# 4. CONSERVATION PROGRAM, WATER RIGHT ANALYSIS, SYSTEM RELIABILITY, AND INTERTIES

The objective of this chapter is to develop a conservation program that will promote efficient water use, ensure that adequate water rights are secured for existing and future needs, and will promote system reliability; and to describe existing and proposed interties.

# 4.1 Conservation Program Development and Implementation

In 2003, the Washington State Legislature passed Engrossed Second Substitute House Bill 1338, more widely known as the Municipal Water Law, to address the increasing demand on the state's water resources. The law established that all municipal water suppliers must use water more efficiently in exchange for water right certainty and flexibility to help meet future demand. In 2007, DOH required that all Class A municipal water systems develop a water use efficiency (WUE) program to plan for conservation. This program consists of five key parts:

- Data collection and analysis to characterize water production and consumption
- Water demand projections
- Analysis of lost and unaccounted-for water
- Goals and measures to promote conservation and WUE
- Analysis of the established WUE measures.

A detailed analysis of water production and distribution characteristics and projections of future demands are presented in Chapter 2. Based on the findings of this analysis and consistent with the requirements of DOH's Water Use Efficiency Guidebook, the City has adopted three WUE goals. The Yelm City Council formally adopted these goals after a public forum was held to present the proposed goals and receive public comments. A copy of the presentation made at the WUE open house is provided in Appendix 4A. This appendix also includes a "Frequently Asked Questions" presentation that was posted to the City's Web site prior to the open house. The goals were adopted by the City in Resolution 488 on July 8, 2008 (see Appendix 4B).

The number of required goals and measures in a WUE program depends on the water system size and type. For Yelm, the following goal and measure requirements and definitions apply:

- **Goals:** Benchmarks to measure WUE. At least one supply-side goal (production) and one demand-side goal (consumption) need to be established. Yelm has elected to establish a third goal related to the use of reclaimed water.
- Measures: Specific activities and programs to achieve the goal. In 2007, the Yelm water system had 2,214 connections and was therefore required to implement at least five measures, not including supply-side measures which are already required.

## 4.1.1 WUE Goal 1: Increase Reclaimed Water Usage

The City has identified reclaimed water distribution as a primary conservation measure and has been producing reclaimed water to offset the demand on potable water since 1999.

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Because reclaimed water is most often used for irrigation, the number of active accounts fluctuates seasonally. There were as many as 16 active accounts in 2007 and 2008. The average number of active accounts per month was 8 in 2007 and 9 in 2008. Primary reclaimed water customers include schools, parks, and governmental buildings.

Table 4-1 shows annual reclaimed water use.

Table 4-1. Reclaimed Water Use						
Year	Annual Demand (gallons)					
2003	8,770,457					
2004	9,483,615					
2005	3,720,948					
2006	7,814,259					
2007	14,818,546					
2008	11,565,531					

In 2007, reclaimed water accounted for approximately 5.9 percent of the total water used for non-potable purposes in Yelm, reducing the demand on the potable water supply by 45.5 acre-feet.

The continued and increased availability of reclaimed water will further reduce the demand on the potable water supply. To increase reclaimed water usage, the following measures will be taken:

Implementation of projects that are identified in the City's Reclaimed Water CIP. The City has developed a draft Reclaimed Water Plan as part of the Sewer Comprehensive Plan update. This draft Reclaimed Water Plan outlines the expansion and upgrade of the water reclamation facility and distribution system. In 1999, this facility was capable of reclaiming 100 percent of the wastewater generated by the wastewater collection system and had an ultimate treatment capacity of 1 million gpd. As demand for reclaimed water increases it is essential that the reclamation system expand to accommodate needs. Key projects outlined in the Reclaimed Water Plan and their schedule for completion are shown in Table 4-2.

Table 4-2. Reclaimed Water Capital Improvement Projects <sup>1</sup>								
Project Description	Anticipated Project Year							
Connect Longmire Park	Completed in 2008							
Reclaimed water hydrant locks	2008 (ongoing)							
Upgrade reclaimed water pump station	2010							
Tanker truck filling station	2010							
Storage tank at water reclamation facility	2011							
Connect Cal-Portland concrete plant	2009							
Upgrade Cochrane Memorial Park Groundwater Recharge Basins	2010							
Line extension to Yelm Creek augmentation site	2012							
Construct stream-flow augmentation site	2012							
Yelm Public Works Groundwater Recharge Basin	2013							
Water reclamation facility Groundwater Recharge Basins	2013							

<sup>1</sup> From City of Yelm Draft Comprehensive Reclaimed Water Plan, 2009.

The City anticipates the completion of this Reclaimed Water Plan by 2011.

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- Evaluate changes to development guidelines to promote the use of reclaimed water and reduce potable water usage. As reclaimed water production capacity increases, it may become feasible to extend reclaimed water services to new development as opportunities arise. Installation of reclaimed water distribution facilities as part of the initial development of a site could reduce potable water demands. For example, the Thurston Highlands Environmental Impact Statement states that reclaimed water distribution pipelines will be installed in all phases of the MPC. The cost to existing rate payers of changing the development guidelines to promote reclaimed water use will be relatively small. The new standards will be borne by new customers. Providing reclaimed water to the MPCs would reasonably be expected to at least double reclaimed water usage over current levels through the irrigation of green spaces, parks, and landscaping.
- **Connect larger water users to reclaimed water where viable.** The completion of the projects outlined in the draft Reclaimed Water Plan and the continued education of the public about the availability and potential uses for reclaimed water will make it feasible for the number of reclaimed water customers to increase. One potential industrial user of reclaimed water is the ready mix concrete batch plant located adjacent to the Public Works facility.

## 4.1.2 WUE Goal 2: Reduce Distribution System Leakage

The volume of water that cannot be accounted for is the difference between the total volume pumped from the sources of supply and the total volume of water consumed as measured at the meters and billed by the City. This "unaccounted-for water" is water used for line flushing, hydrant testing, or fire-fighting, or is water lost through distribution system leaks and illegal connections. This water is collectively referred to as distribution system leakage (DSL). Table 4-3 summarizes the DSL calculations for the period from 2003-2007.

Table 4-3. Annual Distribution System Leakage									
		Percent							
	Total Production	Authorized Consumption	DSL	DSL					
2003	208.1	195.2	12.9	6.2%					
2004	215.2	204.5	10.7	5.0%					
2005	209.1	195.3	13.7	6.6%					
2006	249.7	233.2	16.5	6.6%					
2007	238.1	219.3	18.7	7.6%					

Note: DSL in 2008 was approximately 13 percent.

DOH has established a maximum DSL standard for water systems of 10 percent. If a water system fails to meet this standard, it is required to develop a Water Loss Control Action Plan. In Yelm, the percent of total unaccounted-for water ranged from 5 and 7.6 percent between 2003 and 2007, a significant improvement from 1996 to 2000 when the DSL averaged 13 percent (City of Yelm Comprehensive Water Plan, 2002). To further reduce DSL, since 2002 the City has repaired leaking transmission mains that were detected during annual inspections and has installed nearly 400 hydrant locks to prevent water theft. The average DSL for the last 3 years was 6.9 percent.

The City has identified the reduction of DSL to 6 percent on a rolling 3-year average as a goal of its WUE program. To ensure that continued progress toward the 6 percent DSL goal is met, the City will take the following measures:

**Install production and consumption meters on all sources and service connections.** All wells and individual service connections are metered.

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When feasible, perform an annual audit of the water system. This audit will assist in identifying leaks, identifying customers who may not be categorized in the correct billing class, and provide an indication of consumption trends per class. (An audit to evaluate 2009 water usage patterns was prepared in February, 2010.)

