

# Water Management and Conservation Plan

Prepared for  
**City of The Dalles, Oregon**

**November 2014**

Prepared by



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# Oregon

John A. Kitzhaber, MD, Governor

## Water Resources Department

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November 18, 2014

City of The Dalles  
Attn: Dave Anderson  
313 Court Street  
The Dalles, OR 97058

Subject: Water Management and Conservation Plan

Dear Mr. Anderson:

Enclosed, please find the final order approving the City of The Dalles' Water Management and Conservation Plan and specifying that the diversion of water under Permit S-49653 remains limited to 0.0 cfs and that the diversion of water under Permit S-53930 remains limited to 0.0 acre feet per year.

The attached final order specifies that the City of The Dalles' plan shall remain in effect until **November 14, 2024**. Additionally, the City is required to submit a progress report to the Department by **November 14, 2019**, detailing progress made toward the implementation of conservation benchmarks scheduled in the plan. Finally, the City must submit an updated Water Management and Conservation Plan to the Department by **May 14, 2024**.

*NOTE: The deadline established in the attached final order for submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of The Dalles from any existing or future requirement(s) for submittal of a water management and conservation plan at an earlier date as established through other final orders of the Department.*

We appreciate your cooperation in this effort. Please do not hesitate to contact me at 503-986-0880 or [Lisa.J.Jaramillo@wrdd.state.or.us](mailto:Lisa.J.Jaramillo@wrdd.state.or.us) if you have any questions.

Sincerely,

Lisa J. Jaramillo  
Water Management and Conservation Analyst  
Water Right Services Division

Enclosure

cc: WMCP File

Application S-55346 (Permit S-49653)

Application S-84050 (Permit S-53930)

Mike Ladd, North Central Region Manager

Bob Wood, District #03 Watermaster

GSI Water Solutions, Inc., Attn: Adam Sussman, 1600 SW Western Blvd., Ste. 240, Corvallis, OR 97333



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**BEFORE THE WATER RESOURCES DEPARTMENT  
OF THE  
STATE OF OREGON**

In the Matter of the Proposed Water                    )     FINAL ORDER APPROVING A  
Management and Conservation Plan for the        )     WATER MANAGEMENT AND  
City of The Dalles, Wasco County                 )     CONSERVATION PLAN

**Authority**

OAR Chapter 690, Division 086, establishes the process and criteria for approving water management and conservation plans required under the conditions of permits, permit extensions and other orders of the Department.

**Findings of Fact**

1. The City of The Dalles submitted a Water Management and Conservation Plan (plan) to the Water Resources Department (Department) on July 25, 2014. The plan was required by conditions set forth in the final orders approving Extensions of Time for Permits S-49653 and S-53930.
2. The Department published notice of receipt of the plan on August 5, 2014, as required under OAR Chapter 690, Division 086. No comments were received.
3. The Department provided written comments on the plan to the City on September 19, 2014. In response, the City submitted a revised plan on November 10, 2014.
4. The Department reviewed the revised plan and finds that it is consistent with the relevant requirements under OAR Chapter 690, Division 086.

**Conclusion of Law**

The Water Management and Conservation Plan submitted by the City of The Dalles is consistent with the criteria in OAR Chapter 690, Division 086.

**Now, therefore, it is ORDERED:**

**Duration of Plan Approval:**

1. The City of The Dalles Water Management and Conservation Plan is approved and shall remain in effect until November 14, 2024, unless this approval is rescinded pursuant to OAR 690-086-0920.

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.



**Development Limitations:**

2. The limitation of the diversion of water under Permit S-49653 established in the Final Order approving an Extension of Time for Permit S-49653 (*issued on October 16, 2012*) remains unchanged. Subject to other limitations or conditions of the permit, therefore, the City of The Dalles is not authorized to divert any water under Permit S-49653 at this time.
3. The limitation of the diversion of water under Permit S-53930 established in the Final Order approving an Extension of Time for Permit S-53930 (*issued on October 28, 2011*) remains unchanged. Subject to other limitations or conditions of the permit, therefore, the City of The Dalles is not authorized to divert any water under Permit S-53930 at this time.

**Plan Update Schedule:**

4. The City of The Dalles shall submit an updated plan meeting the requirements of OAR Chapter 690, Division 086 within 10 years and no later than May 14, 2024.

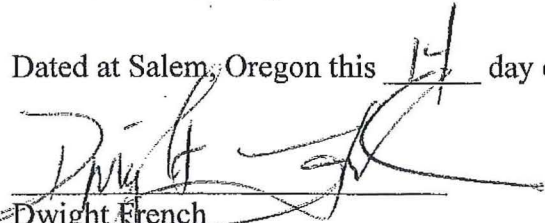
**Progress Report Schedule:**

5. The City of The Dalles shall submit a progress report containing the information required under OAR 690-086-0120(4) by November 14, 2019.

**Other Requirements for Plan Submittal:**

6. The deadline established herein for the submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of The Dalles from any existing or future requirement(s) for submittal of a Water Management and Conservation Plan at an earlier date as established through other final orders of the Department.

Dated at Salem, Oregon this 14 day of November, 2014.

  
Dwight French

Water Right Services Division Administrator, for  
Thomas M. Byler, Director  
Oregon Water Resources Department

Mailing date: NOV 25 2014

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- Exhibit 2-2. Historical Annual Water Demand, Average Day Demand, Maximum Day Demand, Peaking Factor, and Maximum Month Demand, 2005-2012
- Exhibit 2-3. Annual Demand (MG), 2005-2012
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- Exhibit 2-7. Number of Accounts by Customer Category, 2011
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- Appendix A Letters to Local Governments and Comments
- Appendix B Water Conservation Brochure
- Appendix C Excerpts from the 2010 and 2012 Drinking Water Quality Reports
- Appendix D Web site Water Conservation Tips
- Appendix E Water Demand Projections

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# Executive Summary

The City of The Dalles (City), located in the Columbia Gorge east of Mount Hood, is a trading hub for the Mid-Columbia Region with a rich history. The City, which was incorporated as Dalles City by act of the Oregon Territorial Legislature on June 26, 1857, is the third oldest incorporated city in Oregon. The area has ghost towns, Native American petroglyphs, and museums. The City also offers easy access to numerous recreational opportunities.

The City has dedicated substantial time and resources towards water management and conservation measures in recent years, an effort that has helped reduce water demand, and the City plans to implement additional measures. Despite these efforts, the City will need to expand use of its current water rights and to secure redundant surface water resources over time based on the City's anticipated growth, the location of the City's municipal watershed within a natural disaster prone region, the location of the City's groundwater supply within The Dalles Critical Groundwater Area, and the degraded quality of local groundwater.

This is the City's first Water Management and Conservation Plan (WMCP, or Plan). The purpose of this WMCP is to guide development, financing and implementation of water management and conservation programs that ensure sustainable water use, as well as to consider the City's future water needs. The City's surface water permit S-53930 (use of stored water from the enlarged Crow Creek Reservoir) is conditioned to require submission of a WMCP within 1 year of NEPA approval. In addition, the Oregon Water Resources Department's (OWRD) final orders extending the development deadlines for Permits S-53930 and S-49653 (use of water from the Columbia River) include a condition stating that access to additional water under these permits is contingent on a final order approving a WMCP and that the required WMCP must be submitted to the OWRD within 3 years of approval of the extension.

The WMCP is organized into four sections that describe and analyze the City's water supply, water conservation measures, water curtailment plan, and water supply projections and plans.

## Municipal Water Supplier Description

The City has diverse sources of water that provide the City with water management flexibility. The City depends principally upon surface water from the Dog River and South Fork Mill Creek (including the sub-drainages of Alder Creek and Crow Creek) watersheds within The Dalles Municipal Watershed. Surface water from these sources flows into Crow Creek Reservoir, an impoundment created by Crow Creek Dam. Stored water is released at Crow Creek Dam into South Fork Mill Creek and live flow and released stored water are captured 8 miles downstream at the South Fork Mill Creek Intake, at which point water is conveyed a short distance to Wicks Water Treatment Plant. The City uses this stored water and available live flow throughout the year to meet municipal demand. In addition, the City has three groundwater wells within City limits that it uses to supplement surface water supply during the summer months and to provide emergency water supply.

Once infrastructure is developed, water from the Columbia River will provide a redundant water supply for the City's existing surface water and groundwater sources, as well as provide water supply for future growth. This redundant supply is needed given that the City's surface

water sources in The Dalles Municipal Watershed are vulnerable to natural disasters and its groundwater water comes from a designated Critical Groundwater Area.

The City has surface water and groundwater rights that enable it to use the water sources described above. The City has five surface water rights for municipal use: Certificate 5691 for up to 2 cfs from South Fork Mill Creek, Certificate 14954 for up to all the water in Dog River, Certificate 60410 and Permit S-53930 for up to 3055 AF of water from Crow Creek Reservoir, and Permit S-49653 for up to 40 cfs from the Columbia River. The City also holds Certificate 44917 and Permit R-13105 that allow the storage of up to 3055 AF of water from South Fork Mill Creek and Dog Creek in Crow Creek Reservoir. The City has authorization to use up to 18.454 cfs from its three main wells (Lone Pine, Marks, and Jordan Street Wells) under GR 4258 as modified by GR Modification T-10865, Certificate 15543, Certificate 86380, Certificate 48991, and Certificate 60026. The City also holds additional groundwater rights that are not actively used or are not considered part of the municipal water supply.

The City's estimated water service population was 11,964 in 2013, which includes 292 residents outside City limits and excludes residents served by Chenoweth PUD. The City's annual demand, the quantity of water delivered to the water distribution system from the water treatment plant and groundwater wells, averaged 1126.9 MG from 2005 through 2012. During this period, the City's average day demand averaged 3.09 mgd and its greatest maximum day demand was 9.30 mgd in 2005. Demand includes metered consumption, unmetered uses, and water lost to leakage, reservoir overflow, and evaporation.

The City's annual metered consumption averaged 977.9 MG from 2006 through 2012. The City divides its metered customers into four major customer categories to further understand metered consumption for its planning and water conservation efforts. The four major customer categories are: commercial/industrial, single family residential, multi-family residential, and government (which includes facilities owned by the City, County, Port, and College). In 2011, commercial/industrial water users consumed 49 percent and single family residential water users consumed 46 percent of the total metered water use.

The City's unaccounted-for water (the difference between annual demand and metered consumption plus unmetered authorized uses) was 16.5 percent in 2012 and averaged 13.6 percent from 2006 through 2012.

Section 2 of this WMCP provides more details regarding the City's water supply, water use, water rights, and water system.

## **Water Conservation**

OWRD's WMCP rules require municipal water providers to have 5-year benchmarks for initiating or expanding conservation measures related to required conservation programs. The following is a summary of the City's activities associated with the required conservation measures and the 5-year benchmarks for implementing those measures.

### **Annual Water Audit**

To date, the City has periodically conducted annual water audits to obtain information for Water System Master Plans. In addition, the City has been investing resources in its production reporting system to address losses of data in the past and in its billing system to enable more detailed analyses of consumption data. The City also is currently strategizing how to improve



monthly collection of meter data to avoid the occasional situation where data from some meters was not collected for given month resulting in its inclusion in the following month.

