.44						$0.44	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
D-404	Cathodic Protection - Bonding Pipelines	Distribution Project	Maintenance	NA	$0.50	$0.50	$0.50	$0.50	$0.53	$0.55		$3.08	
D-405	Water Dist System Improvements - General	Distribution Project	Demand	NA			$0.10	$1.50	$2.00	$2.00		$5.60	
				SUBTOTAL	$1.70	$1.99	$2.17	$2.00	$2.53	$2.55		$12.94	
O-1	Fish Barrier Removal on P/L R/W	Other	Environmental	2013					$0.12	$0.12		$0.24	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-2	Jackson Project Re-Licensing	Other	Regulatory	2011					$6.00			$6.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
O-3	Diversion Dam Road Culvert at Chaplain Creek	Other	Environmental	2011				$0.02	$0.28			$0.30	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-4	Riverfront (O/M) Site Development	Other	Demand	2010	$0.10	$1.00	$2.00	$2.00				$5.10	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-5	Security Improvements at WFP and Reservoir 3	Other	Operational	2010		$0.60	$0.20	$0.13				$0.93	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-6	Tribal Settlement (Fund 451)	Other	Legal	2008	$1.20	$2.80						$4.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-7	Water - Comprehensive Plan	Other	Planning	NA	$0.10				$0.42	$0.42		$0.94	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
				SUBTOTAL	$1.40	$4.40	$2.20	$2.15	$6.82	$0.54		$17.51	
PS-1	Evergreen Way Pump Station Improvements	Pump Station	Operational	2010		$0.10	$1.30	$1.45				$2.85	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
PS-2	Additional Pump Capacity (6.4 mgd) at Evergreen PS	Pump Station	Operational	2011			$0.47	$0.99	$0.52			$1.98	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
PS-3	Additional Pump Capacity (7.0 mgd) at Evergreen PS	Pump Station	Operational	2013					$0.56	$1.18		$1.74	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
				SUBTOTAL	$0.00	$0.10	$1.77	$2.44	$1.08	$1.18		$6.57	
RS-1	Water Tanks - Rehabilitation	Reservoir Storage	Operational	2012	$3.20	$5.00	$5.00	$0.40	$4.46	$2.25		$20.31	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
RS-2	Panther Creek Improvements	Reservoir Storage	Operational	2011			$0.35	$1.00	$2.50			$3.85	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
RS-3	Reservoir 3 Relining	Reservoir Storage	Maintenance	2008		$0.75						$0.75	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
				SUBTOTAL	$3.20	$5.75	$5.35	$1.40	$6.96	$2.25		$24.91	
ST-1	Chaplain Reservoir Inflow Diverter	Souce/Treatment	Operational	2011				$0.12	$1.38			$1.50	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-2	Groundwater Supply 2 MGD	Source/Treatment	Demand	2012					$0.30	$0.30		$0.60	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-3	Portal 3 Relocation	Source/Treatment	Operational	2009	$0.11	$1.00	$1.60					$2.71	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-4	Portal 4/6 Area Security Improvements	Source/Treatment	Operational	2008		$0.60						$0.60	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-5	WFP Clearwell No. 1 Baffling	Source/Treatment	Operational	2011				$0.05	$0.35			$0.40	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-6	WFP Clearwell No. 2	Source/Treatment	Operational	2009		$8.90	$6.60					$15.50	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-7	WFP Flocculator Reconstruction	Source/Treatment	Operational	2009	$0.50	$0.50	$0.50					$1.50	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-8	WFP Washwater Pond Discharge	Source/Treatment	Operational	2009		$0.50	$6.50					$7.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-9	Additional 26.3 MGD Capacity at Water Filtration Plant	Source/Treatment	Demand	2013				$4.00	$8.00	$16.00		$28.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-10	WFP - Raw Water Intake	Source/Treatment	Operational	2010		$0.20	$0.50	$7.00				$7.70	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-11	WFP - Clearwell Structural Improvements	Source/Treatment	Operational	2011				$0.39	$1.52			$1.91	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-12	WFP - I&C Upgrade	Source/Treatment	Operational	2010				$0.49				$0.49	
				SUBTOTAL	$0.61	$11.70	$15.70	$12.05	$11.55	$16.30		$67.91	
T-1	Pipeline #2 and #3 Replacement PH 6-12 and PH 14	Transmission	Maintenance	2024	$2.00	$12.74	$13.50	$7.00	$10.00	$7.00		$52.24	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
T-2	Pipeline #5 Cross Dike	Transmission	Maintenance	2010	$0.30	$0.50	$2.00	$2.00				$4.80	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
T-3	Pipeline #5 Line Replacement at Pilchuck River	Transmission	Maintenance	2009	$0.10	$0.20	$2.60					$2.90	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.

Project ID	Project Name	Type of Project	Justification for Project	Date To Be Online	2007	2008	2009	2010	2011	2012	Construction Cost	2007-2012 Total Project Cost	Notes
T-4	Water Transmission Pipeline Repairs	Transmission	Maintenance	2012			$0.25	$0.60	$1.90	$0.60		$3.35	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
				SUBTOTAL	$2.40	$13.44	$18.35	$9.60	$11.90	$7.60		$63.29	
				TOTAL [1]	**$9.31**	**$37.38**	**$45.54**	**$29.64**	**$40.84**	**$30.42**		**$193.13**	

Notes:

(1) Total does not include costs for distribution system improvements (Projects I-1 through I-88 and I-500 through I-552). These projects were developed from modeling analysis and will be constructed as funding is available from the general water system improvements fund.

Table 9-4 Capital Improvement Program - Yr 7 (2013) through Yr 20 (2026)
($ are in millions)