**Continue annual leak detection surveys.** The City performs annual leak detection surveys. The 2009–2010 budget sets aside an annual allocation of \$8,000 for this purpose and the City remains committed to conducting annual surveys.

**Work with Fire Department to track water usage.** Major water uses by the Fire Department include fighting fires, testing hydrants, and washing vehicles. By tracking these water uses, the City will be able to more accurately assess how much unaccounted-for water is used for these necessary purposes and how much is lost due to other preventable means, such as system leakage or illegal connections.

## 4.1.3 WUE Goal 3: Reduce Annual Residential Consumption

Between 2005 and 2008, single family residential users used an average of 215 gpd per residential unit. In total, residential classes used approximately 69 percent of Yelm's water. The final WUE goal that the City adopted aims to reduce average annual consumption by single family residential connections to 200 gpd within 5 years. Based on residential usage measured in 2007, a reduction in the average usage per residential connection from 215 to 200 gpd would save approximately 33.8 acre-feet of water. The City has implemented or will implement the following measures to achieve this goal:

**Educate water system customers about the importance of using water efficiently.** The City website provides information and articles which describe methods of conserving water. Additionally, Consumer Confidence Reports provided to the public annually generally contain facts on identifying leaks and conservation tips.

**Provide education outreach programs**. In addition to the required water use efficiency education measure described above, the City has participated in the Yelm Home and Garden Expo in recent years to promote effective conservation practices.

**Provide water conservation kits.** Free conservation material and low-flow residential conservation kits have been made available to the public. These kits have included low-flow shower heads, toilet leakage tabs, toilet balloons, faucet aerators, lawn and garden nozzles, and irrigation timers.

The City will evaluate the cost and feasibility of providing incentives for water conservation through rebates and public recognition. These rebates could be made available to customers who show a significant reduction in water usage or show a commitment to conservation by installing water-saving appliances.

**Implement changes to the rate structure to further encourage conservation.** The City encourages conservation by charging for water use based on consumption; rates increase as usage increases.

In 2008, the City adopted a seasonal rate increase (SRI) which increased summer rates for residential and irrigation customers whose usage fell into the highest usage blocks. This ordinance (see Appendix 4C) was developed in order to promote conservation by large water users. Results show that irrigation use during the months that the SRI was in effect decreased by about 24 percent, or about 10.5 acre-feet. Residential usage showed a less dramatic decrease of approximately 3.5 percent. Because the SRI was only in effect for 1 year, it is difficult to establish how much of this reduction was due to the SRI and how much may have been due to other factors, such as weather and increased conservation awareness. The SRI was eliminated as part of the newly revised rate structure; however, the new rates include rate increases for irrigation users over what was implemented by the SRI in 2008. These new rates are expected to further encourage water conservation.

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New monthly rates that include a revised inclined-block-rate structure have been developed as part of this planning process and are described in detail in Chapter 9. This new rate structure became effective in September 2009 and was applied to three different customer classes: irrigation, residential, and commercial/industrial. (An additional rate increase was adopted on March 9, 2010).

The new rate structure was developed to limit water used for nonessential purposes, such as excessive irrigation. The decrease in irrigation consumption measured in 2008 after implementation of the SRI shows the effect of increased rates; it is anticipated that the additional increases associated with the new rate structure will further cut not only irrigation use, but use across all customer classes.

Adopt an ordinance to aggressively identify leaks beyond the water meter and implement appropriate penalties. Wasting water is already prohibited in the YMC:

"13.04.096 Wasting water prohibited.

It is unlawful for any person to allow water to be wasted at any point beyond the curb-cock or meter by imperfect, faulty or leaking stop-cocks, valves, pipes, closets, faucets or other fixtures and appliances or to use water closets without self-closing valves or to allow any fixtures or appliances to run open for lack of repairs, to permit freezing or to use water for any other purpose other than that set forth in the application upon which charges for water are based, or to use water in violation of the rules and regulations as set forth in this chapter." (Ord. 778, §3, 2003)

**Provide education and assistance to customers on identifying and repairing leaks**. The City currently reviews water bills every month to identify accounts for which increased water usage may indicate that a leak has occurred, and works with the customer to repair the leaks. A new ordinance that specifies how long the customer has to fix a leak and provides specific penalties for failing to do so will be evaluated. In addition, Yelm City Council has stated their intent to develop public information materials that educate homeowners and businesses about how to identify and repair leaks. This information will be made available to the public.

## 4.1.4 Additional Conservation Measures

A key element of the water use projections developed in Chapter 2 is the assumption that water usage for irrigation will not increase beyond 2007 levels until additional water rights are secured. The City will undertake the following measures to achieve this goal:

**Perform an audit on irrigation users.** By auditing irrigation accounts, the City can better track irrigation demand, identify leaks and excessive use, and also identify customers who may benefit from receiving guidance and education on effective irrigation practices. The City will begin performing irrigation audits in 2010.

**Reduce water used at dedicated irrigation meters by 50 percent.** From 2007 to 2009, water demand through dedicated irrigation meters accounted for an average of 75 acre-feet of water annually, or approximately 10 percent of the annual water demand. In 2010, the City adopted a resolution to significantly reduce water used through these irrigation meters. The goal of this resolution is to reduce irrigation demand to at least 50 percent of the water used in 2009; this would reduce overall water demand by 34.33 acre-feet. The City will implement this resolution in four steps:

1. Water budget determination. City staff will determine the appropriate amount of water for irrigation based on the amount and type of landscaping at each customer's property. Water requirements will be developed based on information provided on the customer's historical water usage and the Washington Irrigation Guide (U.S. Department of Agriculture [USDA], Natural Resources Conservation Service, January 2005). This document provides guidelines for irrigation practices, taking into account factors such

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as climate, precipitation, soil type, type of plant being irrigated, evapotranspiration, and the type of irrigation system in use.

- 2. **Customer notification.** Each customer with an irrigation meter will be notified of an appropriate amount to irrigate.
- 3. **Weekly monitoring.** Water system personnel will monitor irrigation meters weekly. Customers will receive weekly letters which compare usage-to-date with total allowable usage.
- 4. **Enforcement.** If a customer exceeds their specified irrigation amount, the irrigation meter on the property will be locked.

The conservation program was approved by DOH on April 29th, 2010. Documentation of the conservation program development, anticipated savings, and DOH approval letter is included in Appendix 4G.

## 4.1.5 Analysis of WUE Program

Demand projections summarized in Chapter 2 present demands at the current ERU and DSL values of 215 gpd/ERU and 6.9 percent, respectively, as well as the demand if the City meets the established WUE goals of 200 gpd/ERU and 6 percent DSL. If the WUE goals are met, water use would be reduced by approximately 8 percent. The City prepared its initial Water Use Efficiency Performance Report Form in July 2008. This report presented water usage and leakage data for 2007 and also included a description of WUE goals and measures that were established. A copy of the 2008 report is presented in Appendix 4D.

In total, the City has implemented ten water use efficiency measures:

- Implementation of a reclaimed water program.
- Provision of public outreach programs.
- Provision of water conservation kits.
- Changes to water rate structure to encourage conservation (counts as three measures as the structure applies to residential, commercial and irrigation customer classes).
- Adoption of ordinance to identify leaks and implement penalties.
- Assistance to customers to identify leaks.
- Performance of audits on irrigation customers to calculate appropriate water usage.
- Implementation of irrigation reduction program.