*Five-Year Benchmarks:* The City will annually compare metered water production to metered consumption and estimated unmetered authorized uses to calculate unaccounted-for water. In the next five years, the City will put in place practices to reduce the occurrence of missed meter reads, which result in higher use attributed to the next month's consumption. In the next five years, the City will continue to improve its billing system to provide more detailed consumption records.

### **System-wide Metering**

The City's water system is fully metered.

*Five-Year Benchmarks:* The City will continue to require meters on all new connections.

### **Meter Testing and Maintenance**

The City's Water Distribution Division has installed automated meter reading (AMR) on all of its meters and the City has replaced any meter found not functioning at the time of AMR installation. The City annually tests about one-fifth of its large meters and repairs or replaces any meter found to be malfunctioning or operating outside of their rated accuracy. The City replaces meters less than 3-inches in size on a schedule instead of testing them. Beginning in 2013, the City will replace 10 percent of the residential water meters on an annual basis. In addition, a monthly meter malfunction report is generated from the meter reading software and the City repairs all meters on this list. The City also replaces any meter upon its failure. The City recently installed magnetic meters at Vista Reservoir and its pump station and on the Marks Well, Jordan Street Well, and Lone Pine Well. These meters have not been tested yet due to the recent installation.

*Five-Year Benchmarks:* Over the next five years the City will continue all of the meter testing and repair activities described above, including an annual test of large meters and residential meter repair and replacement. In addition within 5 years the City will implement a program to test its well meters and its magnetic meters.

### **Water Rate Structure and Billing Practices that Encourage Conservation**

Since 1996, City water rates have included both a monthly basic charge based on meter size and a consumptive charge. Residential and commercial customers outside city limits are charged 1.5 times the applicable rates for bonded water system improvements, in lieu of debt service property taxes collected inside the City. The City also charges contractors a hydrant water usage fee and a Public Works Department fill station fee.

As part of a 10-year (2010-2020) water rate schedule, the City increases Commercial/Industrial and Residential base and consumption charges by 10 percent annually during this period, with an exception in 2011 when the Residential base water charges increased by 8 percent and Residential consumption charges increased by 30 percent. The City intends the substantial increase in consumption charges to encourage water conservation. The City bills customers monthly to provide relatively quick feedback on water usage to customers. Customers' bills are postcards and include usage for the month billed and for the same month in the previous year.

*Five-Year Benchmarks:* The City will continue to bill customers based, in part, on the quantity of water metered at the service connection and will maintain its monthly billing schedule. In the

next 5 years, the City will periodically add water conservation messages to its bills. In the next 5 years, the City will investigate the feasibility of providing past water usage information spanning the previous 12 or 13 months on water bills. In the next 5 years, the City plans to continue to enact rate adjustments for all customer classes that will encourage water conservation.

### **Leak Detection and Repair**

The City has a leak detection and repair program to reduce water losses in the City's water system. Typically, one to two miles of main lines are reviewed for leaks annually and identified leaks are repaired on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years. The City has identified major leaks in the two approximately 7 mile-long pipelines between the water treatment plant and the city limits and has adopted a capital improvement plan to replace the pipelines, as well as a rate schedule and project schedule. Leak repair is an on-going process.

Furthermore, leaks are detected by visual inspection by City staff or by customers who contact the City with concerns. City staff repairs leaks associated with customer connections promptly and repairs other leaks on a priority basis. The AMR system that the City has installed will enable the City to review customer water consumption and to identify customers with elevated water use that suggests a leak needing investigation.

*Five-Year Benchmarks:* Over the next 5 years, the City will conduct leak detection on approximately 26 miles of pipeline, and based on the results of that effort, the City may revisit its annual leak detection efforts. In the next 5 years, the City will continue to seek funding for major leak repairs to fix the leaks as soon as possible. The City will continue to address minor leaks on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years.

### **Public Education**

The City uses a variety of approaches to educate the public about water conservation. The Public Works Department has a booth at the annual Cherry Festival community event where staff offers information and free items that promote efficient indoor and outdoor water use, such as faucet aerators, shower timers, watering brochures and rain gauges, and water conservation booklets for children. The City also provides tours of the WTP to school groups that promote water conservation. Water conservation brochures are available to the public at the Public Works Department office and City Hall Finance Department where utility bills are paid, and the City delivers an annual water quality report to every water customer that contains articles about Water Conservation and links to conservation Web sites.

*Five-Year Benchmarks:* The City will continue to maintain and update its print materials and Web site content about water conservation. The City will continue to provide water conservation information and items at community events. In the next 5 years, the City will seek additional partnerships to promote water conservation.

### **Technical and Financial Assistance Programs**

To increase indoor water conservation, the City provides interested customers with toilet leak detection tablets and leak gauges at the annual Cherry Festival and at the Public Works Department office upon request. To increase outdoor water conservation, the City provides interested customers lawn-watering gauges and gives away free drought-tolerant plants



through a drawing. A City ordinance (General Ordinance No 91-1133, Section 9 (j)) allows a rate adjustment for customers who repair leaks promptly.

*Five-Year Benchmarks:* The City will continue to offer rate adjustments for timely leak repair. The City will continue to offer toilet leak detection tablets, leak gauges, and lawn watering gauges at the annual Cherry Festival and at the Public Works Department office upon request. In the next 5 years, the City will meet with Commercial/Industrial customers to discuss water conservation opportunities.

### **Supplier Financed Retrofit or Replacement of Inefficient Fixtures**

The City offers its customers items that promote efficient water use indoors and outdoors at the annual Cherry Festival, such as faucet aerators and toilet flappers. In addition, many of these items are available at the Public Works Department, and the Finance Department distributes selected items, such as hose nozzles with a brochure about efficient watering.

*Five-Year Benchmarks:* The City will continue to offer 1.5 gpm faucet aerators and toilet flappers to customers at the annual Cherry Festival.

### **Water Reuse, Recycling, and Non-potable Opportunities**

The City provides non-potable water from three wells for use in the heating and cooling system of the new, LEED certified The Dalles Middle School. In addition, the school district is using water from the wells for irrigating approximately 7.9 acres. The City also re-uses treated effluent at its Wastewater Treatment Plant for clarifier sprayers, gravity belt wash down, and digester gas defoaming.

*Five-Year Benchmarks:* The City will continue to explore opportunities for water reuse and recycling. In the next 5 years, the City will contact industrial users to discuss the potential for water reuse in their operations.

### **Other Conservation Measures**

City staff participates actively in the American Water Works Association, including the Pacific NW Section of AWWA.

The City also has an ordinance (General Ordinance No. 91-1133, Section 6) allowing it to terminate a customer's water service in the event of an emergency or damage to the system, or when the customer has been convicted of a violation of water or sewer ordinances or rules or a violation of water restrictions.

*Five-Year Benchmarks:* In the next 5 years, the City will review City ordinances and its building permit review process to find opportunities to encourage water conservation.

Section 3 of this WMCP provides more detailed descriptions of the District's water conservation measures.

## **Water Curtailment**

The City's curtailment plan outlines measures that the City may take in response to short-term water supply shortages. The City's curtailment plan consists of four stages of increasing severity that are intended to be initiated and implemented in progressive steps. The stages include both voluntary and mandatory rationing. Each stage is triggered by initiating conditions that focus on reservoir water storage and water supply deficits in the water system,

as shown in Exhibit ES-1. However, initiating conditions from other supply shortage scenarios also are included.

**Exhibit ES-1. Curtailment Stages 1 through 4.**

Curtailment Stages	Potential Initiating Conditions
<b>Stage 1: Water Shortage Advisory</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 6.0 mgd</li> <li>• Minor maintenance work or damage repair is required at water pumps, mains, or reservoirs</li> <li>• A prolonged period of hot, dry weather is forecasted</li> </ul>
<b>Stage 2: Moderate Water Shortage Alert</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 5.0 mgd</li> <li>• Minor damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a minor part of the water system or a facility</li> <li>• Prolonged period of hot, dry weather</li> </ul>
<b>Stage 3: Severe Water Shortage Alert</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 4.0 mgd</li> <li>• Serious damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a significant part of the water system or a facility</li> <li>• Isolated contamination of the water supply</li> <li>• Serious, persistent drought</li> </ul>
<b>Stage 4: Water Shortage Emergency</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 3.0 mgd</li> <li>• Extensive damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a critical water system or a facility</li> <li>• Contamination of the entire water supply</li> </ul>

The following are examples of actions to curtail water use under the four stages of water curtailment.

- Stage 1: Water Shortage Advisory
  - Ask customers to voluntarily decrease water use (indoor and outdoor) by 10 percent.
  - Limit City water use for street sweeping and for hydrant and water line flushing.
- Stage 2: Moderate Water Shortage Alert
  - Implement mandatory irrigation restrictions for all users
  - Ask commercial and industrial customers to voluntarily reduce non-essential water use by 25 to 50 percent.
- Stage 3: Severe Water Shortage Alert
  - Prohibit use of City water to clean, fill, or maintain levels in decorative streams, ponds, or fountains unless they have a recirculating water system.
  - Ask commercial and industrial customers to voluntarily reduce non-essential water use by 50 to 80 percent.
- Stage 4: Water Shortage Emergency
  - Request that residential customers limit water use to those uses necessary for basic sanitation, drinking, and eating.



- o Ask commercial and industrial customers to voluntarily cease non-essential water uses.

Section 4 of this WMCP details the initiating conditions and response actions associated with each curtailment stage.

## Water Supply

The City’s water supply plan for the next 20 years considers its projected population growth and associated increases in demand during this period. The plan also assesses how the City will meet this projected demand, based on the reliability of its water rights and its current and anticipated infrastructure.

To determine its projected population, the City applied a 1.1 percent growth rate to its 2013 population of 11,964. To determine its projected demand, the City applied a per capita MDD of 644 gpcd to the population projections. The City also developed demand projections that included allowances for weather conditions (1 mgd) and industrial growth (5.65 mgd per year through 2025 and 10.15 mgd per year thereafter). **Exhibit ES-2** presents the City’s 10-year and 20-year population projections and demand projections with and without the weather and industrial allowances.

### Exhibit ES-2. Projected MDD.

Year	Population <sup>1</sup>	MDD (mgd)	MDD (cfs)	MDD + Allowances <sup>2</sup> (mgd)	MDD + Allowances (cfs)
2023	13,347	8.60	13.30	15.25	23.58
2033	14,890	9.59	14.83	20.74	32.08

<sup>1</sup>All population projections presented above are for the City water service area and do not include areas served by the Chenoweth PUD. The 1.1% growth rate was applied to the population in the existing water service area.

<sup>2</sup>A total allowance of 6.65 mgd per year was added through 2025 (1 mgd Weather Allowance + 5.65 mgd Industrial Allowance) and of 11.15 mgd per year was added after 2025 (1 mgd Weather Allowance + 10.15 mgd Industrial Allowance).