Project ID	Project Name	Type of Project	Justification for Project	Total Length of New 8-inch Pipe (ft)	Total Length of New 10-inch Pipe (ft)	Total Length of New 12-inch Pipe (ft)	Total Length of New Pipe (ft)	Date To Be Online	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Construction Cost	2013-2026 Total Project Cost [2]	Notes
I-600	Bridle Park - 56th St SW	Distribution Improvement	Fireflow	874	-	-	874	2025											$0.38				$0.31	$0.38	Costs are in 2006 dollars.
I-601	Bridle Park - Ocean Ave, 52nd Pl SW	Distribution Improvement	Fireflow	882	-	-	882	2025											$0.38				$0.31	$0.38	Costs are in 2006 dollars.
I-602	Bridle Park - 54th St SW	Distribution Improvement	Fireflow	-	1,023	-	1,023	2025											$0.47				$0.38	$0.47	Costs are in 2006 dollars.
I-603	Bridle Park - Seaview Way	Distribution Improvement	Fireflow	-	500	-	500	2025											$0.23				$0.19	$0.23	Costs are in 2006 dollars.
I-604	Bridle Park - 52nd Pl SW	Distribution Improvement	Fireflow	815	-	-	815	2025											$0.35				$0.29	$0.35	Costs are in 2006 dollars.
I-605	Claremont - 47th St SE, Colby Ave	Distribution Improvement	Fireflow	796	441	-	1,237	2025											$0.54				$0.44	$0.54	Costs are in 2006 dollars.
I-606	High - 73rd St SW, 7th Dr W	Distribution Improvement	Fireflow	809	-	-	809	2025												$0.35			$0.28	$0.35	Costs are in 2006 dollars.
I-607	High - 10th Dr SE	Distribution Improvement	Fireflow	415	-	-	415	2025												$0.18			$0.15	$0.18	Costs are in 2006 dollars.
I-608	Lake - 100th Pl SE	Distribution Improvement	Fireflow	354	-	-	354	2025												$0.15			$0.12	$0.15	Costs are in 2006 dollars.
I-609	Lake - Freeway Pl, 124th St SE, Andrew Slater Rd, Watts Rd	Distribution Improvement	Fireflow	-	-	1,894	1,894	2025												$0.91			$0.74	$0.91	Costs are in 2006 dollars.
I-610	Lake - 129th St SE	Distribution Improvement	Fireflow	1,110	-	-	1,110	2025												$0.48			$0.39	$0.48	Costs are in 2006 dollars.
I-611	Low - Virginia Ave	Distribution Improvement	Fireflow	723	-	-	723	2025												$0.31			$0.25	$0.31	Costs are in 2006 dollars.
I-612	Low - N of Everett Ave	Distribution Improvement	Fireflow	-	61	-	61	2025												$0.03			$0.02	$0.03	Costs are in 2006 dollars.
I-613	Madison - Sunset Ln, 50th St SW	Distribution Improvement	Fireflow	825	405	-	1,230	2025													$0.54		$0.44	$0.54	Costs are in 2006 dollars.
I-614	Ring Creek - E of Hardeson Rd	Distribution Improvement	Fireflow	283	-	-	283	2025													$0.12		$0.10	$0.12	Costs are in 2006 dollars.
I-615	Ring Creek - Industry St	Distribution Improvement	Fireflow	17	-	-	17	2025													$0.01		$0.01	$0.01	Costs are in 2006 dollars.
I-616	Stratton Hills - 25th Ave W	Distribution Improvement	Fireflow	-	1,187	-	1,187	2025													$0.54		$0.44	$0.54	Costs are in 2006 dollars.
I-617	View Drive - W View Dr	Distribution Improvement	Fireflow	538	-	-	538	2025													$0.23		$0.19	$0.23	Costs are in 2006 dollars.
								SUBTOTAL	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.35	$2.41	$1.44	$0.00		$6.20	
D-404	Cathodic Protection - Bonding Pipelines	Distribution Project	Maintenance	-	-	-	-	NA	$0.58	$0.61	$0.64	$0.67	$0.70	$0.74	$0.77	$0.81	$0.85	$0.89	$0.94	$0.98	$1.03	$1.09		$11.30	
D-405	Water Dist System Improvements - General	Distribution Project	Maintenance	-	-	-	-	NA	$2.00	$2.00	$2.00	$2.00	$2.00	$3.50	$3.50	$3.50	$3.50	$3.50	$5.00	$5.00	$5.00	$5.00		$47.50	
D-406	Metering	Distribution Project	Operational	-	-	-	-	2016			$7.70	$8.70												$16.40	
								SUBTOTAL	$2.58	$2.61	$10.34	$11.37	$2.70	$4.24	$4.27	$4.31	$4.35	$4.39	$5.94	$5.98	$6.03	$6.09		$75.20	
O-1	Fish Barrier Removal on P/L R/W	Other	Environmental	-	-	-	-	2013	$0.12															$0.12	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
O-7	Water - Comprehensive Plan	Other	Planning	-	-	-	-	NA					$0.56	$0.56					$0.75	$0.75				$2.62	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
								SUBTOTAL	$0.12	$0.00	$0.00	$0.00	$0.56	$0.56	$0.00	$0.00	$0.00	$0.00	$0.75	$0.75	$0.00	$0.00		$2.74	
PRV-1	Valve House No. 2 Replacement	PRV	Structural	-	-	-	-	2014	$0.07	$0.70														$0.77	
								SUBTOTAL	$0.07	$0.70	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00		$0.77	
PS-3	Additional Pump Capacity (7.0 mgd) at Evergreen PS	Pump Station	Operational	-	-	-	-	2013	0.62															$0.62	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
PS-4	Additional Pump Capacity (5.0 mgd) at Evergreen Pump Station	Pump Station	Operational	-	-	-	-	2020						$0.58	$1.22	$0.64								$2.44	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
PS-5	Additional Pump Capacity (12.4 mgd) at Evergreen Pump Station	Pump Station	Operational	-	-	-	-	2026												$1.73	$3.64	$1.91		$7.28	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.

Project ID	Project Name	Type of Project	Justification for Project	Total Length of New 8-inch Pipe (ft)	Total Length of New 10-inch Pipe (ft)	Total Length of New 12-inch Pipe (ft)	Total Length of New Pipe (ft)	Date To Be Online	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Construction Cost	2013-2026 Total Project Cost [1]	Notes
PS-6	Additional Pump Capacity (4.6 mgd) at Casino Pump Station	Pump Station	Operational	-	-	-	-	2020						$0.55	$1.16	$0.61								$2.32	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
PS-7	Additional Pump Capacity (2.0 mgd) at Casino Pump Station	Pump Station	Operational	-	-	-	-	2026												$0.36	$0.75	$0.39		$1.50	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
								SUBTOTAL	$0.62	$0.00	$0.00	$0.00	$0.00	$1.13	$2.38	$1.25	$0.00	$0.00	$0.00	$2.09	$4.39	$2.30		$14.16	
ST-9	Additional 26.3 MGD Capacity at Water Filtration Plant	Source/Treatment	Demand	-	-	-	-	2013	$30.00															$30.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-13	Diversion Tunnel #1 Rehab	Source/Treatment	Maintenance	-	-	-	-	2017			$1.00	$5.00	$5.00											$11.00	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-14	WFP Maintenance Building	Source/Treatment	Operational	-	-	-	-	2017				$0.50	$3.00											$3.50	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
ST-15	Additional 26.3 MGD Capacity at Water Filtration Plant	Source/Treatment	Demand	-	-	-	-	2018			$1.68	$3.54	$5.57	$7.80										$18.59	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
								SUBTOTAL	$30.00	$0.00	$2.68	$9.04	$13.57	$7.80	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00		$63.09	
T-1	Pipeline #2 and #3 Replacement PH 6-12 and PH 14	Transmission	Maintenance	-	-	-	-	2024	$8.00	$7.00		$14.02	$9.87	$9.87	$13.02	$13.02	$20.30	$20.30	$36.16	$36.16				$187.72	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
T-5	Cross Tie Transmission Line (TL – PH 13)	Transmission	Reliability	-	-	-	-	2015	$1.87	$8.10	$7.79													$17.76	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
T-6	Everett-Seattle Intertie Pipeline	Transmission	Reliability	-	-	-	-	2026										$27.59	$27.59	$27.59	$27.59	$27.59		$137.95	2006 costs are escalated 7% per Yr (08/09) & 5% per Yr post 09.
								SUBTOTAL	$9.87	$15.10	$7.79	$14.02	$9.87	$9.87	$13.02	$13.02	$20.30	$47.89	$63.75	$63.75	$27.59	$27.59		$343.43	
								TOTAL [2]	**$43.26**	**$18.41**	**$20.81**	**$34.43**	**$26.70**	**$23.60**	**$19.67**	**$18.58**	**$24.65**	**$52.28**	**$70.44**	**$72.57**	**$38.01**	**$35.98**		**$499.39**	

Notes:
(1) For capital improvement projects for Yr 1 (2007) through Yr 6 (2012) of the planning horizon, please refer to Table 9-3.
(2) Total does not include costs for distribution system improvements (Projects I-600 through I-618). These projects were developed from modeling analysis and will be constructed as funding is available from the general water system improvements fund.

9.2. Capital Improvement Data Base

A database of proposed capital improvements has been developed using Microsoft Access® database. The database includes a project input form that describes the project type, name, description, justification, and schedule. It also has a section to approximate the project complexity of permitting, design and construction as well as funding allocations. A dialog window within the database provides a map that shows the approximate vicinity of the project within the Everett distribution system.