# 4.2 Source of Supply Analysis

As described in the water rights evaluation below, Yelm submitted three water rights applications to Ecology in 1994. Yelm continues to work with Ecology to gain approval of these pending applications. The City has prepared a Water Rights Mitigation Plan (Golder and Associates, 2008) that establishes a commitment to mitigate impacts that are expected as a result of additional groundwater withdrawal associated with these new water rights. It is assumed that the water rights requested by the City, once approved by Ecology, will be conditioned on mitigation that will be provided in phases concurrent with the City's water system expansion.

The City has been involved in the Nisqually Watershed Planning effort (WRIA 11) since its inception in 1999 and continues to work alongside its partners (the Nisqually Tribe and the Cities of Lacey and Olympia) to regionally address water-related issues and water right applications as well as to assess hydrologic impacts resulting from the cumulative pumping by the Cities related to future groundwater withdrawals. These impacts have been modeled and opportunities for joint mitigation are being discussed and implemented (Golder and Associates, 2008).

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The City's Water Rights Mitigation Plan is provided in Appendix 4E. This document provides background information on the planned southwest Yelm wellfield, expected impacts from the development of the wellfield, and the mitigation program proposed to be implemented as Yelm's sources of supply are transitioned to the southwest Yelm wellfield.

DOH planning guidelines require that water systems that plan on seeking new water rights within 20 years of the approval of a water system plan prepare a source-of-supply analysis. The purpose of this analysis is to evaluate opportunities to obtain or optimize the use of existing sources already developed, and evaluate other innovative methods to meet water needs. Criteria for this analysis are explained in the following section.

## 4.2.1 Enhanced Conservation Measures

Yelm established a water conservation program in 2003 (Resolution 433, see Appendix 4F). Previous DOH planning guidelines required that the City develop a conservation program consistent with DOH's Conservation Planning Requirements. The City's 2002 Water System Plan showed how Yelm was complying with those guidelines. Since that time, the Water Use Efficiency Guidebook has replaced the Conservation Planning Requirements. The City is already in compliance with DOH requirements related to WUE, as described in the previous section.

## 4.2.2 Water Rights Changes

Since 1999, the City has secured six water rights transfers from various property owners. The City is also in the process of completing another transfer and anticipates approval by Ecology by 2011 of a decommissioned well water rights consolidation application for a new water right of 31.26 acre-feet. The City will continue to work on securing new water rights from Ecology as part of the City's effort to meet the service requirements mandated under the Growth Management Act. The City will also continue to investigate opportunities for future water rights transfers as part of this effort.

## 4.2.3 Interties

No water systems in the vicinity of Yelm have the capacity or water rights necessary to support a reliable intertie with the Yelm water system. The lack of an intertie with a separate water system limits Yelm's flexibility to deal with a water shortage or emergency. As part of the update to the Water Shortage Response Plan described in Section 4.4.4, the City evaluated the viability of developing an intertie with a neighboring water system. Potential intertie partners included McKenna, Rainier, and Nisqually Pines.

### 4.2.4 Artificial Recharge

Artificial recharge is the injection or infiltration of available surface water or other available water into an aquifer and its subsequent withdrawal. The goal of the Mitigation Plan that has been developed is to mitigate impacts to surface water and groundwater through methods such as reclaimed water infiltration.

## 4.2.5 Use of Reclaimed Water, Reuse, and Other Non-Potable Sources

The City already recharges reclaimed water at Cochrane Memorial Park. Current recharge is approximately 56 acre-feet per year (0.08 cubic feet per second [cfs]). The City plans to increase reclaimed water recharge at Cochrane Memorial Park in the future to offset impacts to Yelm Creek that will result from the initial development of the southwest Yelm wellfield.

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## 4.2.6 Treatment

DOH requires that when additional sources of supply are being pursued as a result of water quality problems with existing sources, purveyors first evaluate the cost of treating the current source. In the case of the Yelm system, the downtown wells have no water quality problems that would require further treatment. The sources are already treated for disinfection and corrosion control and no further treatment is necessary.

New supply sources will undergo the necessary water quality analysis and, if necessary, will be treated to meet all DOH water quality standards.

## 4.2.7 Summary

The City has undertaken a number of steps to maximize the efficient and responsible use of water from its existing sources. Even with these steps, water use has reached the limit of existing water rights for the downtown wells.

Modeling of impacts to surface water and groundwater (Golder and Associates, 2008) shows that development of the southwest Yelm wellfield may have environmental impacts to various surface water bodies within the Deschutes and Nisqually watershed basins. These impacts will occur over a thirty year period as water rights are issued to the City in 'phases' as growth demands. The predicted impacts have been addressed in the City's Mitigation Plan (Golder and Associates/Dally Environmental, 2008). The City intends to maintain the infrastructure at the downtown wells after their water rights have been transferred to the southwest Yelm wellfield to provide emergency backup in the event of a catastrophic wellfield failure or a temporary service interruption.

# 4.3 Water Right Evaluation

This section presents a description, prepared by the City's water rights attorney, of the City of Yelm's water rights permits, claims, certificates, and pending water rights applications and transfers. The Water Rights Self-Assessment forms that were prepared in conjunction with this narrative are provided as Table 4-4 (existing water rights), Table 4-5 (6-year forecast), and Table 4-6 (20-year forecast). The water right applications and resulting water rights quantities described in this analysis correspond with the well development schedules developed for this WSP. Actual water right quantities approved by Ecology may be higher per the City of Yelm's Mitigation Plan.

## 4.3.1 Historical Water Rights

This sub-section provides an overview of the history of water rights developments in the City.

### 4.3.1.1 Water Rights Prior to 1938

The City has a long history of railroad, dairy and other commercial enterprises dating back to the mid-19<sup>th</sup> century. The town was incorporated in 1924. The early history of water use is unclear, but the development of Yelm Ditch indicates the use of surface water in the town's early days. A well may have been developed by the U.S. military that was subsequently used by the town (per communication with City staff). It is not clear whether the "Army Well" is the same as the well identified as the point of withdrawal under Water Right No. 511-D. Records of these early water supply sources or associated water rights were lost to a fire in 1985.

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Table 4-4

### WATER SYSTEM PLAN WATER RIGHTS SELF ASSESSMENT – EXISTING STATUS

PERMIT CERTIFICATE	NAME ON	PRIORITY SOUR		ANY PORTION SUPPLEMENTAL?	EXISTING WATER RIGHTS		EXISTING CONSUMPTION		CURRENT WATER RIGHT STATUS (Excess/Deficiency)	
OR CLAIM #	DOCUMENT	DATE	NUMBER	(If yes, explain in footnote)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. GWC 4980	City of Yelm	4/10/50	Downtown Wells 1 & 2	Yes	157 gpm <sup>(2)</sup>	54.44 aft	_	_	_	_
2. GWC 597	City of Yelm	5/24/50	Downtown Wells 1 & 2	No	500	145	_	_	_	_
3. GWC 1581	City of Yelm	4/19/51	Downtown Wells 1 & 2	Yes	250 <sup>(2)</sup>	62.22	—	_	_	_
5. GWC 5155	City of Yelm	4/16/63	Downtown Wells 1 & 2 <sup>(1)</sup>	No	380	77	_	_	_	_
6. GWC 5721	City of Yelm	12/6/66	Downtown Wells 1 & 2	Yes	80	14.2(2)	_	_	_	_
7. G2-22969	City of Yelm	7/12/74	Downtown Wells 1 & 2	No	140	63	_	_	_	_
8. G2-24778	City of Yelm	11/30/77	Downtown Wells 1 & 2	Yes	100(2)	39	_	_	_	_
9. G2-26041	City of Yelm	12/7/81	Downtown Wells 1 & 2	No	500	356	_	_	_	_
10. GWC 3561	City of Yelm	7/7/58	Downtown Wells 1 & 2	Yes	700	112 (2),(6)	-	_	_	_
				TOTALS	2,300 gpm	796.66 aft	1,200 gpm <sup>(3)</sup>	812.3 aft <sup>(4)</sup>	+1,100 gpm	-15.64 aft <sup>(5)</sup>

<sup>(1)</sup> Place of use transferred from Ferguson Wells 1 and 2 in 2009

<sup>(2)</sup> Non-additive quantity.