Next, the City estimated that its current total reliable water supply during the period of peak summer demand is 12.1 cfs (5.4 cfs of surface water + 6.7 cfs of groundwater = 12.1 cfs). The 5.4 cfs of surface water comes from the City’s three certificated surface water rights in The Dalles Municipal Watershed. The 6.7 cfs of groundwater comes from groundwater rights for municipal use from the City’s primary wells (Lone Pine, Marks, and Jordan Street Wells) and assumes that the Jordan Street Well (capacity of 4.0 cfs) would be unavailable.

As shown in **Exhibit ES-2**, the City’s MDDs are projected to range between 13.3 cfs (without allowances) and 23.6 cfs (with allowances) in 10 years (2023). To meet these projected demands, the City plans to use the existing certificated surface water rights and groundwater rights described above, and as needed, additional supply by upgrading the capacity of the Lone Pine Well by 2.9 cfs by 2020. This will make the City’s total reliable water supply (surface water and groundwater) capacity approximately 15.0 cfs (12.1 cfs + 2.9 cfs additional capacity = 15.0 cfs), or 19.0 cfs if the City includes the 4.0 cfs from the Jordan Street Well. In the unlikely event that

the City approaches the high-end of the projected demand range, the City will explore additional well capacity upgrades.

As shown in **Exhibit ES-2**, the City's MDDs are projected to range between 14.8 cfs (without allowances) and 32.1 cfs (with allowances) in 20 years (2033). The City plans to meet these projected MDDs through expansions of Crow Creek Dam and the Wicks Water Treatment Plant (projected completion is between 2028 and 2033), which will allow additional storage under Permit R-13150 and use of that stored water under Permit S-53930. The City anticipates the expansions will result in an additional 10.1 cfs of water supply under these permits for a reliable summer supply of 15.5 cfs from surface water sources ( $5.4 + 10.1 = 15.5$ ). Thus, the City's total reliable summer supply after expanding the capacity of its surface water system and the Lone Pine Well is projected to be 25.1 cfs ( $15.5$  cfs from surface water +  $9.6$  cfs ( $6.7 + 2.9 = 9.6$ ) from groundwater = 25.1 cfs), or 29.1 cfs if the City includes the 4.0 cfs from the Jordan Street Well. In the unlikely event that the City approaches the high-end of the projected demand, the City will likely explore additional well capacity upgrades and accelerate efforts to develop water supply from the Columbia River (under Permit S-49653).

Thus, the City anticipates meeting projected demand over the next 10 years and is not requesting access to water under its "extended permits" in this WMCP. If needed, the City may request access to additional stored water under extended Permit S-53930 in its 10-year update of this WMCP, when the City's water supply situation and the approaches for providing that water supply will be clearer.

Section 5 provides details about the City's future service area, population projections, demand projections, and strategies to meet its projected water supply needs.



# 1. Municipal Water Supplier Plan Elements

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*This section satisfies the requirements of OAR 690-086-0125.*

*This rule requires a list of affected local governments to whom the plan was made available, and a proposed date for submittal of an updated plan.*

## Introduction

Recognizing the finite nature of local potable water resources, the City of The Dalles (City) has invested in water conservation measures, such as installation of automated meter reading on all of its meters, implementation of a substantial increase in residential consumptive water use charges in 2011, and ongoing distribution of brochures and free water efficient fixtures to residential customers. These and other conservation measures have helped reduce water demand and have provided a basis for additional conservation actions. Despite implementation of these conservation measures, the City will need to expand use of its current water rights and secure redundant surface water resources over time due to the degraded quality of local groundwater, the designation of The Dalles Critical Groundwater Area, the location of the City's municipal watershed within a fire-prone region and area with an active volcano, and anticipated residential, commercial, and industrial growth.

The purpose of this Water Management and Conservation Plan (WMCP, or Plan) is to guide development, financing and implementation of water management and conservation programs that ensure sustainable water use, as well as to consider the City's future water needs. The goal in preparing this WMCP is to establish a working document that will have a positive effect on the City's water planning in future years.

## Plan Requirement

This is the City's first WMCP. The City's surface water permit S-53930 (use of stored water from the enlarged Crow Creek Reservoir) is conditioned to require submission of a WMCP within 1 year of NEPA approval. In addition, OWRD's final orders extending the development deadlines for Permits S-53930 and S-49653 (use of water from the Columbia River) include a condition stating that access to additional water under these permits is contingent on a final order approving a WMCP and that the required WMCP must be submitted to the OWRD within 3 years of approval of the extension.

This WMCP meets all of the requirements of the Oregon Administrative Rules (OAR) adopted by the Water Resources Commission in November 2002 (OAR Chapter 690, Division 86) regarding WMCPs.

## Plan Organization

The WMCP is organized into the following sections, each addressing specific sections of OAR Chapter 690, Division 86. Section 2 is a self-evaluation of the City's water supply, water use, water rights and water system. The information developed for Section 2 is the foundation for the sections that follow. The later sections use this information to consider how the City can

improve its water conservation and water supply planning efforts. The WMCP also includes appendices with supporting information.

<b>Section</b>	<b>Requirement</b>
Section 1 – Water Supplier Plan	OAR 690-086-0125
Section 2 – Water Supplier Description	OAR 690-086-0140
Section 3 – Water Conservation Element	OAR 690-086-0150
Section 4 – Water Curtailment Element	OAR 690-086-0160
Section 5 – Water Supply Element	OAR 690-086-0170

The City has relied on information from the following sources in preparing this plan:

- City of The Dalles Water Master Plan [CH2MHill, 2006]
- City of The Dalles Public Works staff
- Portland State University Population Research Center
- Oregon Water Resources Department (OWRD)

## **Affected Local Governments**

### **OAR 690-086-0125(5)**

The following local governments may be affected by this WMCP:

- City of The Dalles
- Wasco County

Thirty days before submitting this WMCP to OWRD, the City made the draft WMCP available for review by each affected local government listed above along with a request for comments relating to consistency with the local government's comprehensive land use plan. The letters requesting comment and any comments received are in **Appendix A**.

In addition, the City provided Chenoweth Water People's Utility District (Chenoweth PUD) with notice of the draft plan as a courtesy.

## **Plan Update Schedule**

### **OAR 690-086-0125(6)**

The City anticipates submitting an update of this WMCP within 10 years of the final order approving this WMCP. As required by OAR Chapter 690, Division 86, a progress report will be submitted within 5 years of the final order.

## **Time Extension**

### **OAR 690-086-0125(7)**

The City is not requesting additional time to implement metering or a previous benchmark.



## 2. Water Supplier Description

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*This section satisfies the requirements of OAR 690-086-0140.*

*This rule requires descriptions of the City's water sources, water delivery area and population, water rights, and adequacy and reliability of the existing water supply. The rule also requires descriptions of the City's customers and their water use, the water system, interconnections with other water suppliers, and quantification of system leakage.*

### **Water Sources**

#### **OAR 690-086-0140(1)**

The City's primary source of water is surface water from the Dog River and South Fork Mill Creek (including the sub-drainages of Alder Creek and Crow Creek) watersheds within The Dalles Municipal Watershed. South Fork Mill Creek and Crow Creek originate on the east slope of Surveyor's Ridge, in Mill Creek Buttes, about 25 miles southwest of the City. South Fork Mill Creek flow is augmented by water diverted from Dog River, a tributary of Hood River also to the southwest of the City. Surface water from Dog River, Crow Creek, and South Fork Mill Creek flows into Crow Creek Reservoir, an impoundment created by Crow Creek Dam. Stored water is released at Crow Creek Dam into South Fork Mill Creek and live flow and released stored water are captured 8 miles downstream at the South Fork Mill Creek Intake. This water then flows by gravity a short distance to Wicks Water Treatment Plant.

The City has three groundwater wells that supplement surface water supply during the summer months and supply emergencies. The wells draw water from The Dalles Pool aquifer and are located within City limits and The Dalles Critical Groundwater Area. The City also has one well that serves a tourist facility not connected to the City's water system and wells used by the school district in a LEED-certified middle school's heating and cooling system, as well as to irrigate 7.9 acres of school grounds.

In addition, the City has authorization to appropriate water from the Columbia River. The City is currently in the planning phase to develop infrastructure to utilize this source.

In 2012, approximately 87 percent of municipal water supply came from the City's surface water sources and 13 percent came from groundwater.

### **Interconnections with Other Systems**

#### **OAR 690-086-0140(7)**

The City has an intertie with Chenoweth Water People's Utility District (Chenoweth PUD) located in the western portion of the City's service area (approximately 10<sup>th</sup> and Perkins), which has a maximum capacity of 1400 gpm. Chenoweth PUD has its own water supply and the intertie enables Chenoweth PUD to receive water from City in an emergency. The City does not depend on water supply from Chenoweth PUD to meet its current or anticipated future water needs, but the City can receive water from Chenoweth PUD in an emergency.

## **Intergovernmental Agreements**

**OAR 690-086-0140(1)**

The City does not have any written intergovernmental agreements with other water providers, including Chenoweth PUD. However, the City and Chenoweth PUD have a close working relationship and coordinate utility work and maintenance of the existing intertie between the two systems.

## **Service Area Description and Population**

**OAR 690-086-0140(2)**

Exhibit 2-1 provides maps of the City's water service area. Based upon the 2013 Certified Oregon Population Estimate produced by the Portland State University Population Research Center, the City's estimated service area population within City limits in 2013 was 14,400. Of this population, approximately 2,768 people are served by Chenoweth PUD. The City also served approximately 292 residents outside City limits through 117 residential service connections. Therefore, the City's estimated water service population in 2013 was 11,964 ( $14400 + 292 - 2768 = 11,964$ ).



Exhibit 2-1. City of The Dalles Current Service Area Map.