The database is organized into the following project types: Controls/SCADA, distribution improvement, distribution project, PRV, pump station, reservoir storage, source/treatment, transmission pipe and other categories. A project can include a number of different kinds of features. For example a project designated as a "pump station" may include both a pump station and pipe within the project.

A database scheduling feature allows the user to enter the desired project on-line date and anticipated durations (in months) for construction, design, permitting, and predesign. The database will then use this information to calculate the dates (month and year) to start permitting and design and construction to meet the desired project on-line date.

The input form includes a project prioritization section so that each project can be scored and then prioritized based upon criteria like providing level of services, meeting capacity/growth, and regulatory compliance.

The database will provide both project lists and individual project reports. Individual project reports include descriptive information as well as schedule to start design and permitting, start of construction and on-line dates. Each project report also includes a current construction and project cost as well as an escalated construction year project cost.

Project CIP listing reports can be also be obtained by sorting the database by one of several criteria; including online date, project ID, project cost, priority rank, or project name. The database has been developed as a flexible tool for City of Everett staff to use for planning and funding of a CIP that will meet and or exceed system needs over the next 20 years.

9.3. Cost Estimates

Planning level opinion of construction and project costs have been developed for each of the recommended improvements listed in the tables above, based on Year 2006 dollars. The costs are based on available information at the time of publication of this document and can be expected to vary from 30 percent less to 50 percent more than the estimates provided. The final costs will depend on project specific costs associated with actual labor and material costs, site conditions, productivity, competitive market conditions, final project scope, implementation schedule, and other variables.

The costs were developed using approximate planning level unit costs in addition to allowances for indirect costs, which were calculated as a percentage of the construction cost. The construction and indirect costs are summed to determine a total project cost for Year 2006. Because all costs are provided in Year 2006 dollars, future costs must be adjusted to account for the effects of inflation and prevailing construction market conditions at the time of construction. Table 9-5 shows the unit costs and indirect costs used in developing project costs in the CIP.

Table 9-5 Distribution System Cost Estimate Factors

Construction Costs (Ductile Iron Pipe)	
Pipe Diameter (Inches)	**2006 Installed Cost ($/foot)**
6	$60
8	$70
10	$75
12	$80
16	$85
18	$95
24	$120
30	$150
36	$180
40	$200
Indirect Costs (Percentages of Construction Cost)	
City Project Administration	3 %
Permitting	3 % (average) to 6 % (complex)
Design (including survey and geotech)	10 % (average) to 15 % (complex)
Construction Services	6 % (average) to 12 % (complex)
Contractor Mobilization	10 %
Construction Contingency	50 %
State Sales Tax	8.6 %

Project information and costs were provided by the City of Everett for several of the non-distribution pipeline projects. Costs for projects other than pipelines are estimated on a case-by-case basis. The City of Everett maintains a list of CIP projects and updates the schedule and estimated costs for these projects every year. For this document, an annual escalation factor of 5.0 percent is used to determine future project costs.

Figures

For Figures 9-1a through 9-3l, please contact the City.

10. Financial Plan

10.1. Introduction

The purpose of the financial plan is to provide reasonable assurance that the City of Everett (City) has and will have the financial ability to maintain and operate the utility on an ongoing basis, plus have the capacity to obtain sufficient funds to construct the water system improvements as identified in Chapter 9.

The financial plan can only provide this qualified assurance if it considers the "total system" costs of providing water – both operating and capital. To meet these objectives, the financial plan includes the following elements:

- Past Financial Performance
- Funding Sources
- Capital Financing Plan
  - 6-Year CIP with revenue sources, 2007-2012
  - Total Water System Projects with Revenue Sources, 2007-2026
- Projected Financial Performance
  - Revenue Requirement Forecast, 2007-2012
- Rate Structure and Conservation Objectives

The water system customer base is comprised of full-service retail customers, untreated industrial customer(s), and wholesale customers. Currently, Kimberly Clark is the only untreated industrial water customer. The 1981 agreement with the Public Utility District No. 1 of Snohomish County for the Multipurpose Development of Sultan Basin sets the framework under which water filtration costs are accounted for, and water filtration rates are established. The agreement requires that water filtration rates be established and charged based on a separate accounting of costs and revenues related to the water filtration function. Therefore, the City has a separate accounting structure and rate schedule for "water filtration service" and "water service". The discussion and analyses presented herein separately address water filtration and water service functions.

10.2. Past Financial Performance

The City's Utilities Division is responsible for managing the water, sewer and surface water utilities. The audited financial statements combine all three utilities under a single water / sewer utility proprietary fund. For purposes of preparing this financial plan, the detailed water utility financial information maintained by the City in its utility cash flow model was used.

The historical financial statements presented in the next section show the financial viability and strength of the City to continue providing a high level of service.

10.2.1. Water Service

Table 10-1 shows the financial information for water service from 2001 through 2006.

Table 10-1 Water Service Financial Results (2001 – 2006)

Water Service	2001	2002	2003	2004	2005	Estimated 2006
Rate Revenues						
Retail	$8,420,809	$8,261,214	$9,633,152	$8,371,508	$8,632,381	$9,201,264
Wholesale	4,841,798	5,124,476	5,157,673	5,426,176	4,707,118	4,879,992
subtotal: Rate Revenues	**$13,262,607**	**$13,385,690**	**$14,790,825**	**$13,797,684**	**$13,339,499**	**$14,081,256**
Other Operating Revenues	$358,750	$32,567	$32,730	$32,893	$33,058	$538,977
Total Operating Revenues	**$13,621,357**	**$13,418,257**	**$14,823,554**	**$13,830,577**	**$13,372,557**	**$14,620,233**
Non-operating Revenues						
Interest Income	N/A	$920,527	$574,439	$356,403	$994,531	$1,884,516
Connection Charge Revenues	N/A	282,628	316,318	324,846	679,494	575,675
Other Non-Operating Revenues	N/A	1,127,374	1,075,725	1,105,034	164,316	260,000
subtotal: Non-operating Revenues	**$ -**	**$2,330,529**	**$1,966,482**	**$1,786,283**	**$1,838,341**	**$2,720,192**
Total Revenues	**$13,621,357**	**$15,748,786**	**$16,790,036**	**$15,616,860**	**$15,210,899**	**$17,340,425**
O&M Expenditures						
Salaries & Benefits	$3,781,039	$3,696,346	$3,946,314	$4,126,220	$4,167,052	$4,650,216
Supplies	1,044,667	909,360	956,088	621,852	1,556,761	1,709,281
Professional Services	620,070	511,602	259,372	301,569	456,980	304,007
Outside Services	1,615,044	520,891	591,677	360,327	269,640	459,048
Utilities	497,630	536,235	545,041	531,864	402,302	500,570
City Taxes	827,676	809,580	820,176	827,861	827,772	924,000
State Taxes	406,448	413,582	418,940	421,003	419,679	425,804
Motor Vehicle Replacement	163,594	100,093	444,962	365,257	71,766	312,904
Payments to General Government	819,442	1,165,608	1,094,041	1,386,001	1,290,162	1,486,179
Capital Equipment	-	-	-	-	-	-
TOTAL	**$9,775,611**	**$8,663,297**	**$9,076,611**	**$8,941,954**	**$9,462,114**	**$10,772,010**
Debt Service Payments						
Interest	$485,149	$524,302	$882,042	$934,916	$900,493	$853,446
Principal	1,838,821	1,734,841	2,065,689	1,935,369	1,990,117	2,021,687
subtotal: Debt Service Payments	**$2,323,970**	**$2,259,143**	**$2,947,731**	**$2,870,285**	**$2,890,610**	**$2,875,133**
Total Disbursements	**$12,099,581**	**$10,922,440**	**$12,024,342**	**$11,812,239**	**$12,352,724**	**$13,647,143**
Surplus/(Deficit)	**$1,521,777**	**$4,826,346**	**$4,765,694**	**$3,804,622**	**$2,858,174**	**$3,693,282**

N/A = Not Available.
Note: Information was obtained from the City's Utilities Cash Flow Model maintained by City staff.