<sup>(3)</sup>Instantaneous pumping at the Downtown Wellfield is currently limited to 1,200 gpm.

<sup>(4)</sup>Existing consumption for 2009. In 2010, taking into account conservation savings, projected consumption is 796.66 aft.

<sup>(5)</sup> Water rights deficit for 2009 per DOE. In 2010, taking into account conservation savings, planned excess is 0 aft (796.66 – 796.66 = 0 aft).

<sup>(6)</sup> The status of Q<sub>a</sub> of 112 acre-feet claimed by City is disputed by Ecology. While the City is not waiving or relinquishing its claim to the identified 112 aft, this Plan does not presently rely on that quantity for its current planning efforts. Shown as a non-additive quantity, but subject to revision.



Table 4-4 (continued)

## WATER SYSTEM PLAN WATER RIGHTS SELF ASSESSMENT – EXISTING STATUS

DENIDING WATER RIGHT	NAME ON	DATE	ANY PORTION	PENDING W	ATER RIGHTS
APPLICATION (New/Change)	APPLICATION	SUBMITTED	SUPPLEMENTAL? (If yes,	Maximum Instantaneous Flow	Maximum Annual Volume (Qa)
mininger (new/change)	MILLIGHTION	SODWITTED	explain in footnote)	Rate (Qi) Requested	Requested
1. 597 - Credit for Decommissioned	City of Yelm	3/08/2010	No	0	31.26
Wells <sup>(1)</sup>	-				
2. G2-00792 (McMonigle) <sup>(1)</sup>	City of Yelm	4/18/2008	No	85	121.33
3. G2-29084	City of Yelm	1/10/94	No	1,500	3,000
4. G2-29085	City of Yelm	1/10/94	No	3,000	3,500
5. G2-29086	City of Yelm	1/10/94	No	3,000	3,500
<sup>(1)</sup> Anticipated to be approved in 2011.		·			



### Table 4-5

### WATER SYSTEM PLAN

## WATER RIGHTS SELF ASSESSMENT – 6 YEAR FORECAST (2015)

PERMIT NAME ON CERTIFICATE DOCUMEN		PRIORITY	SOURCE NAME/	ANY PORTION SUPPLEMENTAL?	EXISTING WATER RIGHTS		FORECAST USE FROM (6-year I	ED WATER SOURCES Demand)	FORECASTED WATER RIGHT STATUS (Excess/Deficiency)	
OR CLAIM #	Т	DATE	NUMBER	(If yes, explain in footnote)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. GWC 4980	City of Yelm	4/10/50	Downtown Wells 1 & 2	Yes	157 gpm <sup>(2)</sup>	54.44 aft	-	_	_	_
2. GWC 597	City of Yelm	5/24/50	Downtown Wells 1 & 2	No	500	145	_	_	_	_
3. GWC 1581	City of Yelm	4/19/51	Downtown Wells 1 & 2	Yes	250 <sup>(2)</sup>	62.22	_	_	_	_
5. GWC 5155	City of Yelm	4/16/63	Downtown Wells 1 & 2 <sup>(1)</sup>	No	380	77	_	-	_	_
6. GWC 5721	City of Yelm	12/6/66	Downtown Wells 1 & 2	Yes	80	14.2 <sup>(2)</sup>	_	_	_	_
7. G2-22969	City of Yelm	7/12/74	Downtown Wells 1 & 2	No	140	63	—	-	Ι	Ι
8. G2-24778	City of Yelm	11/30/77	Downtown Wells 1 & 2	Yes	100(2)	39	_	_	-	
9. G2-26041	City of Yelm	12/7/81	Downtown Wells 1 & 2	No	500	356	_	_		
10. GWC 3561	City of Yelm	7/7/58	Downtown Wells 1 & 2	Yes	700	112 (2),(5)	—	-	Ι	Ι
11. 597 - Credit for Decomm. Wells <sup>(6)</sup>	City of Yelm	3/08/2010	Downtown Wells 1 & 2	No	0	31.26	—	_	_	-
12. G2-00792 (McMonigle) <sup>(6)</sup>	City of Yelm	4/18/2008	Downtown Wells 1 & 2	No	85	121.33	—	-	-	-
		S	UBTOTAL – D	OWNTOWN WELLS	2,385 gpm	949.25 aft	1,700 gpm <sup>(3)</sup>	525 aft <sup>(4)</sup>	+685 gpm	+426.8 aft(8)
13. New Phase 1	City of Yelm		SW Yelm	No	750	554	750(3)	554(4)	0	0
Water Right <sup>(7)</sup>			#1A	TOTAT	2.425	1 502 05 0	2.450	1 0 50 8/4	<0 <b>.</b>	
				TOTALS	5,135 gpm	1,503.25 aft	2,450 gpm <sup>(3)</sup>	1,079 aft <sup>(4)</sup>	+685 gpm	+424.3 aft <sup>(8)</sup>



Table 4-5 (continued)

#### WATER SYSTEM PLAN

### WATER RIGHTS SELF ASSESSMENT - 6 YEAR FORECAST (2015)

<sup>(1)</sup> Place of use transferred from Ferguson Wells 1 and 2 in 2009

<sup>(2)</sup> Non-additive quantity.

<sup>(3)</sup>Instantaneous pumping capacity at the Downtown Wellfield increased to 1,700 gpm with planned completion of Downtown Well project in late 2010. Project is estimated to add 500 gpm of instantaneous pumping capacity. Expected capacity of SW Yelm Well #1A estimated to be 750 gpm.

<sup>(4)</sup>Projected total consumption for 2015 is 1,079 aft, see Table 2-21. SW Yelm Well #1A is assumed to be operated up to its water right (554 aft). Remaining demand (525 aft) produced at Downtown Wells 1 and 2.

<sup>(5)</sup> The status of Q<sub>a</sub> of 112 acre-feet claimed by City is disputed by Ecology. While the City is not waiving or relinquishing its claim to the identified 112 aft, this Plan does not presently rely on that quantity for its current planning efforts. Shown as a non-additive quantity, but subject to revision.

<sup>(6)</sup> Anticipated to be approved in 2011.

<sup>(7)</sup>New well with a capacity of 750 gpm and a Qa of 554 acre-feet. Water right represents a portion of right covered in application G2-29084 (see below). Water right applications and resulting water rights quantities shown above correspond with well development schedules developed for this WSP. Actual water right quantities approved by Ecology may be higher per the City of Yelm's Mitigation Plan. Anticipated to be approved in 2012.

<sup>(8)</sup>Quantity subject to revision, depending on disposition of water right application GWC 3561.

PENDING WATER RIGHT	NAME ON	DATE	ANY PORTION	PENDING WATER RIGHTS					
ADDI ICATION (New/Change)	ADDI ICATIONI	SUBMITTED	SUPPLEMENTAL? (If yes,	Maximum Instantaneous Flow	Maximum Annual Volume (Qa)				
APPLICATION (New/Change)	MILICATION	SUDWITTED	explain in footnote)	Rate (Qi) Requested	Requested				
1. G2-29084 <sup>(9)</sup>	City of Yelm	1/10/94	No	750	2,446				
2. G2-29085	City of Yelm	1/10/94	No	3,000	3,500				
3. G2-29086	City of Yelm	1/10/94	No	3,000	3,500				
<sup>(9)</sup> Remainder of water right after applyin	<sup>(9)</sup> Remainder of water right after applying a portion to SW Yelm Well #1A. Qi = 1,500 - 750 = 750 gpm. Qa = 3,000 - 554 = 2,446 aft.								