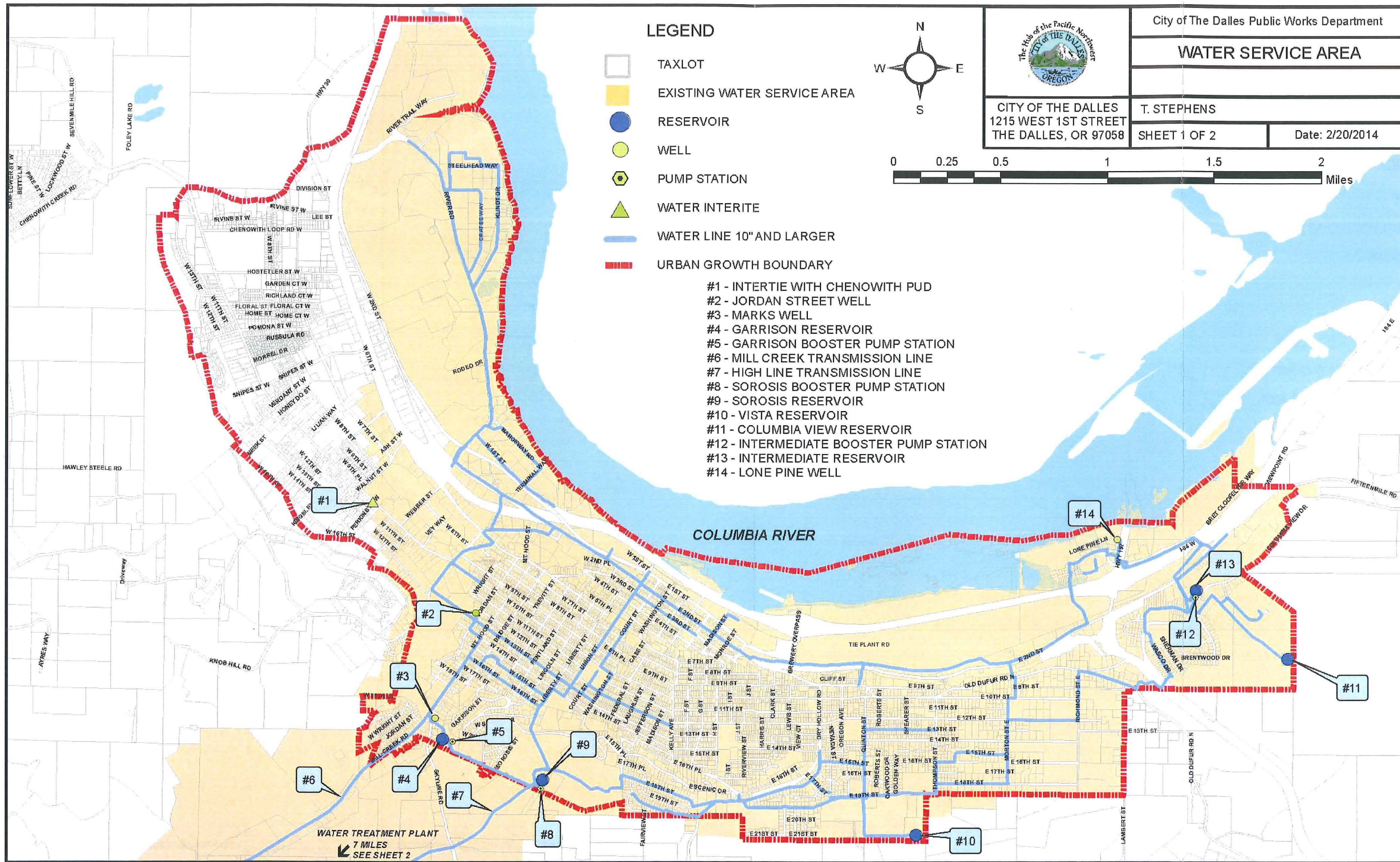




Exhibit 2-1. City of The Dalles Current Service Area Map, continued.

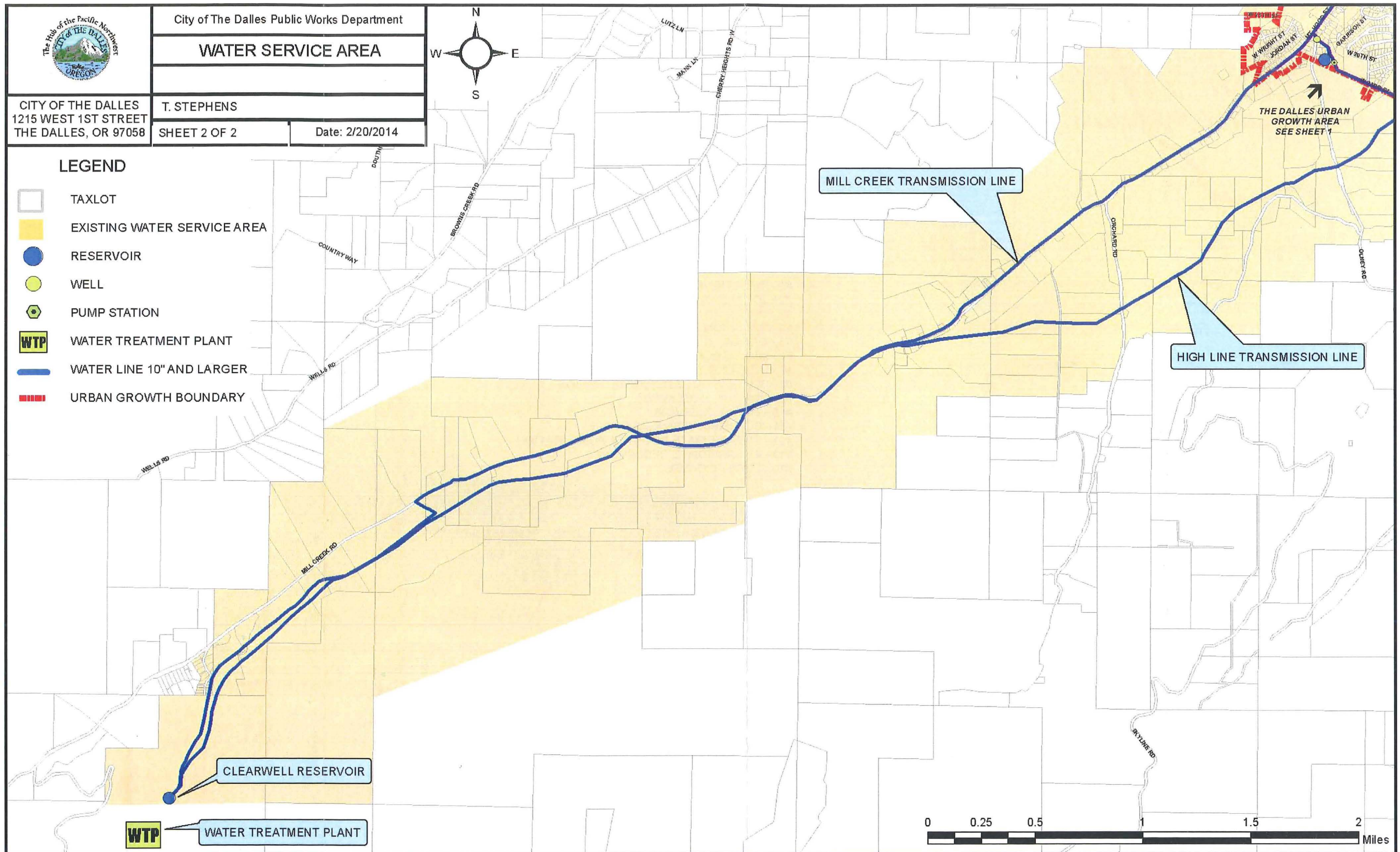
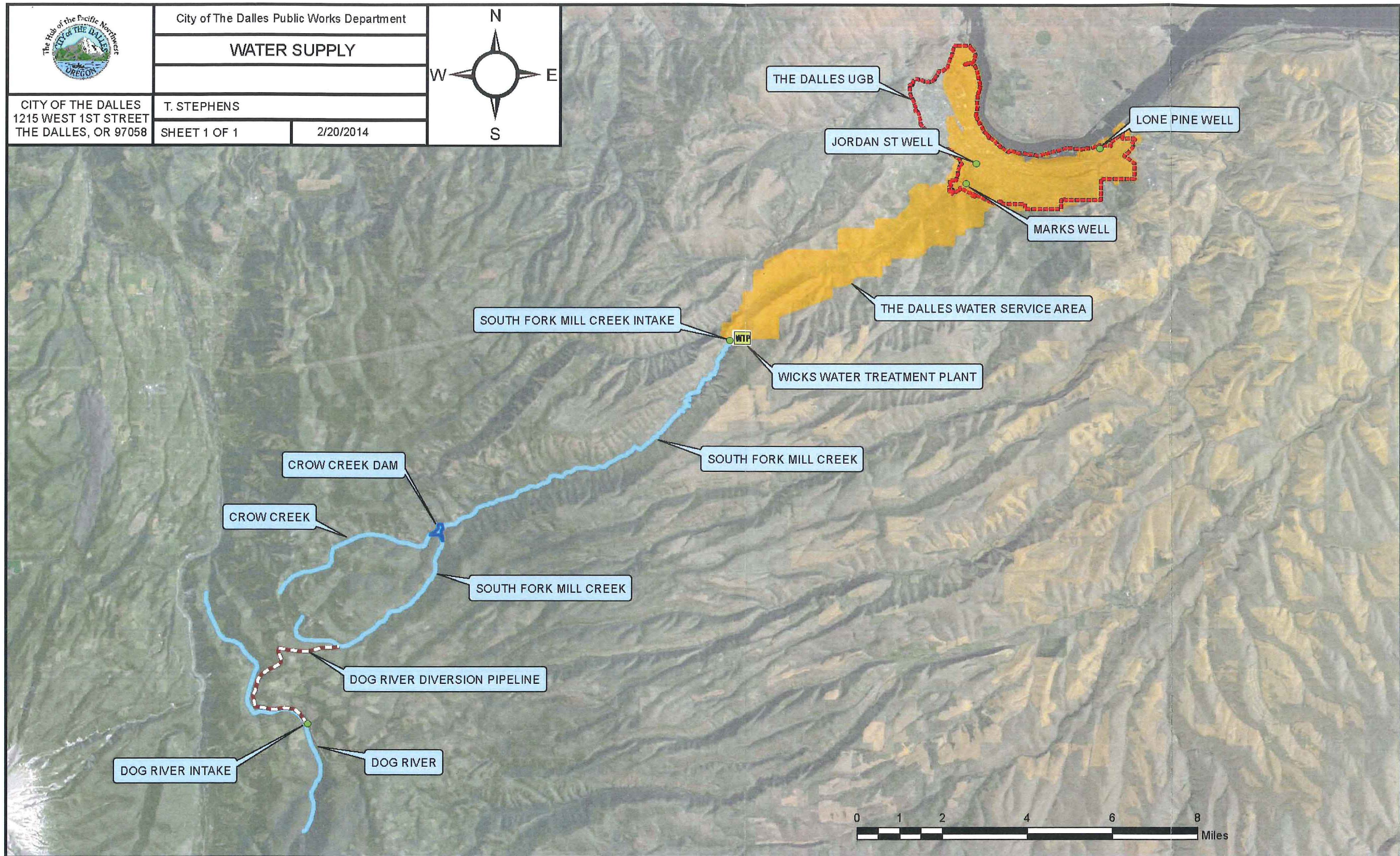




Exhibit 2-1. City of The Dalles Current Service Area Map, continued.





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# Records of Water Use

*OAR 690-086-0140(4) and (9)*

## Terminology

Demand refers to the quantity of water delivered to the water distribution system from the water treatment plant and groundwater wells. Demand includes metered consumption, unmetered uses, and water lost to leakage, reservoir overflow, and evaporation. For the purposes of this WMCP, the terms demand and production are synonymous. Consumption refers to the portion of water use that is metered. Generally, demand and consumption in municipal systems are expressed in units of million gallons per day (mgd). They may also be expressed in cubic feet per second (cfs) or gallons per minute (gpm). One mgd is equivalent to 1.55 cfs or 694 gpm. For annual or monthly values, a quantity of water is typically reported in million gallons (MG). Water use per person (per capita use) is expressed in gallons per person (per capita) per day (gpcd).

This WMCP uses the following terms to describe specific values of system demands:

- Average day demand (ADD) equals the total annual system input (demand) divided by 365 days.
- Maximum day demand (MDD) equals the highest system demand that occurs on any single day during a calendar year.
- Maximum monthly demand (MMD) in MG equals the highest total monthly demand of the 12 months of a calendar year. MMD in mgd equals the average day demand of the one month with the highest total demand of the 12 months of a calendar year.
- Peaking factors are the ratios of one demand value to another. The most common and important peaking factor is the ratio of the MDD to the ADD.