Water service rate revenues have been stable at around $14.0 million between 2001 and 2006. Revenues from retail customers comprise 64% of the total rate revenues. Other operating revenues have been at relatively negligible levels. The City generated approximately $2.0 million in non-operating revenues. Interest income fluctuated from $356,000 in 2004 to an estimated $1.9 million in 2006. The major drivers of these fluctuations are variations in interest rates in recent years, and cash and investments of the water service function. The connection charge revenues showed an increasing trend between 2002 and 2005 which reflects the rapid growth in the Puget Sound area. Other non-operating revenues such as timber sales, leases, and property sales, were above $1.0 million between 2002 and 2004. The revenues from these sources dropped sharply in the last two years. Despite some fluctuations in other revenues, the water service function has maintained a healthy level of total revenues. This is mostly due to the fact that the City

provides water service to a large customer base, and the water service rate structure generates a relatively stable revenue stream.

Operating and maintenance expenditures of the water service increased from $8.7 million in 2002 to an estimated $10.8 in 2006. The main drivers of this increase are salaries and benefits, supplies, and payments to general government. Salary and benefits costs represent approximately 40% of the total O&M costs. Parallel to the general increasing trend in benefits costs, this line item rose from $3.7 million in 2002 to $4.7 million in 2006. Supplies costs grew significantly in the last two years (2005-2006) compared to the prior years. The increase in supplies costs is due to the operations decision to convert all existing water meters to radio-read from the existing manual read. Payments to general government represent just over 10% of the total O&M costs. This line item showed a small but steady upward trend between 2001 and 2006. Other O&M costs fluctuated in different directions, somewhat balancing each other, but none showed any noteworthy change over the analysis period.

Water service annual debt service payments increased from $2.3 million in 2002 to $2.9 million in 2003, and remained stable at this level.

The water utility generated healthy surpluses between 2001 and 2006. These surpluses helped pay current capital expenditures and accumulate cash balances for future capital needs.

10.2.2. Filtration

Table 10-2 shows the financial information for water filtration from 2001 through 2006.

Table 10-2 Filtration Financial Results (2001 – 2006)

Filtration	2001	2002	2003	2004	2005	Estimated 2006
Rate Revenues						
Retail	$1,526,446	$1,485,752	$1,655,307	$1,441,123	$1,507,320	$1,568,720
Wholesale	5,152,281	5,940,032	5,796,338	6,702,212	6,842,700	8,693,154
subtotal: Rate Revenues	**$6,678,727**	**$7,425,784**	**$7,451,645**	**$8,143,335**	**$8,350,021**	**$10,261,874**
Other Operating Revenues	-	$8,961	$ 54,512	$1,409	$85	$913
Total Operating Revenues	**$6,678,727**	**$7,434,745**	**$7,506,157**	**$8,144,744**	**$8,350,106**	**$10,262,788**
Non-operating Revenues						
Interest Income	N/A	$226,582	$186,341	$89,245	$220,436	$302,159
Connection Charge Revenues	N/A	-	-	-	-	-
Other Non-Operating Revenues	N/A	-	-	-	-	-
subtotal: Non-operating Revenues	**$ -**	**$226,582**	**$186,341**	**$89,245**	**$220,436**	**$302,159**
Total Revenues	**$6,678,727**	**$7,661,327**	**$7,692,498**	**$8,233,989**	**$8,570,542**	**$10,564,947**
O&M Expenditures						
Salaries & Benefits	$2,189,810	$2,221,498	$2,391,170	$2,342,852	$2,373,701	$2,668,087
Supplies	825,344	871,056	801,282	1,006,225	1,198,129	1,276,154
Professional Services	321,495	849,074	636,173	378,629	379,879	720,201
Outside Services	258,576	451,572	568,161	352,590	454,592	708,859
Utilities	295,346	352,457	330,452	292,053	344,584	355,115
City Taxes	432,600	472,788	479,016	488,600	583,512	594,997
State Taxes	82,807	70,289	112,186	72,474	80,185	83,696
Motor Vehicle Replacement	1,210	18,930	-	-	-	-
Payments to General Government	246,945	468,215	537,895	576,415	538,428	656,121
Capital Equipment	1,210	47,231	53,811	99,658	386,808	144,057
TOTAL	**$4,655,344**	**$5,823,110**	**$5,910,146**	**$5,609,497**	**$6,339,819**	**$7,207,287**
Debt Service Payments						
Interest	$711,402	$744,273	$914,138	$972,430	$936,576	$887,616
Principal	1,574,880	1,516,380	1,552,600	1,560,200	1,592,400	1,644,960
subtotal: Debt Service Payments	**$2,286,282**	**$2,260,653**	**$2,466,738**	**$2,532,630**	**$2,528,976**	**$2,532,576**
Total Disbursements	**$6,941,626**	**$8,083,763**	**$8,376,884**	**$8,142,127**	**$8,868,795**	**$9,739,863**
Surplus/(Deficit)	**$(262,899)**	**$(422,436)**	**$(684,386)**	**$91,862**	**$ (298,253)**	**$825,084**

N/A = Not Available.
Note: Information was obtained from the City's Utilities Cash Flow Model maintained by City staff.

Water filtration rate revenues increased from $6.7 million in 2001 to an estimated $10.3 million in 2006, primarily from increases in wholesale rate revenues. Rate revenues from retail customers remained stable during the analysis period at about $1.5 million. Parallel to increases in water sales, revenues from wholesale customers increased significantly. Other operating revenues and non-operating revenues of the water filtration service have been relatively insignificant.

Total O&M expenditures increased from $4.6 million to $7.2 million between 2001 and 2006. The major drivers of this increase are supplies, professional services, outside services, and payments to general government.

Total revenues of the water filtration service have been more than adequate to cover the O&M costs. However, when approximately $2.5 million/year in debt service payments is added to the overall cash needs, the water filtration service operated with small amounts of deficits and surpluses from year to year. These fluctuations have been managed using available working capital.

10.2.3. Water Utility as a Whole

Table 10-3 combines the financial results for water service and water filtration.