Table 4-6

#### WATER SYSTEM PLAN

### WATER RIGHTS SELF ASSESSMENT - 20 YEAR FORECAST (2029)

PERMIT CERTIFICATE	NAME ON	PRIORITY	SOURCE NAME/	ANY PORTION SUPPLEMENTAL? (If ves. explain in	EXISTING WATER RIGHTS Maximum Maximum		FORECASTED WATER USE FROM SOURCES (20-year Demand)		FORECASTED WATER RIGHT STATUS (Excess/Deficiency)	
OR CLAIM #	DOCUMENT	DATE	NUMBER	(If yes, explain in	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum
				loothote)	Instantaneous	Annual Volume (Oa)	Instantaneous	Annual Volume (Oa)	Instantaneous	Annual Volume (Oa)
1. Existing water	r rights (see Tables	4-4 and 4-5)	SW Yelm	Yes	750 gpm	554  ac-ft			Plow Rate (QI)	Volume (Qa)
transferred fro	m downtown wells	5.	Well #2 <sup>(1)(7)</sup>		or				—	-
2. Existing water rights (see Tables 4-4 and 4-5)			SW Yelm	Ves	750 mm	395.25 ac-ft	_	_	—	_
transferred fro	m downtown wells	5.	Well #3 <sup>(1)</sup>	750 gpiii - 575.25 ac-it	—					
3. Existing water rights (see Tables 4-4 and 4-5)		4-4 and 4-5)	SW Yelm	Yes	750 gpm	_	-	_	_	-
transferred fro	m downtown wells	S.	Well #4 <sup>(1)</sup>							
4. Existing water	r rights (see Tables	4-4 and 4-5)	SW Yelm	No	135 gpm	_	_	_	—	-
transferred fro	m downtown wells	S.	Well #5 <sup>(1)</sup>							
SUBTOTA	L – WATER RIGH	ITS TRANSFE	RRED FROM DO	OWNTOWN WELLS <sup>(2)</sup>	2,385 gpm	949.25 ac-ft				
5. New Phase 1 W	ater Right <sup>(3)</sup>		SW Yelm	No	750 gpm	554 ac-ft				
			#1A							
6. New Phase 2 W	ater Right <sup>(4)</sup>		SW Yelm #3	No	_	158.75 ac-ft				
7. New Phase 3 W	ater Right <sup>(4)</sup>		SW Yelm #4	No	_	554 ac-ft				
8. New Phase 3 W	ater Right <sup>(4)</sup>		SW Yelm #5	No	615 gpm	554 ac-ft				
			•	TOTALS	3,750 gpm	2,770 ac-ft	3,750 gpm <sup>(5)</sup>	1,881 ac-ft <sup>(6)</sup>	0 gpm	+889 ac-ft

<sup>(1)</sup> Existing water rights for downtown wells planned for transfer to Southwest Yelm wells by 2029, consistent with mitigation plan.

<sup>(2)</sup> Matches water rights shown in Table 4-6 for downtown wells.

 $^{(3)}$  See Table 4-5

<sup>(4)</sup>Phase 2 and Phase 3 water rights represent a portion of total water right applied for in pending application G2-29084, consistent with mitigation plan. Water right applications and resulting water rights quantities shown above correspond with well development schedules developed for this WSP. Actual water right quantities approved by Ecology may be higher per the City of Yelm's Mitigation Plan.

<sup>(5)</sup> Total capacity of SW Yelm Wells 1A – 5 (5 x 750 gpm).

<sup>(6)</sup> Projected Qa for 2029, see Table 2-21.

<sup>(7)</sup>New well with a capacity of 750 gpm and a Qa of 554 acre-feet, per mitigation plan. Typical for five Southwest Yelm wells. Anticipated construction dates: SW Yelm #1A - 2012, SW Yelm #2 - 2016, SW Yelm #3 - 2018, SW Yelm #4 - 2024, SW Yelm #5 - 2030.

PENDING WATER RIGHT	NAME ON	DATE	ANY PORTION	PENDING WATER RIGHTS				
APPLICATION (New/Change)	APPLICATION	SUBMITTED	SUPPLEMENTAL? (If yes,	Maximum Instantaneous Flow	Maximum Annual Volume (Qa)			
MITLIC//IION (New/Change)		SODMITTED	explain in footnote)	Rate (Qi) Requested	Requested			
1. G2-29084 <sup>(8)</sup>	City of Yelm	1/10/94	No	135 gpm	1,179.25 ac-ft			
2. G2-29085	City of Yelm	1/10/94	No	3,000	3,500			
3. G2-29086	City of Yelm	1/10/94	No	3,000	3,500			
<sup>38</sup> Remainder of water right after applying a portion to SW Yelm Wells #1A, 3, 4, and 5. (Remaining Qi= $1,500 - 750 - 615 = 135$ gpm, Qa= $3,000 - 554 - 158.75 - 554 = 1,179.25$ aft.)								

#### 4.3.1.2 Water Rights 1938-1974

**Certificate No. 511-D.** Although this water right has been relinquished by the City, it is included here because its history is important in understanding the City's Water Right Certificate Nos. 597 and 3561. In 1938, the City began using a well located at the site of the present City Hall. Declaration of Ground Water Claim No. 603 was filed in 1948. Certificate of Ground Water Right No. 511-D authorized the withdrawal of 240 gpm and 60 acre-feet per year from this original City well. Construction drawings for the present City Hall, dated July 31, 1974, included a note stating that decommissioning of the well at that location would be required. The well was decommissioned sometime between the date of that note (July 1974) and January 1983, when correspondence from the Ecology stated that the old well had been decommissioned and that, for that reason, Ground Water Right No. 511-D should be relinquished. Effective February 7, 1983, the City voluntarily relinquished this water right.

**Certificate No. 597.** On May 24, 1950 the City applied for a water right for a new well, now known as Well 1 at the City's downtown wellfield. A Report of Findings prepared by the Washington State Department of Conservation and Development, Ecology's predecessor agency, identified other existing sources at that time as "one drilled and one dug well." The state agency assured the Yelm City Council at that time that the City's existing water rights would not be affected by issuance of this new water right. Certificate of Ground Water Right No. 597 authorizes use of 500 gpm and 145 acre-feet per year. In 2001, pursuant to an Application for Change submitted by the City, Ecology approved changes to this water right adding Well 2 at the City's downtown wellfield as an additional point of withdrawal, and clarifying the place of use of the water right.

**Certificate No. 3561-A.** On July 7, 1958, the City applied for a water right for a second well at the City's downtown wellfield. The Proof of Appropriation for this water right confirms that this water right is an alternate right, used in rotation with water right Nos. 511-D and 597, as discussed below.

Ecology's POL-1040 (Use of Terms that Clarify Relationships between Water Rights) points to the importance of intent in determining the characteristics of a water right. The intent of the City in this case is clear; the Proof of Appropriation for the water right states that water from the new well was used "every other month." The fact that this water right fulfills the City's intent to use this well half of the time is confirmed by the annual authorized quantity, 112 acre-feet per year, which is equivalent to one-half of the total authorized quantity for the other two wells (205 acre-feet per year) plus 10 percent. Adding 10 percent for flexibility was common, and continues (though less frequently) today.