## Historical Water Demands

The following water demand data is based on the sum of metered data from the Mill Creek and High Line transmission line intakes at the Wicks WTP and the Lone Pine Well, Jordan Street Well, and Marks Well wellheads. **Exhibit 2-2** summarizes the City's water demands from 2005 through 2012.

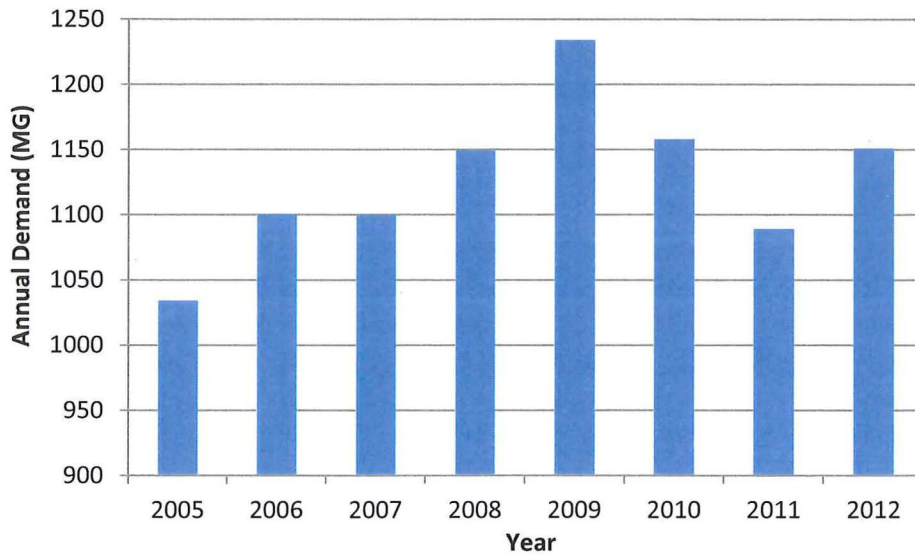
**Exhibit 2-2. Historical Annual Water Demand, Average Day Demand, Maximum Day Demand, Peaking Factor, and Maximum Month Demand, 2005-2012.**

Year	Annual Demand (MG)	ADD (mgd)	MDD (mgd)	MDD:ADD Peaking Factor	MMD (MG)	MMD (mgd)
2005	1034.0	2.83	9.30	3.3	159.8	5.16
2006	1100.4	3.01	7.77	2.6	185.5	5.98
2007	1099.7	3.01	7.32	2.4	156.3	5.04
2008	1149.1	3.14	8.31	2.6	177.5	5.73
2009	1233.9	3.38	7.99	2.4	196.2	6.33
2010	1158.0	3.17	8.10	2.6	181.3	5.85
2011	1089.2	2.98	7.83	2.6	167.9	5.42
2012	1151.1	3.15	7.37	2.3	174.8	5.64
Average	1126.9	3.09	8.00	2.6	174.9	5.64
Maximum	1233.9	3.38	9.30	3.3	196.2	6.33

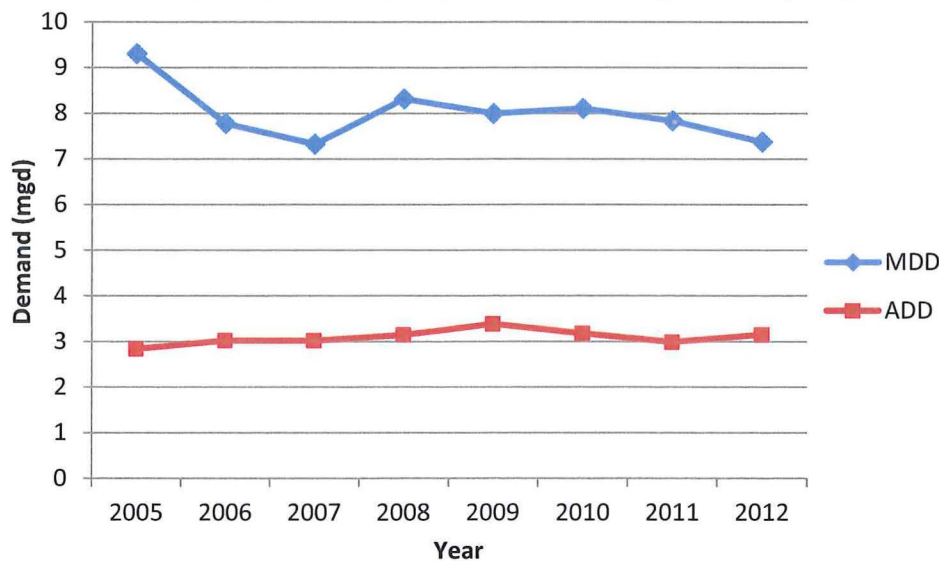
## Annual and Daily Demands

As shown in **Exhibit 2-2** and **Exhibit 2-3**, annual demand increased from 2005 through 2009 and peaked in 2009 at 1,233.9 MG. From 2010 through 2012, annual demand returned to levels similar to those in 2006 through 2008. **Exhibit 2-2** and **Exhibit 2-4** show that ADD ranged from 2.83 mgd to 3.38 mgd during that time period and mirrored annual demand fluctuations. The City's MDD remained relatively constant from 2006 to 2012 and does not appear to be closely tied to its trends in annual and average day demands.

**Exhibit 2-3. Annual Demand (MG), 2005-2012.**



**Exhibit 2-4. Average Day Demand (ADD) and Maximum Day Demand (MDD), 2005-2012.**



MDD is an important value for water system planning. Water rights and supply facilities (e.g. treatment plants, pipelines, and reservoirs) must be capable of meeting a city's MDD. If the MDD exceeds the combined supply capacity on any given day, finished water storage levels will be reduced, and if the MDD exceeds combined supply capacity on several consecutive days, a water shortage may occur.

Weather patterns and the economy strongly influence MDD. Weather patterns that can cause fluctuations in MDD from year to year include: maximum temperatures, the number of consecutive days with high temperatures, when high temperatures occur in the summer, overall rainfall levels during the summer, and consecutive days without rainfall. Unusually hot and/or dry weather results in more outdoor irrigation, which increases the MDD. The economy can affect MDD by influencing: customer spending on irrigation, the number of new homes with landscapes needing intense irrigation for plant establishment, and the opening or closing of facilities that use water in their operations.

### **Peaking Factors**

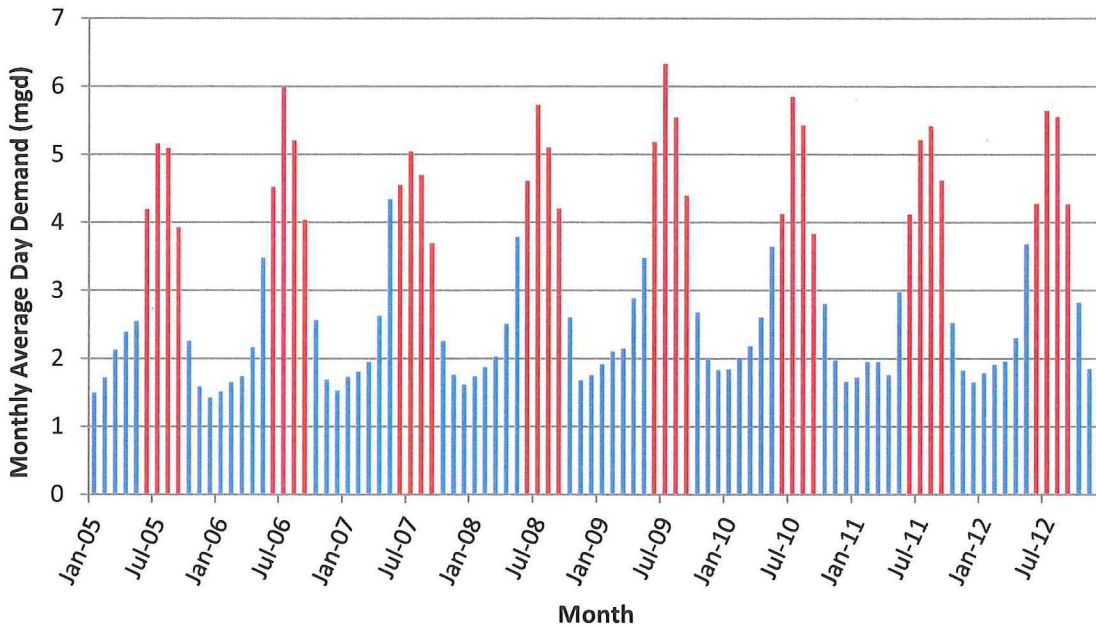
The City's MDD to ADD peaking factor averaged 2.6 from 2005 through 2012. This peaking factor is typical of other water utilities in arid regions, such as the City of Redmond (averaged 2.5 from 2006 to 2011; *City of Redmond 2013 WMCP*) and the City of Prineville (averaged 2.6 from 2000 to 2006; *City of Prineville 2011 WMCP*). This peaking factor is an important component used in demand forecasting.



## Monthly Demand

The City's average MMD volume from 2005 through 2012 was 174.9 MG, as shown in **Exhibit 2-2**, and the MMD occurred in July each of those years except 2011. During the same period, the City's ADD for those maximum-demand months averaged 5.64 mgd. **Exhibit 2-5** shows monthly ADD, with the peak season months of June through September in red. The highest monthly ADD of 6.33 mgd occurred in July 2009 and the months with the greatest ADD were consistently July and August.

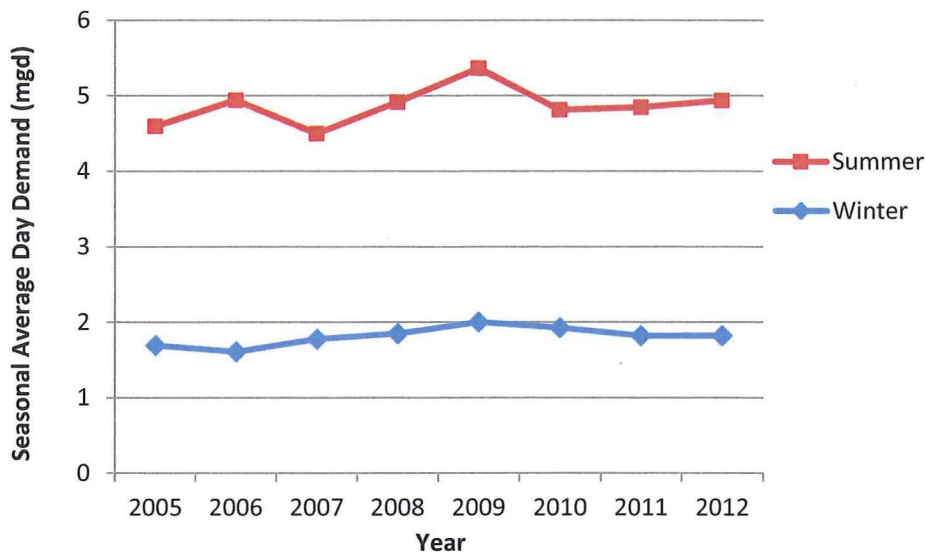
**Exhibit 2-5. Monthly Average Day Demand (mgd), 2005-2012. Red indicates peak season months (June through September) while blue indicates non-peak season months.**



## Seasonal Demand

Exhibit 2-6 shows that from 2005 through 2012, Summer (June through September) ADD ranged from 4.50 mgd to 5.36 mgd and Winter (December through March) ADD ranged from 1.61 mgd to 2.00 mgd. During this period, the average of the City's ADD in the summer was 2.7 times greater than the average of the City's ADD in winter. The difference between seasons is largely attributable to water demand for irrigation and commercial and industrial cooling water uses during the summer months.