Table 10-3 Water Utility Financial Results (2001 - 2006)

Water Utility As A Whole	2001	2002	2003	2004	2005	Estimated 2006
Rate Revenues						
Retail	$9,947,255	$9,746,966	$11,288,459	$9,812,631	$10,139,701	$10,769,985
Wholesale	9,994,079	11,064,508	10,954,011	12,128,387	11,549,819	13,573,146
subtotal: Rate Revenues	**$19,941,334**	**$20,811,474**	**$22,242,470**	**$21,941,019**	**$21,689,520**	**$24,343,131**
Other Operating Revenues	$ 358,750	$ 41,528	$ 87,242	$ 34,303	$ 33,143	$ 539,891
Total Operating Revenues	**$20,300,084**	**$20,853,002**	**$22,329,712**	**$21,975,321**	**$21,722,663**	**$24,883,021**
Non-operating Revenues						
Interest Income	N/A	$1,147,109	$ 760,780	$ 445,648	$1,214,967	$2,186,676
Connection Charge Revenues	N/A	282,628	316,318	324,846	679,494	575,675
Other Non-Operating Revenues	N/A	1,127,374	1,075,725	1,105,034	164,316	260,000
subtotal: Non-operating Revenues	**$ -**	**$2,557,111**	**$2,152,823**	**$1,875,528**	**$2,058,778**	**$3,022,351**
Total Revenues	**$20,300,084**	**$23,410,113**	**$24,482,535**	**$23,850,849**	**$23,781,441**	**$27,905,372**
O&M Expenditures						
Salaries & Benefits	$5,970,850	$5,917,844	$6,337,484	$6,469,072	$6,540,753	$7,318,303
Supplies	1,870,011	1,780,416	1,757,370	1,628,077	2,754,890	2,985,435
Professional Services	941,565	1,360,676	895,545	680,198	836,859	1,024,208
Outside Services	1,873,620	972,463	1,159,838	712,917	724,232	1,167,907
Utilities	792,976	888,692	875,493	823,917	746,886	855,685
City Taxes	1,260,276	1,282,368	1,299,192	1,316,461	1,411,284	1,518,997
State Taxes	489,256	483,871	531,126	493,477	499,864	509,501
Motor Vehicle Replacement	164,804	119,023	444,962	365,257	71,766	312,904
Payments to General Government	1,066,387	1,633,823	1,631,936	1,962,416	1,828,590	2,142,300
Capital Equipment	1,210	47,231	53,811	99,658	386,808	144,057
TOTAL	**$14,430,955**	**$14,486,407**	**$14,986,757**	**$14,551,451**	**$15,801,933**	**$17,979,298**
Debt Service Payments						
Interest	$1,196,551	$1,268,575	$1,796,180	$1,907,346	$1,837,069	$1,741,062
Principal	3,413,701	3,251,221	3,618,289	3,495,569	3,582,517	3,666,647
subtotal: Debt Service Payments	**$4,610,252**	**$4,519,796**	**$5,414,469**	**$5,402,915**	**$5,419,586**	**$5,407,709**
Total Disbursements	**$19,041,207**	**$19,006,203**	**$20,401,226**	**$19,954,365**	**$21,221,519**	**$23,387,007**
Surplus/(Deficit)	**$1,258,877**	**$4,403,910**	**$4,081,309**	**$3,896,484**	**$2,559,922**	**$4,518,366**

N/A = Not Available.
Note: Information was obtained from the City's Utilities Cash Flow Model maintained by City staff.

The cash surpluses of the water service have been sufficient to offset the cash deficits of water filtration that occurred from year to year. Overall, the water utility's revenues have been stable. The total revenues were adequate to pay for O&M expenditures, make annual debt service payments, and generate cash surpluses to pay for capital expenditures.

10.2.4. Existing Long-Term Debt

The City has issued revenue bonds and obtained Public Works Trust Fund (PWTF) loans in the past to fund water system improvements. Table 10-4 shows the outstanding debt service payments for these debt obligations as of January 1, 2007. Since the utility has multiple debt issues, the table combines all revenue bonds and all PWTF loans into the two categories for summary purposes.

Table 10-4 Existing Long Term Debt

Years	Water Service						Filtration		
	PWTF Loans			Revenue Bonds			Revenue Bonds		
	Principal	Interest	Total	Principal	Interest	Total	Principal	Interest	Total
2007	$936,382	$134,070	$1,070,452	$1,169,525	$1,134,428	$2,303,953	$1,716,200	$1,312,953	$3,029,153
2008	936,382	119,468	1,055,850	375,970	1,081,800	1,457,770	917,760	1,238,274	2,156,034
2009	882,203	104,866	987,069	391,755	1,064,881	1,456,636	954,040	1,199,625	2,153,665
2010	802,159	90,806	892,964	410,410	1,047,252	1,457,662	998,280	1,158,755	2,157,035
2011	802,159	77,546	879,705	483,595	1,028,784	1,512,379	1,098,760	1,115,270	2,214,030
2012	651,849	64,286	716,135	505,120	1,007,431	1,512,551	1,145,960	1,067,148	2,213,108
2013	651,849	52,349	704,198	714,630	985,131	1,699,761	737,040	1,016,024	1,753,064
2014	481,452	40,412	521,865	750,505	950,017	1,700,522	774,040	979,808	1,753,848
2015	296,218	33,588	329,806	787,815	912,491	1,700,306	812,520	941,106	1,753,626
2016	268,401	28,615	297,016	826,560	873,101	1,699,661	852,480	900,480	1,752,960
2017	268,401	23,921	292,322	868,175	831,773	1,699,948	895,400	857,856	1,753,256
2018	268,401	19,226	287,628	912,660	788,364	1,701,024	941,280	813,086	1,754,366
2019	268,401	14,532	282,933	957,145	742,731	1,699,876	987,160	766,022	1,753,182
2020	268,401	9,838	278,239	1,005,935	694,874	1,700,809	1,037,480	716,664	1,754,144
2021	268,401	5,143	273,545	1,053,290	647,181	1,700,471	1,086,320	667,476	1,753,796
2022	44,914	449	45,363	1,106,385	594,517	1,700,902	1,141,080	613,160	1,754,240
2023	44,914	225	45,138	1,158,045	542,050	1,700,095	1,194,360	559,048	1,753,408
2024	-	-	-	1,216,880	484,147	1,701,027	1,255,040	499,330	1,754,370
2025	-	-	-	1,277,150	423,303	1,700,453	1,317,200	436,578	1,753,778
2026	-	-	-	1,340,290	359,446	1,699,736	1,382,320	370,718	1,753,038
2027	-	-	-	1,404,865	294,720	1,699,585	1,448,920	303,962	1,752,882
2028	-	-	-	1,475,180	224,477	1,699,657	1,521,440	231,516	1,752,956
2029	-	-	-	1,549,800	150,718	1,700,518	1,598,400	155,444	1,753,844
2030	-	-	-	1,627,290	73,228	1,700,518	1,678,320	75,524	1,753,844

Note: Information was provided by City staff in September 2006.

10.3. Funding Sources

The City may fund the water capital improvement program from a variety of sources. In general, these sources can be summarized as: 1) governmental grant and loan programs; 2) publicly issued debt (tax-exempt or taxable); and 3) cash resources and revenues. These sources are described below.

10.3.1. Government Programs

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining miscellaneous grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of even the very low-interest loans makes the effort of applying worthwhile. State programs identified as potential funding sources for the utility improvements set forth in this Comprehensive Water System Plan are discussed next.

Public Works Trust Fund - The Public Works Trust Fund (PWTF) is a commonly used, low-cost revolving-loan fund established by the 1985 State Legislature to provide financial assistance to local governments for public works projects. Eligible projects now include repair, replacement, rehabilitation, reconstruction, or improvement of eligible public works systems to meet current standards for existing users. With recent revisions to the program, growth-related projects consistent with 20-year projected needs are now eligible.

PWTF loans are available at interest rates of 0.5 percent, 1 percent, and 2 percent, with the lower interest rates given to applicants who pay a larger share of the total project costs. The loan applicant must pay a minimum of 5 percent towards the project cost to qualify for a 2 percent loan, 10 percent for a 1 percent loan, and 15 percent for a 0.5 percent loan. The useful life of the project determines the loan term up to a maximum of 20 years. The applicant must be a local government, such as a City, County, or special purpose utility district, and have an approved long-term plan for financing its public works needs. Local governments must compete for PWTF dollars since more funds are requested each year than are available. The Public Works Board evaluates each application and transmits a prioritized list of projects to the legislature. The legislature then indicates its approval by passing an appropriation from the Public Works Assistance Account to cover the cost of the approved loans. Once the Governor has signed the appropriations bill into law, the local governments receiving the loans are offered a formal loan agreement with the appropriate interest rate and term, as determined by the Public Works Board. Normally these loans are authorized, and the proceeds are drawn down as expenditures are made and then reported to the State.