Ecology's POL-1040 describes the characteristics of "alternate" water rights as follows:

"... a water right that can be used either instead of, or simultaneously with, another water right ... An alternate water right generally does not have an annual quantity that is additive to other water rights. Alternate water rights are typically associated with municipal water supply purpose of use." POL-1040 at p. 3.

When 511-D was relinquished, the remaining two rights, 597 and 3561, continued to authorize a total of 205 acre-feet per year. POL 1040 addresses this issue as well:

"alternate water rights are intended to add flexibility to water systems. Because *the water right holder always had the option of full utilization of this right (in lieu of another),* the potential to increase withdrawals under the right which might result in impairment is diminished. Indeed, full utilization of an alternate right was typically considered in the initial impairment analysis. Thus, there are situations where the re-designation of a right from non-additive to additive is possible as long *as the total additive quantities contained in both water right authorizations are preserved.* Such instances must be considered on a case-by-case basis, and could be made in the context of a change application or other administrative action" [our emphasis].

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In 2001, pursuant to an application for change submitted by the City, Ecology approved changes to this water right, adding Well 1 at the City's downtown wellfield as an additional point of withdrawal under this right, and clarifying the place of use of this water right.

### 4.3.1.3 Water Rights 1974-2005

**Certificate No. G2-22969.** This water right was transferred to the City in 1999. It was one of two water rights transferred from local farms. The two water rights were identified by the families that owned them—Shattuck and Horath. This certificate, known as the Horath Certificate, has a priority date of July 12, 1974. As modified when transferred to the City, it authorizes 140 gpm and 63 acre-feet per year. In evaluating the proposed transfer, Ecology determined that the place of use of the Shattuck certificate was the same as the Horath certificate. A review of the paperwork does not conclusively show that the place of use of the two certificates was the same; however, the Shattuck certificate has been relinquished pursuant to Ecology direction.

**Certificate No. G2-26041.** This certificate with a priority date of December 7, 1981, authorizes 500 gpm and 356 acre-feet per year.

#### 4.3.1.4 Recent Transfers

**Certificate No. 4980.** This surface water right from the Dragt farm, southwest of the City, was transferred to the City by Amended Report of Examination dated August 27, 2007. The priority date of this water right is April 10, 1950. It authorizes 157 gpm non-additive to existing rights, and 54.44 acre-feet per year. The point of withdrawal was changed from surface water diversion to the City's downtown wellfield.

**Certificate No. 1581.** This groundwater right transferred from the Dragt farm to the City of Yelm has a priority date of April 9, 1951. A Report of Examination dated December 22, 2006, authorizes 250 gpm (non-additive) and 62.22 acre-feet per year from the City's downtown wellfield.

**Certificate No. G2-24778.** This groundwater right from the Dragt farm was transferred to the City by Report of Examination dated December 22, 2006. It has a priority date of November 30, 1977, and authorizes 100 gpm (non-additive) and 39 acre-feet per year from the City's downtown wellfield.

**Certificate No. 5155-A.** This water right, known by the original landowner's name of Ferguson, was transferred to the City from the Tahoma Valley Golf and Country Club. It has a priority date of April 16, 1963. The annual quantity authorized for municipal use is 77 acre-feet, with an instantaneous pumping rate of 380 gpm.

**Certificate No. 5721-A.** This second Ferguson right (priority date December 6, 1966) was transferred from the Tahoma Valley Golf and Country Club to the City authorizing additional instantaneous quantities in the amount of 80 gpm and a non-additive annual quantity of 14.2 acre-feet.

### 4.3.1.5 Pending Applications

**Application No. G2-21613 (THUR 08-01).** This pending application requests transfer of a portion of the irrigation water rights held by the McMonigle family from the McMonigle farm to the City of Yelm. The application was accepted by the Thurston County Water Conservancy Board on April 21, 2008 but the application was subsequently denied by Ecology. As of May, 2010 this application is still the subject of a Pollution Control Hearings Board appeal. The City anticipates transfer of approximately 121.33 acre-feet and 85 gpm pursuant to this application by 2011.

**Application No. 597.** This pending application would provide the City with a credit for wells that have been decommissioned. The application was submitted on March 3, 2010. This application requests 31.26 acre-feet and 0 gpm for municipal purposes.

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**Application No. G2-29084.** This pending application was prepared in draft form on June 10, 1994 by the developer of the Thurston Highlands project, requesting 1,500 gpm and 2,000 acre-feet per year for irrigation purposes. The application was assigned to the City by the developer in July of 1994; as revised and submitted by the City to Ecology, this application requests 1,500 gpm and 3,000 gpm from three wells for municipal purposes.

**Application No. G2-29085.** This pending application was submitted to Ecology by the Thurston Highlands developer on January 10, 1994, requesting 3,000 gpm and 3,500 acre-feet per year from three wells for municipal purposes. It was assigned to the City in July 1994.

**Application No. G2-29086.** This pending application was submitted to Ecology by the Thurston Highlands developer on January 10, 1994, requesting 3,000 gpm and 3,500 acre-feet per year from three wells for municipal purposes. The application was assigned to the City in July 1994. The City has conducted test well drilling and testing of potential well sites for all three applications (G2-29084, G2-29085, and G2-29086).

# 4.3.2 Future Water Right Capacity

Future water demand projections are presented in Chapter 2 of this WSP. Figures 4-1 through 4-4 present comparisons of those projected demands against available and anticipated future water rights:

- Figure 4-1: Projected water demands and water rights (acre-feet) for the primary scenario described in this WSP, which does not include the MPCs.
- Figure 4-2: Projected water demands and water rights (in ERUs at 215 gpd/ERU) for the scenario that does not include the MPCs.
- Figure 4-3: Projected water demands and water rights (acre-feet) for the alternative scenario that includes the MPCs.
- Figure 4-4: Projected water demands and water rights (in ERUs at 215 gpd/ERU) for the scenario that includes the MPCs.

These figures include the following information:

- Water rights held by the City is shown to be approximately 796.66 acre-feet.
- Anticipated schedule for securing additional water rights, as documented in Table 1-2 of the Yelm Water Rights Mitigation Plan (Appendix 4E). This sequence of new water rights approvals and transfers is summarized in Tables 4-7 (without MPCs) and 4-8 (with MPCs). This schedule is consistent with the schedule of improvements described in detail in Chapter 8 for the development of new wells in the southwest Yelm wellfield and the water rights self-assessment forms presented above. For example, in 2012 the first southwest Yelm well is schedule to be put into service and a new Phase 1 water right of 554 acre-feet is shown to be secured for this source.
- Water rights held by the City after all pending applications are approved, including the transfer of water rights from the downtown wells to the new southwest Yelm wellfield and application G2-29084, is shown to be 3,949.25 acre-feet.

# 4.4 System Reliability

The purpose of the water system reliability analysis is to summarize efforts being undertaken to ensure that an adequate quantity of water can be provided at all times. When water shortages or interruptions in service occur, public health can be threatened because customers may use other non-potable sources of water inappropriately, or system pressure may be reduced such that basic public health needs are not met or other backflow-related problems occur.