**Exhibit 2-6. Historical Seasonal Average Day Demand (mgd), 2005-2012. Summer = June to September. Winter = December to March.**



## Authorized Consumption

Authorized consumption is equal to the metered and certain unmetered water uses within the system.

## Customer Characteristics and Use Patterns

### OAR 690-086-0140(6)

### Consumption Data

The following analyses of the City's customer water use are based on metered water use records either from a single year or from 2006 through 2012. (Data from 2005 are not included in the following consumption analyses due to inaccurate billing data for that year.) For analyses covering one year, 2011 records were used due to delayed meter reading during two months in 2012 that resulted in over-reporting during the subsequent months, as well as lack of clarity as to water use by customer class during those months. On four occasions between 2006 and 2012, the City was not able to read metered consumption throughout the entire system at the end of the month, resulting in some meter readings in the subsequent month including two months of consumption data. The billing records for these years are, nonetheless, sufficient to provide a good description of the City's water use.

## Customer Description

The City's customers are divided into four major customer categories: commercial/industrial, single family residential, multi-family residential, and government. Government includes facilities owned by the City, County, Port, and College. Exhibit 2-7 shows the number of accounts by customer category in 2011.

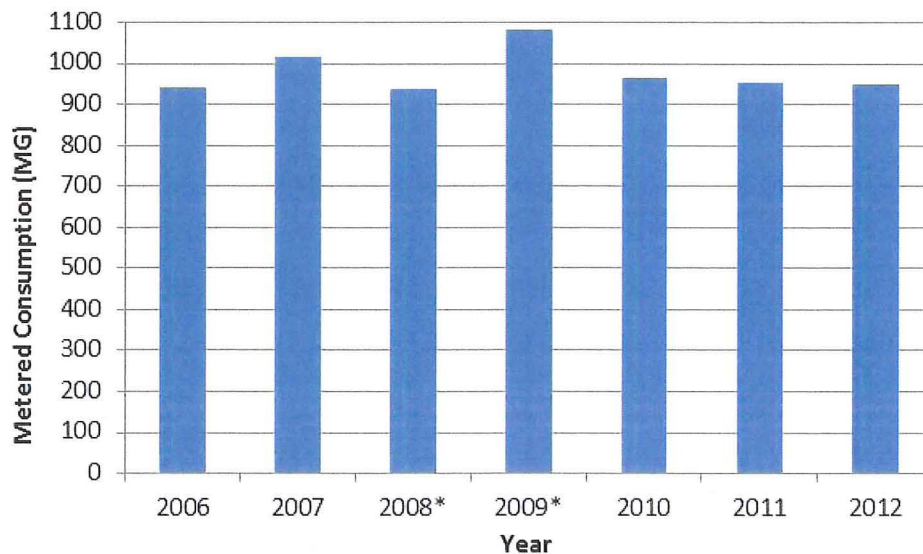
**Exhibit 2-7. Number of Accounts by Customer Category, 2011.**

Customer Category	Number of Accounts
Commercial/Industrial	582
Single Family Residential	3906
Multi-Family Residential	74
Government	46
Total	4608

## Annual Consumption

Exhibit 2-8 shows that the City's total annual metered water use has been relatively constant in recent years, which corresponds with the downturn in the economy that began in 2008.

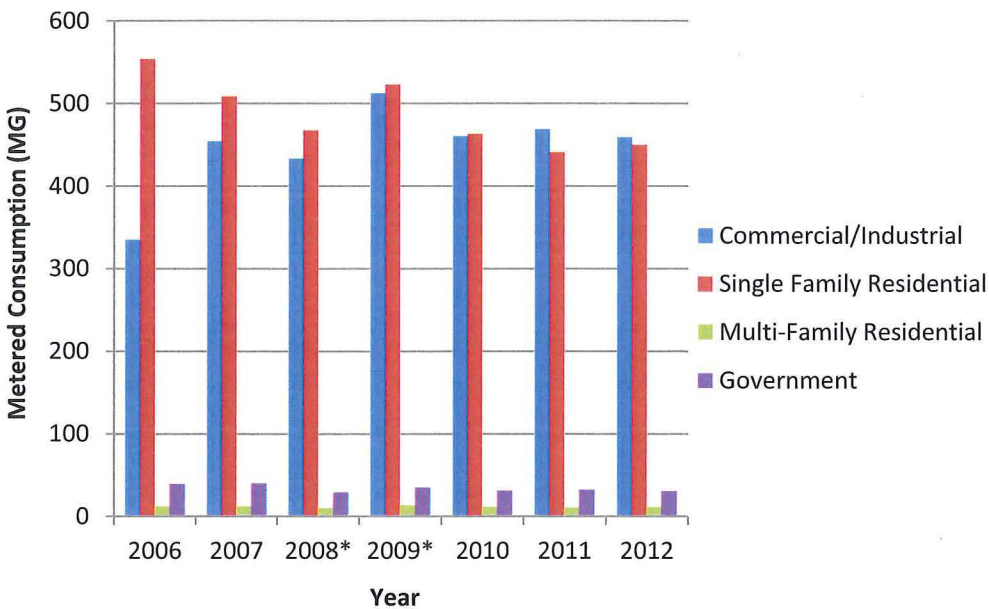
**Exhibit 2-8. Annual Water Use, 2006-2012.**



\*2008 underreports December consumption and 2009 includes some December 2008 consumption, which was captured in January 2009 meter readings.

Exhibit 2-9 illustrates annual metered water use by each customer category during the same period. Single Family Residential water use was the customer category with greatest water consumption through 2010 and Commercial/Industrial had the greatest water consumption in 2011 and 2012. Commercial/Industrial water use grew substantially in 2007 and has maintained among the highest, if not the highest, levels of consumption since then. Commercial/Industrial customers are significant water users in the City due to the combination of the City having an interstate running through it, a considerable amount of land zoned industrial, and water sources capable of supporting industries.

**Exhibit 2-9. Annual Water Use by Customer Category, 2006-2012.**

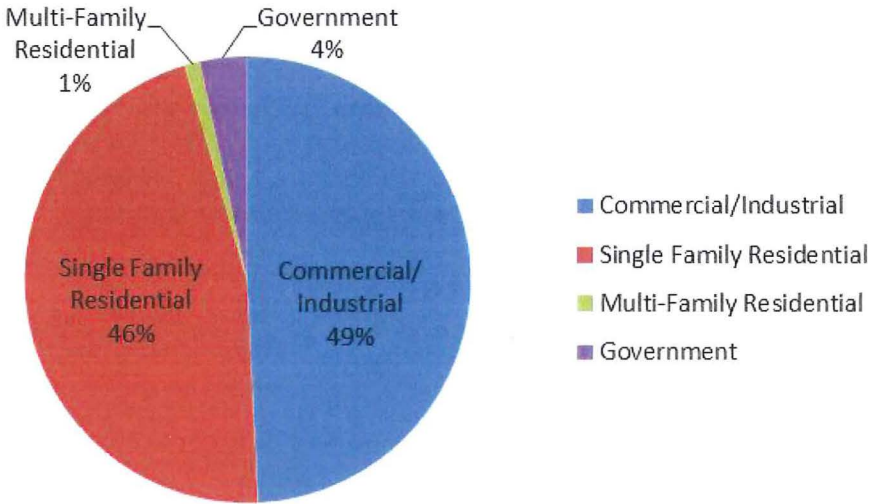


\*2008 underreports December consumption and 2009 includes some December 2008 consumption, which was captured in January 2009 meter readings.



Water use by each customer category in 2011 is presented as a pie chart in **Exhibit 2-10**. Commercial/industrial water use was slightly greater than single family residential water use, with 49 percent and 46 percent of total water use, respectively. Conservation efforts focused on these two customer categories would yield the greatest water savings given their dominant portion of total use.

**Exhibit 2-10. Percent Annual Water Use by Customer Category, 2011.**

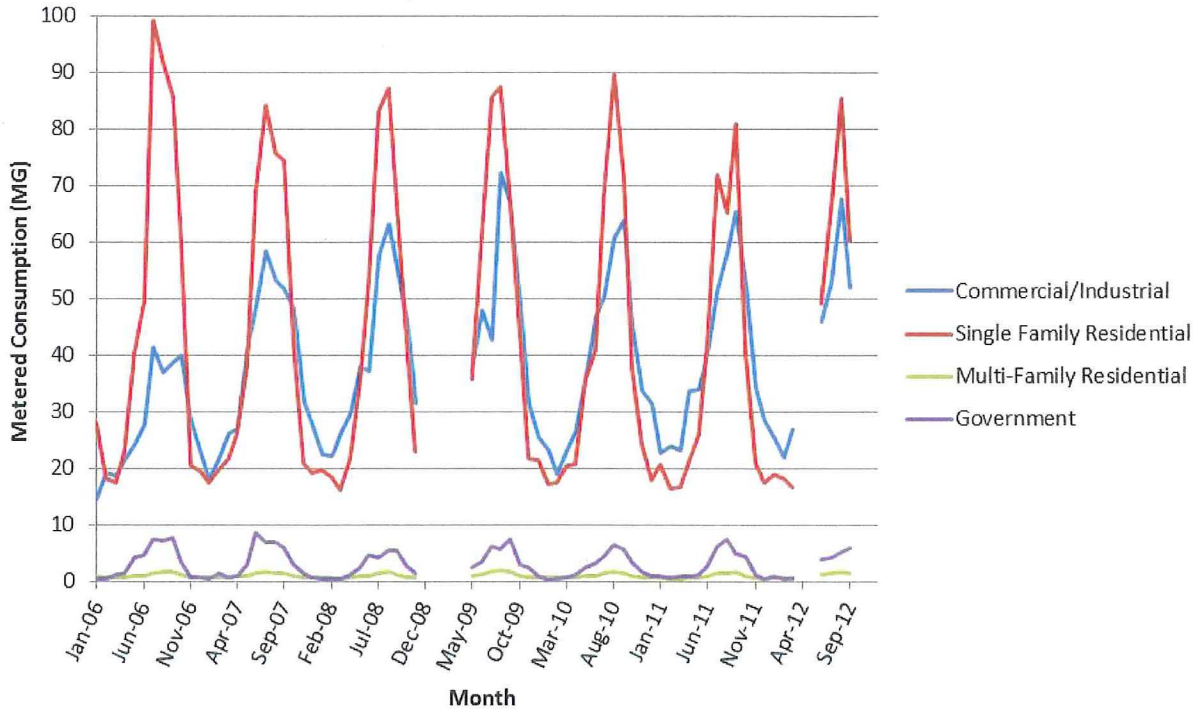


## Monthly Consumption

Exhibit 2-11 shows monthly metered consumption by customer category from 2006 through 2012. Months when meter reading was incomplete (December 2008, March 2009, April 2012, and October 2012) and the following months that included two months-worth of consumption (January 2009, April 2009, May 2012, and November 2012) were not included in the exhibit to provide a clearer picture of monthly consumption trends.