Community Economic Revitalization Board - Managed by the Department of Community Trade and Economic Development, this program provides grants and loans to fund public facilities that result in specific private-sector development. Eligible projects include water, sewer, roads, and bridges.

Community Development Block Grant (CDBG) Program - A federal government program administered by the State Department of Community Trade and Economic Development, the CDBG program provides grants and loans for infrastructure improvements, including water projects for business development that create or retain jobs for low and moderate-income residents.

Department of Ecology - The Department's Water Quality Financial Assistance Program sponsors four grant and loan programs: the Centennial Clean Water Fund, the Federal 319 Program, the State Revolving Fund Loan program (managed by the PWTF Board), and the Aquatic Weeds Grant Programs. While most of these funding sources go to wastewater programs, projects such as development and implementation of groundwater and wellhead protection programs are also included. The U.S. Congress has authorized a limited amount of money for the Drinking Water State Revolving Fund (DWSRF) loan specifically for programs to improve water quality. Funding is generally limited to 50 percent of qualified project costs and comes as either a grant or low-interest loan (0 percent for up to 5 years, increasing to 4.8 percent for 15 to 20 years). The City has been approved for an $11.0 million DWSRF loan for the Clearwell project.

Of these programs, the PWTF is the most attractive loan program for the City. However, given the level of competition for these funds, the PWTF should not be relied on as a source of funding for all qualified projects in a conservative rate-making forecast. This financial plan assumes revenue bond debt for all CIP borrowing needs, except for low-interest loans that have been approved. It is recommended that the City continue to pursue low-interest loans for all eligible projects.

10.3.2. Public Debt

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility and the debt obligation does not

extend to the City's other revenue sources. With this limited commitment, revenue bonds typically require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by ordinance as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing bonds problematic. In the case of the City of Everett, strong historical financial performance bodes well for continued reliance on this form of financing capital projects. For the most part, tax-exempt bonds may be issued by a governmental agency for its capital projects with the exception of funding needs that serve private sector or non-governmental interests such as mutual water companies and home owner's associations (which are classified as 501c corporations). Generally speaking, if more than 10 percent of a capital project provides direct benefit and service to the private sector (e.g. a business or mutual water company receiving wholesale water), the associated revenue bonds will likely be taxable. It is important that each agency perform due diligence in this regard where there is a question of private versus public benefit.

10.3.3. City Funds and Reserves

User charges (rates) paid by the utility's customers are the main funding source for all water utility activities. The rates cover total annual costs associated with operation and maintenance of the water system, and other ongoing costs of providing water services. Rates can pay for capital improvement projects in two ways: either paying for debt service or directly paying for capital projects. Although funding the capital costs directly through rates does not result in the additional interest expense associated with issuing debt, this policy can cause large and/or volatile rate increases.

Table 10-5 below demonstrates the projected total cash balances (operating and capital funds combined) for each water utility function and on a combined basis.

Table 10-5 Projected Cash Balances Summary

Year End:	2007	2008	2009	2010	2011	2012
Water Service	$37,908,164	$16,643,665	$2,589,214	$2,152,179	$964,422	$1,154,496
Filtration	15,789,891	11,499,279	2,360,326	2,147,555	2,146,036	1,786,766
Total: Water Utility	**$53,698,055**	**$28,142,944**	**$4,949,540**	**$4,299,734**	**$3,110,459**	**$2,941,262**

10.3.4. Connection Charges

Connection Charges (Capital Facility Charges or CFCs) are legal sources of funding provided through development and growth in customers typically used by utilities to support capital needs. Connection charges are authorized in the Washington Revised Code 35.92.025. These charges are imposed on new customers connecting to the system as a condition of service, in addition to any other costs incurred to connect the customer such as meter installation charges. Typically, the basis for the connection charge is the total original capital cost the utility will or has incurred to provide the water system. The underlying

premise of the connection charges is that growth (i.e., future customers) will pay upfront for growth-related costs that would not have been necessary absent the increase in customer base.

The purpose of the connection charge is two-fold: 1) to provide funding sources for capital financing, and 2) to recover an equitable level of investment in the system from new customers. In the absence of such a right-to-connect charge, growth-related costs would be borne, in large part, by existing customers. In addition, the current customers' net investment in the utility would be diluted by the addition of new customers absent a connection charge. This dilution, if allowed, would in effect be a subsidy to new connections. From a financial perspective, a new customer should become financially equivalent to an existing customer by paying the connection charge.

There are several approaches to calculating a connection charge. The City's existing connection charge uses the system buy-in method, which calculates the average cost paid by the existing customers for existing system assets. This method does not incorporate the cost of planned future capital improvements. Therefore, the charge has not been updated for purposes of this financial plan. FCS GROUP recently recommended updating the City's connection charges using the same methodology (i.e. system buy-in method). The City's existing connections charges for single-family residential customers and the proposed charge in the most recent update are provided below in Table 10-6.

Table 10-6 Connection Charges

	Existing Charges for Single-Family Residences	Proposed Charge per ERU (1, 2)
Less than 1,000 sq. ft.	$410	$2,488
1,000 to 2,000 sq. ft.	482	2,488
Over 2,000 sq. ft.	600	2,488

Notes:
(1) Based on buy-in method.
(2) One ERU is defined as 10 ccf of water consumption per month in the Connection Charge Update Study

10.4. Capital Financing Plan

The capital funding component evaluates planned capital costs and available resources to determine whether additional funding will be required from rates, either to pay for new debt service or to directly fund the capital projects.

Table 10-7 summarizes the proposed capital funding strategy for the six-year CIP. This strategy uses the current connection charges (as no increase has yet been adopted), the recommended rate increases shown in the revenue requirement forecast in Table 10-9 and Table 10-10, and the issuance of additional revenue bonds. The use of revenue bonds, as opposed to the more favorable PWTF loans, in this plan is assumed in order to remain conservative in projecting the financial viability of the utility. It is expected that the City will pursue lower cost State loans whenever possible.

Table 10-7 summarizes total capital costs from 2007 through 2012 together with anticipated funding sources. These sources include capital reserves (including projected connection

charge revenues) and revenue bond proceeds. Water service capital projects total $125.3 million (inflated dollars) for the six-year period. The financing plan calls for the use of revenue bond proceeds in the amount of $64.7 over the next six years. The use of revenue bond proceeds shown in the table represents $65.5 million in bond issues projected to fund capital needs, pay issuance costs, and fund required reserves.

Total filtration capital projects over the same period is $67.9 million (inflated dollars). The financing plan indicates that approximately $30.5 million of this amount will be funded with available capital reserves ($11.0 million of this amount is the proceeds from the DWSRF loan for the Clearwell project). The remainder will be funded with revenue bond proceeds.

Overall, in the six-year period the amount of debt financing to total financing for the water utility as a whole is about 53%, within the industry target ratio of 60 percent debt to 40 percent equity.