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Figure 4-1 Water Rights Capacity in Acre-Feet (no MPCs)

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Figure 4-2 Water Rights Capacity in ERUs (no MPCs)

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Chapter 4



Figure 4-3 Water Rights Capacity In Acre-Feet (with MPCs)

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Figure 4-4 Water Rights Capacity in ERUs (with MPCs)

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## 4.4.1 Source Reliability

Yelm's two existing wells currently provide an adequate level of reliability. Pump tests for the existing wells have shown that both wells are capable of producing large volumes of water without a decrease in the water level of nearby wells. Hydraulic limitations in the pipeline between the wells and the Baker Hill reservoir prevent the operation of both wells at the same time, so Yelm essentially has one redundant well in case the other well is out of service. The capacity evaluation presented in Chapter 3 shows that there is currently adequate source capacity with just a single well in service. When the southwest Yelm wellfield is developed as water demands increase, source reliability will be substantially improved.

The City's Wellhead Protection Plan is presented in Chapter 5. The two existing wells are in close proximity to each other in downtown Yelm and a spill or other event that affects the production of one well would likely affect both wells. Moving future sources to the southwest Yelm wellfield will result in the sources being much more spread out and drawing water from different aquifers, greatly improving the reliability of the system.

As stated above, the City intends to maintain the infrastructure at the downtown wells after their water rights have been transferred to the southwest Yelm wellfield to provide emergency backup in the event of a catastrophic wellfield failure or a temporary service interruption. This will further increase the water system's reliability and redundancy.

## 4.4.2 Water Right Adequacy

As documented throughout this WSP, Yelm will need to secure additional water rights in order to meet future water demands. Until additional water rights are secured, the City's ability to provide service to the retail service area identified in this WSP will be limited. Sections 4.2 and 4.3, above, describe steps the City has taken to date to secure additional water rights, dating back to water rights applications that were prepared in 1994. The Water Rights Mitigation Plan (Golder and Associates, 2008) establishes a commitment on the City's part to mitigate impacts that are expected to result from additional groundwater withdrawal associated with these new water rights.

# 4.4.3 Facility Reliability

Chapter 3 presents an evaluation of existing system reliability. Key findings from this evaluation include:

- Some areas of the existing distribution system currently lack sufficient capacity to meet fire flow standards. The most severe shortcomings are downtown in the area around City Hall. A program of 10 projects to replace undersized distribution system facilities is described in Chapters 3 and 8.
- The two existing downtown wells are prevented from operating at the same time due to hydraulic restrictions in the downstream pipeline to the Baker Hill tank. One well currently provides adequate source capacity and the second well provides a redundant backup in the event that the first well is out of service.
- The two existing reservoirs currently provide adequate storage capacity and the ability to take one reservoir offline for a short period of time for maintenance.
- Existing chlorination and corrosion control treatment facilities meet DOH standards.

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	Table 4-7. A	nticipated Water Rigl	nts (Qa) Capacity (wi	thout MPCs)	
	(1)	(2)	(3)	(4)	(5)
Year	Projected Annual Demand (ac-ft)	Projected Annual Demand (ERU)	New Water Rights Approved (ac-ft)	Total Water Rights Held (ac-ft)	Total Water Rights Held (ERU)
2007	731	3,033	-	796.66	3,308
2008	756	3,140	-	796.66	3,308
2009	812	3,373	-	796.66	3,308
2010	796.66	3,308	-	796.66	3,308
2011	904	3,754	152.59	949.25	3,942
2012	952	3,951	554.00	1,503.25	6,242
2013	994	4,126	-	1,503.25	6,242
2014	1,036	4,302	-	1,503.25	6,242
2015	1,079	4,479	-	1,503.25	6,242
2016	1,134	4,709	-	1,503.25	6,242
2017	1,190	4,940	-	1,503.25	6,242
2018	1,245	5,172	158.75	1,662.00	6,901
2019	1,302	5,405	-	1,662.00	6,901
2020	1,358	5,639	-	1,662.00	6,901
2021	1,406	5,839	-	1,662.00	6,901
2022	1,455	6,040	-	1,662.00	6,901
2023	1,503	6,242	-	1,662.00	6,901
2024	1,552	6,445	554.00	2,216.00	9,201
2025	1,601	6,649	-	2,216.00	9,201
2026	1,666	6,918	-	2,216.00	9,201
2027	1,752	7,274	-	2,216.00	9,201
2028	1,816	7,542	-	2,216.00	9,201
2029	1,881	7,812	-	2,216.00	9,201
2030	1,947	8,083	1,733.25	3,949.25	16,398

(1) See Table 2-21. Projected demands for 2008, 2009, and 2010 were prepared during initial drafting of this WSP and were estimated to be 819, 843, and 868 ac-ft, respectively. Actual demands were 756 ac-ft (2008) and 812 ac-ft (2009). In 2010, a conservation program was developed with a projected demand of 797 ac-ft for 2010. Actual data and the revised 2010 projection were used when evaluating system capacity from 2007-2010; demand projections shown in Table 2-21 were used to evaluate capacity from 2011-2030.

(2) See Table 2-21; based on 215 gpd/ERU. Demands shown for 2007 - 2009 are actual demands.

(3) New water rights secured as described in Final Water Rights Mitigation Plan (Table 1-2, Appendix 4E) and Section 3.3.1.3. Water right applications and resulting water rights quantities shown above correspond with well development schedules developed for this WSP. Actual water right quantities approved by Ecology may be higher per the City of Yelm's Mitigation Plan.

2010–2012: Additional water rights from decommissioned well credits (31.26 ac-ft) and McMonigle transfer (121.33 ac-ft) totaling 152.59 ac-ft assumed for 2011. Phase 1 water right of 554 ac-ft secured for Southwest Yelm Well 1A. Water right acquisition assumed to be completed in time for Southwest Yelm Well 1A to be put into operation in 2012.

2013-2017: No new water rights required as rights for SW Yelm Well #2 will be transferred from the downtown wells.

<u>2018–2024</u>: Portion of Phase 2 water right of 158.75 ac-ft secured in 2018 for SW Yelm Well #3. Remainder of downtown water rights (395.25 ac-ft) also transferred to SW Yelm Well #3. Remainder of Phase 2 water right and portion of Phase 3 water right for 554 ac-ft secured for SW Yelm Well #4.

<u>2025–2037</u>: Final Phase 4 water right of 1,733.25 ac-ft secured. For the "without MPCs" scenario this water right is not required over the 20-year planning horizon and is assumed to be acquired in 2030.

(4) Totaling all existing and anticipated water rights. The status of Qa of 112 acre-feet claimed by City is disputed by Ecology. While the City is not waiving or relinquishing its claim to the identified 112 aft, this Plan does not presently rely on that quantity for its current planning efforts and the quantity is not shown in the above table.

(5) Based on 215 gpd/ERU.

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	Table 4-8.	Anticipated Water Ri	ghts (Qa) Capacity (v	vith MPCs)	
	(1)	(2)	(3)	(4)	(5)
Year	Projected Annual Demand (ac-ft)	Projected Annual Demand (ERU)	New Water Rights Approved (ac-ft)	Total Water Rights Held (ac-ft)	Total Water Rights Held (ERU)
2007	731	3,033	-	796.66	3,308
2008	756	3,140	-	796.66	3,308
2009	812	3,373	-	796.66	3,308
2010	1,085	4,505	554.00	1,350.66	5,608
2011	1,187	4,930	152.59	1,503.25	6,242
2012	1,301	5,402	-	1,503.25	6,242
2013	1,410	5,853	-	1,503.25	6,242
2014	1,519	6,307	554.00	2,057.25	8,542
2015	1,629	6,762	-	2,057.25	8,542
2016	1,747	7,255	-	2,057.25	8,542
2017	1,867	7,751	158.75	2,216.00	9,201
2018	1,987	8,249	554.00	2,770.00	11,502
2019	2,107	8,749	-	2,770.00	11,502
2020	2,228	9,252	-	2,770.00	11,502
2021	2,329	9,671	-	2,770.00	11,502
2022	2,430	10,092	-	2,770.00	11,502
2023	2,532	10,515	554.00	3,324.00	13,802
2024	2,635	10,940	-	3,324.00	13,802
2025	2,737	11,367	-	3,324.00	13,802
2026	2,855	11,855	-	3,324.00	13,802
2027	2,994	12,433	-	3,324.00	13,802
2028	3,112	12,923	554.00	3,878.00	16,103
2029	3,231	13,416	-	3,878.00	16,103
2030	3,350	13,911	71.25	3,949.25	16,398

(1) See Table 2-20. Demands shown for 2007,2008, and 2009 based on actual demands. Demands in following years are projected.