Monthly metered consumption peaked in the summer months for all customer categories. Single family residential had the greatest consumption in the summer months but commercial/industrial water use during the winter months was substantial enough to make it the customer category with the greatest total consumption. This suggests that water conservation efforts targeting single family residential water users would be most effective when focusing on summer season water use, specifically outdoor watering. Efforts targeting year-round water use by commercial/industrial water users would also be beneficial.

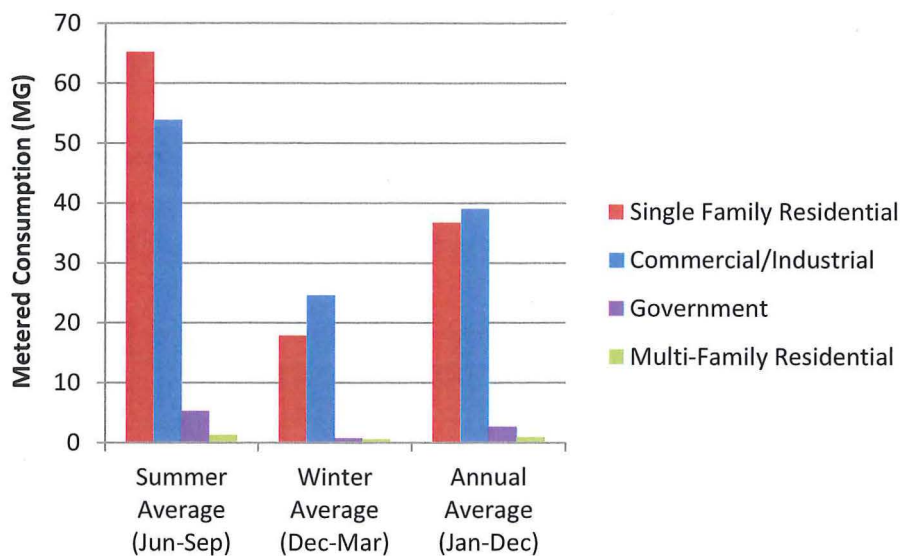
**Exhibit 2-11. Monthly Metered Consumption by Customer Category, 2006-2012.**



## Seasonal Consumption

Average monthly consumption by season and customer category in 2011 is shown in **Exhibit 2-12**. The City's total summer consumption was approximately 2.9 times greater than its total winter consumption. This difference is less than other communities in arid regions, such as the City of Redmond (4.2; *City of Redmond 2013 WMCP*) and the City of Bend (4.1; *City of Bend 2011 WMCP*). Consumption during summer months exceeded winter consumption by 3.7 times for single family residential customers and by 2.2 times for commercial/industrial customers. This reinforces the trend demonstrated by the monthly consumption data that single family residential consumption has greater seasonal variation than commercial/industrial water consumption.

**Exhibit 2-12. Seasonal Water Consumption by Customer Category, 2011.**



## Single Family Residential Per Capita Consumption

Single Family Residential per capita demand, expressed in gallons per capita per day (gpcd), is the City's total demand from single family residential customers divided by the estimated water delivery area population. This value is intended to provide an estimate of the amount of water actually used by typical individual. In 2012, Single Family Residential water use totaled 449.6 MG and the City's population was 11,964 (no population change occurred between 2012 and 2013), resulting in a Single Family Residential per capita demand of 103.0 gpcd.

## **Unaccounted-for Water**

### ***OAR 690-086-0140(9)***

For the purposes of this WMCP, unaccounted-for water, or water loss, is the difference between the finished water produced and metered water consumption plus unmetered authorized water usage. Thus, unaccounted-for water represents system leakage and unmetered unauthorized water usage.

The estimates of unmetered authorized uses consider the following:

- The City fee schedule includes a system for tracking and invoicing contractor water usage for construction purposes. Water taken from fire hydrants is metered and water taken from the Public Works Department fill station is tracked by volume estimate per load. Records can be totaled to obtain the volume of contractor water use.
- Reservoir draining and cleaning is tracked by capacity of the individual reservoirs (approximately 1 MG/year).
- Water used to pressure test, chlorinate and flush new water main lines is tracked by the use of a written flushing plan.
- Hydrant flushing is tracked based on the duration of each hydrant flush times the rate through the use of a software database program.

Unmetered uses not accounted for above are commonly the result of incomplete or inaccurate metering of consumer demand, and include the following typical categories:

- Unmetered or unauthorized connections
- Unmetered water for operations and maintenance uses (street cleaning)
- Unmetered water for fire fighting
- Reservoir overflows
- Data collection errors

System leakage, as the name implies, is water lost due to deteriorating pipe, compromised pipe joints, service connections, valves, etc. With proper record keeping and metering of water, the percentage of unaccounted-for water should approach the net volume lost to actual leakage.



**Exhibit 2-13** shows the City's unaccounted-for water from 2006 through 2012. Unmetered authorized uses (including reservoir draining and cleaning, hydrant flushing and contractor use of hydrants) occurred each year and were included in the calculation of unaccounted-for water. Estimated water use to fill and drain and refill the new Vista Reservoir was also included in 2011 and 2012 unmetered authorized uses. Thus, the City's unaccounted-for water (the difference between annual demand and metered consumption plus unmetered authorized uses) was 16.5 percent in 2012 and averaged 13.6 percent from 2006 through 2012.

The City suspects that the two approximately 7 mile-long transmission lines between the WTP and city limits may have significant water losses. The City is currently in the process of installing meters at the lower ends of the transmission lines to enable comparison of the quantities of water entering and leaving the lines. The City's adopted Capital Improvement Plan anticipates replacing those transmission lines in 2019-2020. Another source of water loss briefly occurred in May 2011 when a main break resulted in loss of 0.08 MG. The City promptly repaired this leak as soon as it was discovered.

**Exhibit 2-13. Unaccounted-for Water, 2006-2012.**

Year	Annual Demand (MG)	Annual Metered Consumption (MG)	Unmetered Authorized Uses (MG)	Unaccounted-for Water (MG)	Unaccounted-for Water (%)
2006	1100.4	940.1	2.72	157.6	14.3
2007	1099.7	1,014.4	5.02	80.2	7.3
2008 <sup>1</sup>	1149.1	988.5	7.20	153.3	13.3
2009 <sup>1</sup>	1233.9	1,034.3	3.30	196.4	15.9
2010	1158.0	965.4	7.51	185.1	16.0
2011	1089.2	952.5	6.36	130.4	12.0
2012	1151.1	950.3	10.63	190.2	16.5
Average	1140.2	977.9	6.1	156.6	13.6

<sup>1</sup>For the purposes of this analysis, December 2008 and January 2009 consumption readings were added together then averaged between the two months due to incomplete consumption meter readings in December 2008. Consequently, unaccounted-for water values for these years are estimates.

## Water Rights

**OAR 690-086-0140(5)**

**Exhibit 2-14** provides detailed information about the City's water rights. The City has five surface water rights for municipal use. These surface water rights authorize the use of up to 2 cfs from South Fork Mill Creek (Certificate 5691), all the water in Dog River (Certificate 14954), up to 3055 AF of water from Crow Creek Reservoir (Certificate 60410 and Permit S-53930), and up to 40 cfs from the Columbia River (Permit S-49653). The City also holds two storage water rights that allow the storage of up to 3055 AF of water from South Fork Mill Creek and Dog Creek in Crow Creek Reservoir (Certificate 44917 and Permit R-13105).

The City holds seven groundwater rights for municipal use that total 20.824 cfs (13.5 mgd). Of the 20.824 cfs, 18.454 cfs come from the Lone Pine, Marks, and Jordan Street Wells (GR 4258 as modified by GR Modification T-10865, Certificate 15543, Certificate 86380, Certificate 48991, and Certificate 60026). The remaining municipal groundwater rights authorize the use of up to 0.81 cfs under Certificate 85886 for use of the Mill Creek Well and 1.56 cfs from the Wicks Well under Certificate 44915. The Mill Creek well currently is not actively used. GR-4257 is a domestic/manufacturing water right for use of up to 0.368 cfs from the Stadelman well, however, this well currently is not actively used.

The City holds several groundwater rights that are not considered part of the municipal water supply. Permit G-13421 is a municipal water right for 1.1 cfs from the Kuck well, but that water right supplies the Columbia Gorge Discovery Center tourist facility outside the City limits and is not connected to the City water system. As part of a multi-agency effort to have the center located and built in the area in the early 1990s, the City offered to operate the water infrastructure (well, reservoir, and necessary pipelines) once they were constructed by the County, which does not have any utility operations. The City will also inherit ownership of the water supply facilities once the County's period of bonded indebtedness expires. Certificate 87278 is a commercial water right for up to 0.3384 cfs from three wells that is used in a heating and cooling system in the new, LEED certified The Dalles Middle School, and the wells are not connected to the City water system.



Exhibit 2-14. City of The Dalles Water Rights.