Table 10-7 6-Year Capital Financing Plan; 2007-2012 (Inflated $)

	2007	2008	2009	2010	2011	2012	TOTAL
WATER SERVICE							
Total Capital Projects	**$8,700,000**	**$25,680,000**	**$29,840,000**	**$ 17,710,000**	**$29,290,000**	**$ 14,120,000**	**$125,340,000**
Funding Sources							
Capital Reserves	$8,700,000	$25,680,000	$ 17,943,665	$ 3,589,214	$ 2,952,179	$ 1,764,422	$60,629,480
Revenue Bond Proceeds			11,896,335	14,120,786	26,337,821	12,355,578	64,710,520
Total	**$8,700,000**	**$25,680,000**	**$29,840,000**	**$ 17,710,000**	**$29,290,000**	**$ 14,120,000**	**$125,340,000**
FILTRATION							
Total Capital Projects	**$ 610,000**	**$ 11,700,000**	**$15,700,000**	**$12,050,000**	**$ 11,550,000**	**$16,300,000**	**$ 67,910,000**
Funding Sources							
Capital Reserves	$ 610,000	$11,700,000	$11,499,279	$2,360,326	$ 2,147,555	$ 2,146,036	$30,463,197
Revenue Bond Proceeds			4,200,721	9,689,674	9,402,445	14,153,964	37,446,803
Total	**$ 610,000**	**$ 11,700,000**	**$15,700,000**	**$12,050,000**	**$ 11,550,000**	**$16,300,000**	**$ 67,910,000**
WATER UTILITY AS A WHOLE							
Total Capital Projects	**$9,310,000**	**$37,380,000**	**$45,540,000**	**$29,760,000**	**$40,840,000**	**$30,420,000**	**$193,250,000**
Funding Sources							
Capital Reserves	$ 9,310,000	$37,380,000	$29,442,944	$5,949,540	$5,099,734	$ 3,910,459	$91,092,677
Revenue Bond Proceeds			16,097,056	23,810,460	35,740,266	26,509,541	102,157,323
Total	**$9,310,000**	**$37,380,000**	**$45,540,000**	**$29,760,000**	**$40,840,000**	**$30,420,000**	**$193,250,000**

Table 10-8 shows the total capital projects from 2007 through 2026 and anticipated funding sources by category for each function of the water utility and on a combined basis. The share of debt funding relative to total funding in the utility's long-term capital financing plan is approximately 58 percent, again within the industry standards.

Table 10-8 20-Year Capital Financing Plan; 2007-2026 (Inflated $)

	Water Service	Filtration	Total
Total Capital Projects	$561,520,000	$131,000,000	$692,520,000
Funding Sources			
Capital Reserves	$230,896,237	$59,568,921	$290,465,158
Revenue Bond Proceeds	330,623,763	71,431,079	402,054,842
Total	$561,520,000	$131,000,000	$692,520,000
Percentage Shares of Funding Sources			
Capital Reserves	41.1%	45.5%	41.9%
Revenue Bond Proceeds	58.9%	54.5%	58.1%
Total	100.0%	100.0%	100.0%

10.5. Projected Financial Performance

10.5.1. Basis for Revenue Requirements

The revenue requirement analysis determines the amount of rate revenue needed in a given year to meet that year's expected financial obligations. Analytically, at least two separate conditions must be satisfied for each year of the analysis period in order for rates to be sufficient. Periodic cash needs must be met and the minimum revenue bond debt service coverage requirement must be realized.

The cash flow test identifies cash requirements for the utility in the year addressed. Those requirements can include cash operating and maintenance expenses, debt service, directly funded capital outlays, capital transfers, and any projected additions to reserves. The total cash needs are then compared to projected utility revenues. Any projected shortfalls are identified and the level of rate increase necessary to make up the shortfall is estimated.

The coverage requirement on the City's outstanding revenue bonds is currently 1.25 times revenue bond debt. The coverage test in this analysis followed the City's internal coverage policy to set a higher coverage standard of 2.0 times combined water/sewer utility revenue bond debt. The coverage factor adds some protection for bondholders against the risk of poor financial performance in any given fiscal year. Any excess cash flow derived from the added coverage can be used for capital costs.

A number of forecast assumptions are used in the analysis.

- Rate revenues are calculated to increase with growth in future years, which is projected to be around 2.5% per year for retail customers and 2.62% per year for wholesale customers. The growth rate for retail customers is based on the average of population growth and projected growth in average day demand as

provided in Chapter 3. The growth rate for wholesale customers is based on the growth in wholesale customers' average day demand.

- The City implemented a 10% rate increase in 2006 both for water service and filtration. 2006 estimated rate revenues reflect this rate increase.
- Operating and maintenance expenses are escalated annually at 3% for general cost inflation, 5% for salary and benefits, and 7% for motor vehicle replacement and payments to general government.
- Inflated capital expenses reflect 5% construction cost inflation per year.
- In addition to maintenance and operating costs, revenue requirements include capital costs for existing debt service and new debt service incurred to fund the CIP.
- The City's fund interest earnings rate is assumed at 4%.
- The forecast assumes a revenue bond interest rate of 5%, an issuance cost of 1%, and repayment term of 20 years.
- The coverage requirement is set at the City's internal policy of 2.0 on a water/sewer combined utility basis. The projections relied on the sewer and surface water revenue requirement analysis as updated by City staff in late 2006.
- The City adopted new rates for both water service and water filtration for 2007 and 2008. The new rates result in about a 5% per year increase over the 2006 rates. No additional rate increases are assumed for years 2007 and 2008.

10.5.2. Water Service

Table 10-9 summarizes the projected financial performance and rate revenue requirements of water service for 2007 through 2012. Table 10-9 assumes debt coverage by rate increases only. Actual rate increases will depend on whether the City is successful in obtaining available loan and/or grant alternatives.

Table 10-9 Water Service Revenue Requirement Forecast

	2007	2008	2009	2010	2011	2012
Rate Revenues at Existing Rates						
Retail	$9,431,296	$9,667,078	$9,908,755	$10,156,474	$10,410,386	$10,722,698
Wholesale	5,007,848	5,139,053	5,273,696	5,411,867	5,553,658	5,638,074
subtotal: Rate Revenues	**$14,439,144**	**$14,806,132**	**$15,182,452**	**$15,568,341**	**$15,964,044**	**$16,360,771**
Non-rate Revenues	$174,146	$175,017	$175,892	$176,772	$177,655	$178,544
Total Revenues	**$14,613,290**	**$14,981,149**	**$15,358,344**	**$15,745,113**	**$16,141,700**	**$16,539,315**
Expenses						
O&M Expenses (1)	$11,418,346	$11,661,564	$12,272,693	$12,919,638	$13,604,703	$14,333,369
Existing Debt Service	3,374,406	2,513,620	2,443,705	2,350,627	2,392,083	2,228,686
New Debt Service	-	-	966,923	2,114,392	4,252,857	5,255,889
Total Expenses	**$14,792,751**	**$14,175,184**	**$15,683,321**	**$17,384,656**	**$20,249,644**	**$21,817,944**
Annual Rate Adjustment	**5.0%**	**5.0%**	**6.0%**	**6.0%**	**6.0%**	**6.0%**
Cumulative Rate Adjustment	**5.0%**	**10.3%**	**16.9%**	**23.9%**	**31.3%**	**39.2%**
Rate Revenues After Rate Adjustments						
Retail	$9,902,861	$10,657,954	$11,579,867	$12,581,525	$13,669,827	$14,924,718
Wholesale	5,258,240	5,665,806	6,163,105	6,704,053	7,292,482	7,847,527
subtotal: Rate Revenues	**$15,161,101**	**$16,323,760**	**$17,742,972**	**$19,285,579**	**$20,962,309**	**$22,772,244**

Note: (1) Includes additional taxes due to projected rate increases.