(2) See Table 2-20; based on 215 gpd/ERU. Demands shown for 2007 - 2009 are actual demands.

(3) New water rights secured as described in Final Water Rights Mitigation Plan (Table 1-2, Appendix 4E) and Section 3.3.1.3. Water right applications and resulting water rights quantities shown above correspond with well development schedules developed for this WSP. Actual water right quantities approved by Ecology may be higher per the City of Yelm's Mitigation Plan.

<u>2010–2012</u>: Phase 1 water right of 554 ac-ft secured for Southwest Yelm Well 1A. Water right acquisition assumed to be completed in time for Southwest Yelm Well 1A to be put into operation in 2010 for the with-MPC scenario. Additional water rights from decommissioned well credits (31.26 ac-ft) and McMonigle transfer (121.33 ac-ft) totaling 152.59 ac-ft assumed for 2011.

2013–2017: Transfer of 554 ac-ft from downtown well for SW Yelm 2 (2014. Phase 2 water right of 554 ac-ft secured for Southwest Yelm Well 3 (2014). Transfer of remainder of downtown well water rights (395.25 ac-ft) and new water right of 158.75 ac-ft secured for SW Yelm Well 4 in 2017.

2018–2029: Water rights of 554 ac-ft secured for SW Yelm Well 5 (2018), SW Yelm Well 6 (2023) and SW Yelm Well 7 (2028).

<u>2029–2037</u>: Final Phase 4 water right of 71.25 ac-ft secured to complete application G2-29084. For the "with MPCs" scenario this water right is not required over the 20-year planning horizon and is assumed to be acquired in 2030.

(4) Totaling all existing and anticipated future water rights held. The status of Qa of 112 acre-feet claimed by City is disputed by Ecology. While the City is not waiving or relinquishing its claim to the identified 112 ac-ft, this Plan does not presently rely on that quantity for its current planning efforts and the quantity is not shown in the above table.

(5) Based on 215 gpd/ERU.

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## 4.4.4 Water Shortage Response Planning

The City's water shortage response plan is included in Appendix 4H. The water shortage response plan includes the following elements:

- A water shortage response plan provides a systematic response, should the need arise, to reduce customer demands due to a water supply emergency. The Plan establishes a strategy in advance of actual conditions so that, in the event that such events occur, the purveyor is prepared to maintain essential public health and safety and minimize adverse impacts.
- Elements of a water shortage contingency plan are similar to a conservation program. However, there is a difference between long-term water conservation measures and water curtailment actions. Curtailment actions are designed to quickly reduce water use, are relatively short-lived, and usually involve some tradeoffs or hardship for customers. A staged approach was developed for the water shortage plan. The response plan began with an advisory stage followed by voluntary measures, and then mandatory measures, if required.

The elements of the existing response plan are outlined in the following sub-section.

### 4.4.4.1 Advisory Stage Triggers

The advisory stage is triggered by at least one of the following conditions:

- The water level in the wells is 40 feet above the bottom of the well (23 feet below pump house floor).
- Dry-weather forecast for 14 days or longer.
- A major water production well out of service for an extended period of time.
- After a natural disaster or large fire, when the reservoirs are drawn down and there is not sufficient recovery time.
- Water rights are interrupted due to in-stream flow requirements.

#### 4.4.4.2 Advisory Stage Actions

The advisory stage includes the following actions:

- Prepare water users for a potential water shortage. Public education through the media plays an important role. The media announce the nature of the emergency and the urgency for the water curtailment measures.
- Assess water system operation activities (main flushing, reservoir cleaning, etc.) that may be accelerated to completion prior to peak season or reduced to conserve supply.
- Intensify efforts to monitor weather forecasts to predict peak consumption periods.

#### 4.4.4.3 Voluntary Stage Triggers

The voluntary stage is triggered by at least one of the following conditions:

- The water level in the wells is 36 feet above the bottom of the well (27 feet below the pump house floor).
- Fire potential is high or fires have been experienced.
- Reservoir levels are continually low and not recovering.

#### 4.4.4.4 Voluntary Stage Actions

The voluntary stage includes the following actions:

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- Initiate media campaign to promote consumption goals and voluntary customer curtailment actions. Keep customers informed of potential water shortage solutions.
- Recommend specific customer actions to reduce demand, such as washing cars less often and reducing irrigation.
- Set up customer "hotline" for customers to obtain additional conservation information.

### 4.4.4.5 Mandatory Stage Triggers

The mandatory stage is triggered by at least one of the following conditions:

- The water level in the wells is 25 feet above the bottom of the well (36 feet below the pump house floor).
- After a natural disaster.
- A large fire event.
- Hot weather over a long period of time (drought conditions).
- Low water levels in the reservoirs (water level down to 25 feet) and the pumps cannot recover or keep up with demand.

#### 4.4.4.6 Mandatory Stage Actions

The mandatory stage includes the following actions:

- Restrict lawn watering to 1 or 2 days per week. Prohibit irrigation between 10:00 a.m. and 7:00 p.m.
- Prohibit car washing except at commercial car wash facilities that recycle water.
- Prohibit washing of sidewalks, streets, decks, and driveways, except as necessary for public health and safety.
- Prohibit water waste.
- Set up a customer "hotline" to report restriction violations.

## 4.4.5 Monitoring Well Levels

Water levels in the wells have been measured and recorded periodically since 2001. In general, the well levels show some seasonal fluctuation, with water levels being slightly lower in the summer and fall than in the winter and spring. Water levels have not changed significantly since 2001. The depth to the water surface in wells is shown in Table 4-9.

# 4.5 Interties

There are no existing or proposed interties between the City's water system and the surrounding water systems. The City's Contingency Plan in Section 5.4 includes an evaluation of potential interties with neighboring water systems.

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	Table 4-9. Static Water Level Measurements <sup>1</sup>										
	2001	2002	2003	2004	2005	2006	2007	2008	2009		
Month	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)	Average Reading (feet)		
January		24.2	31.3	28.4	29.8	22.2	22.5	26.6	29.1		
February		23.9	28.1			22.3	24.3	24.3	26.1		
March	30.9	24.0	27.1			24.9			28.8		
April	30.8	24.5	25.7	28.8	29.9	25.8		24.5	27.3		
Мау	30.8	25.7	26.7			28.9		28.2			
June	31.6	28.4		29.7	29.8						
July	32.6	30.7	32.7					32.2			
August	33.7	31.5									
September	34.5	33.4	34.5			35.0					
October	35.3	33.6	34.6				33.8				
November	34.4	34.4					32.9	34.8			
December	28.9	34.4	31.8	30.0	30.5	26.9		33.1			
Annual Average	32.3	29.1	30.2	29.2	30.0	26.6	28.4	29.1	27.8		

<sup>1</sup> Rather than the height of the water column in the well, measurements reflect distance from the top of the well slab (approximately 1' above ground surface elevation) to the water surface elevation. Therefore, the greater the distance to water surface, the lower the water level in the well.

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