Following the adopted 5% rate increases for 2007 and 2008, the water service will need a 6% rate increase per year for the following four years (2009 through 2012) to meet operating and maintenance costs and debt obligations. The main driver of these rate increases is the impact of new debt issues on cash needs and coverage requirements. It is important to note that these projections are based upon current assumptions and the capital program identified herein. Circumstances might change over time, causing actual rate adjustments to be higher or lower once actual costs are known.

10.5.3. Filtration

Table 10-10 summarizes the projected financial performance and rate revenue requirements of water filtration for 2007 through 2012. Table 10-10 assumes debt coverage by rate increases only. Actual rate increases will depend on whether the City is successful in obtaining available loan and/or grant alternatives.

In addition to the already adopted 5% a year rate increases for 2007 and 2008, filtration rates are projected to be adjusted by another 5% in 2009 and 6% a year thereafter (2010 – 2012) to meet the utility's filtration related cash needs and coverage requirements through the 6-year analysis period.

Table 10-10 Filtration Revenue Requirement Forecast

	2007	2008	2009	2010	2011	2012
Rate Revenues at Existing Rates						
Retail	$1,607,938	$1,648,137	$1,689,340	$1,731,574	$1,774,863	$1,828,109
Wholesale	8,920,915	9,154,643	9,394,494	9,640,630	9,893,214	10,043,591
subtotal: Rate Revenues	**$10,528,853**	**$10,802,779**	**$11,083,834**	**$11,372,204**	**$11,668,078**	**$11,871,700**
Non-rate Revenues	$ 918	$ 923	$ 927	$ 932	$ 937	$ 941
Total Revenues	**$10,529,771**	**$10,803,702**	**$11,084,762**	**$11,373,136**	**$11,669,014**	**$11,872,642**
Expenses						
O&M Expenses (1)	$7,006,427	$7,226,240	$7,569,610	$7,938,743	$8,328,350	$8,733,431
Existing Debt Service	3,029,153	2,156,034	2,153,665	2,157,035	2,214,030	2,213,108
New Debt Service	349,474	640,703	981,734	1,768,111	2,530,416	3,677,885
Total Expenses	**$10,385,054**	**$10,022,977**	**$10,705,009**	**$11,863,890**	**$13,072,797**	**$14,624,424**
Annual Rate Adjustment	**5.0%**	**5.0%**	**5.0%**	**6.0%**	**6.0%**	**6.0%**
Cumulative Rate Adjustment	**5.0%**	**10.3%**	**15.8%**	**22.7%**	**30.1%**	**37.9%**
Rate Revenues After Rate Adjustments						
Retail	$1,688,335	$1,817,071	$1,955,623	$2,124,784	$2,308,578	$2,520,505
Wholesale	9,366,960	10,092,993	10,875,301	11,829,848	12,868,178	13,847,600
subtotal: Rate Revenues	**$11,055,296**	**$11,910,064**	**$12,830,924**	**$13,954,632**	**$15,176,755**	**$16,368,106**

Note: (1) Includes additional taxes due to projected rate increases.

10.6. Rate Structure and Conservation Objectives

10.6.1. Existing Rates

The City of Everett's water customers pay a separate filtration rate in addition to a water service charge. The City's water customer base consists of full service retail customers, untreated industrial water customer(s), and several wholesale customers. Currently, Kimberly Clark is the only untreated industrial water customer, and is not subject to the water filtration rate.

Everett's water rate ordinance categorizes the City's full service retail water customers as fixed rate accounts, domestic metered accounts, commercial/industrial/government accounts, and irrigation accounts. The City also has full service retail customers outside the City boundaries. The City charges its' outside retail customers a 25% surcharge applied to its in-city retail water service rates. The City does not and cannot charge a surcharge on water filtration rates, as set by 1981 Agreement for Multipurpose Development of Sultan Basin.

Silver Lake Water District and Mukilteo Water District use part of Everett's distribution system and pay "West of Snohomish River" rates, whereas Public Utility District No. 1 of Snohomish County, the cities of Marysville and Monroe, and other wholesale customers receive their water off of Everett's transmission lines. These customers pay "East of Snohomish River" rates. Both water service and water filtration rates for these customers are established by the City's rate ordinance. The water service rates for the wholesale customers include a 20% surcharge applied to its in-City water service rates. Alderwood Water and Wastewater District pays a fixed demand charge and the water filtration rate based on its contractual terms, and a commodity charge set by the City using the cost of service analysis.

The City's water rates for 2006 through 2008 are summarized in Table 10-11.

Table 10-11 Water Service and Filtration Rates (2006 – 2008)

	2006 Rates			2007 Rates			2008 Rates		
	Water Service	Filtration	Total	Water Service	Filtration	Total	Water Service	Filtration	Total
RETAIL CUSTOMERS									
Fixed Rate Accounts (per month)	$15.500	$3.250	$18.750	$16.300	$3.400	$19.700	$17.100	$3.600	$20.700
Domestic Metered Rates (per ccf)									
0 ccf - 6 ccf (minimum charge)	$9.300	$1.950	$11.250	$9.780	$2.040	$11.820	$10.260	$2.160	$12.420
over 6 ccf	1.550	0.325	1.875	1.630	0.340	1.970	1.710	0.360	2.070
Commercial/Industrial/ Government									
0 ccf - 6 ccf (minimum charge)	$9.300	$1.950	$11.250	$9.780	$2.040	$11.820	$10.260	$2.160	$12.420
6 ccf - 30 ccf	1.550	0.325	1.875	1.630	0.340	1.970	1.710	0.360	2.070
30 ccf - 150 ccf	0.960	0.325	1.285	1.011	0.340	1.351	1.062	0.360	1.422
over 150 ccf	0.530	0.325	0.855	0.548	0.340	0.888	0.575	0.360	0.935
Irrigation (per ccf)									
0 ccf - 6 ccf (minimum charge)	$10.660	$1.950	$12.610	$11.220	$2.040	$13.260	$11.760	$2.160	$13.920
6 ccf - 30 ccf	1.777	0.325	2.102	1.870	0.340	2.210	1.960	0.360	2.320
30 ccf - 150 ccf	0.963	0.325	1.288	1.011	0.340	1.351	1.062	0.360	1.422
over 150 ccf	0.820	0.325	1.145	0.861	0.340	1.201	0.904	0.360	1.264
WHOLESALE CUSTOMERS									
East of Snohomish River									
Monthly Fixed Charge	$165.000	$-	$165.000	$173.250	$-	$173.250	$181.910	$	$181.910
Volume Charge (per ccf)	0.231	0.355	0.586	0.243	0.373	0.616	0.255	0.392	0.647
West of Snohomish River									
Non-pumped (per ccf)	$0.490	$0.355	$0.845	$0.515	$0.373	$0.888	$0.541	$0.392	$0.933
Pumped (per ccf)	0.710	0.355	1.065	0.746	0.373	1.119	0.783	0.392	1.175

10.6.2. Rate Structure and Conservation Objective

The majority of single-family residential customers are un-metered. Until such time as metering becomes universal, conservation-based rate structures are limited, and would likely be ineffective. For metered customers, the City could consider transitioning to more conservation-oriented structures, such as single block rates or seasonal rates.

The City launched a comprehensive conservation plan in 2001, which includes school and park landscape audits, regional marketing and education, industrial water reuse, leak detection and repair, and etc.

10.7. Conclusion

The City continues to maintain the water utility in a healthy financial position and is taking steps with this plan to ensure future stability of the water utility financial status. The City has a long range financial plan, which enables it to meet projected capital and operational requirements outlined in this plan and does so through upfront rate increases in 2007 and 2008 to meet current needs and a series of needed rate increases to meet future needs. The adoption of the recommended connection charge would also help pay for capital expenditures that would result in a lower borrowing need and/or rate adjustments.