Source	Application	Permit	Claim, Decree, or Transfer	Certificate	Priority Date	Type of Beneficial Use	Authorized Rate (cfs)	Authorized Date for Completion	Maximum Rate of Withdrawal to Date		2012 Average Withdrawal		Five-Year (2008-2012) Average Withdrawal		Comments
									Instantaneous (cfs)	Annually (MG)	Monthly (MG)	Daily (mgd)	Monthly (MG)	Daily (mgd)	
<b>Groundwater: Municipal System Connection</b>															
3 wells: Lone Pine, Jordan, and Marks wells			GR 4258, Modification T-10865		10/11/1923	Municipal, Domestic, Irrigation, Manufacturing, and Industrial	5.124 (2300 gpm)		5.124						Located within The Dalles Critical Groundwater Area. GR Modification T-10865 replaced the original POA (City Hall Well) with the three current authorized POAs.
A well - Marks Well	U-135	U-127		15543	11/1/1940	Municipal	2.68		2.68						Used for supplemental supply and emergency back-up due to elevated Fe and Mn. Located within The Dalles Critical Groundwater Area.
A well - Marks Well	U-181	U-189	<del>T-7258</del>	86380	10/4/1945	Municipal	0.69		0.69	283.2	12.1	0.40	15.0	0.50	Confirms change in POA under T-7258 April 1-October 1 period of use. Supplemental and emergency back-up due to elevated Fe and Mn. Located within The Dalles Critical Groundwater Area.
A well - Jordan Street Well	G-23	G-7806		48991	10/16/1953	Municipal	5.5		5.5						Used for supplemental and emergency back-up due to elevated Fe and Mn. Located within The Dalles Critical Groundwater Area.
A well - Lone Pine Well	G-1415	G-7807		60026	3/13/1959	Municipal	4.46		4.46						Located within The Dalles Critical Groundwater Area.
Wicks Well	G-2076	G-2132		44915	7/2/1962	Municipal	1.56		1.56	47.8	0.63	0.02	1.30	0.04	Used for emergency back-up only due to elevated hydrogen sulfide and temperature.
A well - Mill Creek Well	U-181	U-189	<del>T-7258</del>	85886	10/4/1945	Municipal	0.81		0.81	Information Unavailable	N/A	N/A	N/A	N/A	0.81 cfs of T-7258 reverted back to Mill Creek Well. April 1-October 1 period of use. Currently not in use. Located within The Dalles Critical Groundwater Area.
A well - Stadelman Well			GR 4257		1910	Domestic / manufacturing	0.368 (165 gpm)		0.368	Information Unavailable	N/A	N/A	N/A	N/A	Currently not usable due to poor water quality and not in use. Located within The Dalles Critical Groundwater Area.
<b>Groundwater: No Municipal System Connection</b>															
Kuck Well	G-14580	G-13421			7/23/1997	Municipal	1.11		0.56	19.0	N/A	N/A	N/A	N/A	Serves tourist facility; not connected to City system. Permit is in the name of the County of Wasco, Judge John Mabrey.
3 Wells	G-15518	G-15149		87278	6/4/2001	Commercial	0.338 cfs, limited to: Well 1-- 0.077 cfs, Well 5-- 0.2 cfs, and Well 9-- 0.111 cfs		0.338 cfs, limited to: Well 1-- 0.077 cfs, Well 5-- 0.2 cfs, and Well 9-- 0.111 cfs	51.3	N/A	N/A	N/A	N/A	Non-potable. Used for heating and cooling system at a middle school and irrigation of school grounds (7.9 acres). Located within The Dalles Critical Groundwater Area.

Exhibit 2-14. City of The Dalles Water Rights, continued.

Source	Application	Permit	Claim, Decree, or Transfer	Certificate	Priority Date	Type of Beneficial Use	Authorized Rate (cfs) or Volume (AF)	Authorized Date for Completion	Maximum Rate or Volume of Withdrawal to Date		2012 Average Withdrawal		Five-Year (2008-2012) Average Withdrawal		Comments	
									Instantaneous (cfs or annual volume (AF))	Annual (MG)	Monthly (MG)	Daily (mgd)	Monthly (MG)	Daily (mgd)		
<b>Surface Water</b>																
South Fork Mill Creek, a tributary of Mill Creek			Mill Creek Decree	5691	1862	Municipal	2	N/A	2							
Dog River, a tributary of Hood River			Hood River Decree	14954	8/1/1870	Municipal	"All the water in stream at point of diversion"	N/A	All the water in stream at point of diversion	1025.5	80.1	2.63	80.6	2.65		
Crow Creek Reservoir, a tributary of Mill Creek	S-43668	S-32479		60410	5/29/1967	Municipal	955 AF	N/A	955 AF							
Crow Creek Reservoir, a tributary of South Fork Mill Creek	S-84050	S-53930		N/A	1/21/1999	Municipal	2100 AF	10/1/2041	0	0	0	0	0	0	0	Currently undeveloped
Columbia River, a tributary of the Pacific Ocean	S-55346	S-49653		N/A	1/13/1986	Municipal	40	10/1/2073	0	0	0	0	0	0	0	Currently undeveloped. Subject to "fish persistence" conditions.
<b>Storage</b>																
South Fork Mill Creek, Dog River	R-43667	R-4988		44917	5/29/1967	Storage for Municipal Use	955 AF	N/A	955 AF	955 AF	23.1	0.76	9.4	0.31		
South Fork Mill Creek, Dog River	R-84049	R-13105		N/A	1/21/1999	Storage for Municipal Use	2100 AF	11/20/2021	0	0	0	0	0	0	0	Currently undeveloped Any deficiency in supply from South Fork Mill Creek is to be made up by diversion from Dog River.



### **Aquatic Resource Concerns**

The City's authorized surface water sources are Dog River, South Fork Mill Creek, Crow Creek Reservoir, and the Columbia River. With the exception of Crow Creek Reservoir, each of these sources is listed as a water quality limited stream according to the Oregon Department of Environmental Quality (DEQ) due to certain parameters not meeting water quality criteria. The City's point of diversion on Dog River is at approximately River Mile (RM) 4.5. Dog River is listed as water quality limited between RM 0 and 10.7 for beryllium and iron. The City's point of diversion on South Fork Mill Creek is at approximately RM 1.1. South Fork Mill Creek is water quality limited for temperature and a Total Maximum Daily Load (TMDL) has been approved for that parameter. The City's authorized point of diversion on the Columbia River is located just upstream of The Dalles Dam (RM 191.5). The Middle Columbia River at this location is water quality limited for the following parameters: pH, temperature, dioxin, and total dissolved gas. TMDLs have been approved for dioxin and total dissolved gas.

The list of water quality limiting parameters for these water bodies can be found in DEQ's Water Quality Assessment - Oregon's 2010 Integrated Report Assessment Database at <http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp>

# Evaluation of Water Rights/Supply

OAR 690-086-0140(3)

The City's primary water supplies are currently provided by surface waters from The Dalles Municipal Watershed, which encompasses a 22,000 acre drainage containing the watersheds of Dog River and South Fork Mill Creek, including the sub-drainages of Alder Creek and Crow Creek. Water from Dog River is diverted and conveyed to South Fork Mill Creek via a 3.5 mile pipeline. At the confluence of South Fork Mill Creek and Crow Creek, Crow Creek Dam impounds water from Dog River and South Fork Mill Creek in Crow Creek Reservoir. The City's live flow from Dog River and South Fork Mill Creek and stored water in Crow Creek Reservoir are released from the Crow Creek Dam into South Fork Mill Creek. This water is then diverted 8 miles downstream at the South Fork Mill Creek intake, at which point the water flows by gravity a short distance to the Wicks Water Treatment Plant. This stored water and available live flow are used throughout the year to meet municipal demand. Reliable late summer flows from these surface water sources, including available live flows and stored water releases, are currently 5.4 cfs (3.5 mgd). This is based upon a rate that can be sustained all summer long and not over-drafting the water in Crow Creek Reservoir before refilling begins. The City normally begins drawdown in early July and it is often November before any refilling begins. Expansions of Crow Creek Reservoir and the Wicks Water Treatment Plant, as identified in the City's 2006 Water System Master Plan, are anticipated to increase the reliable summer flows from these sources to 15.5 cfs (10 mgd), for a total increase of 10.1 cfs.

The City holds the most senior water right on Dog River (Certificate 14954) and on South Fork Mill Creek (Certificate 5691), making the City's Dog River and South Fork Mill Creek water supply very reliable. The City's storage water rights (Certificate 44917 and Permit R-13105) are junior to a few water rights, but the reliability of the stored water and use of that stored water is not expected to be diminished given that storage occurs in winter months when flows are typically ample and the other water rights are primarily for irrigation.

The Dog River and South Fork Mill Creek watersheds have the potential to be devastated by fire and volcanic activity. In the summer of 2013, a fire in the municipal watershed threatened the City's water treatment plant and burned vegetation right up to stream banks, which has created the longer-term threat of the water treatment plant becoming overwhelmed by ash and sediments during heavy rain events. A fire in 1967 also occurred in the municipal watershed followed by heavy rains, resulting in enough ash and sediment flowing into the water treatment plant that the City had to shut it down for an extended period of time. Effects of the 1967 fire on water quality were still evident 20 years later. In addition, the City's watersheds are immediately adjacent to and downwind from Mt. Hood.

The City's current surface water supplies are supplemented by groundwater sources during peak demand summer months and emergencies. The City holds a total of 20.824 cfs (13.5 mgd) in groundwater rights for municipal use and 18.454 cfs (11.9 mgd) of that comes from the three wells used as the City's primary municipal groundwater sources: Lone Pine Well, Marks Well, and Jordan Street Well (GR 4258 as modified by T-10865, Certificate 15543, Certificate 86380, Certificate 48991, and Certificate 60026). The hydraulic pumping capacity of these three wells is 10.7 cfs (6.9 mgd) when running 24 hours per day. Thus, of the 18.454 cfs in water rights from these three wells, 10.7 cfs is the maximum sustainable rate currently usable. The Marks and Jordan Street Wells have less desirable water quality due to elevated iron, manganese, and



turbidity levels, and must be blended with treated surface water supplies. The Marks Well is the last of the three wells that the City uses as a result of having the poorest water quality. The Wicks Well has very poor water quality (Certificate 44915), such that the 1.56 cfs (1 mgd) municipal water right can only be used in emergencies to supplement surface water supplies after full treatment through the water treatment plant. The Mill Creek Well (Certificate 85886) and the Stadelman Well (GR-4257) are currently not in use. The three wells providing water to The Dalles Middle School (Certificate 87278), and the Kuck Well (Permit G-13421) are not connected to the City's municipal water supply system. All wells except the Wicks Well and the Kuck Well are located within The Dalles Critical Groundwater Area.

To determine total reliable municipal groundwater supply, industry guidelines instruct water utilities to anticipate the loss of the single largest source, which for the City, is the Jordan Street Well at 4.0 cfs. Subtracting 4.0 cfs from the 10.7 cfs of the City's primary municipal groundwater sources results in 6.7 cfs (4.3 mgd) of current total reliable municipal groundwater supply. Combining the City's current reliable supplies of surface water (5.4 cfs) and groundwater (6.7 cfs), the City's total current reliable water supply during peak summer demand, is 12.1 cfs (7.8 mgd). The City's MDD has exceeded 7.8 mgd five times since 2005 and averaged greater than 7.8 mgd from 2005 through 2013, which indicates that the City's current reliable water supply estimate is conservative due to the exclusion of the Jordan Street Well and that the City needs to continue to plan for additional water supply.

The City's water use permit on the Columbia River (Permit S-49653) will provide a redundant water supply for the City's existing surface water and groundwater sources, as well as provide water supply for future growth. This redundant supply is important for the City because its groundwater rights appropriate water from a designated Critical Groundwater Area and its primary surface water supplies are vulnerable to catastrophic fires and volcanic events.

## **System Description**

### **OAR 690-086-140(8)**

The City operates a public drinking water system (Public Water System Identification Number 4100869). **Exhibit 2-1** is a schematic of the City's water distribution system.

The City's surface water sources are described above. The City's Wicks Water Treatment Plant (WTP) was constructed in 1947 and has a rated capacity of 6.05 mgd by the Oregon Health Authority (OHA) Drinking Water Program. However, the City can only realistically operate at about 5.6 mgd and still have reasonable filter run times. As described above, the firm capacity of the WTP from the surface water sources during late summer flows, including available live flows and stored water releases, is currently 5.4 cfs (3.5 mgd). Two finished water transmission pipelines, the High Line and the Mill Creek Line, use gravity flow to convey water approximately 7 miles from the WTP to the City limits. The High Line conveys water to Sorosis Reservoir and the Mill Creek Line conveys water to Garrison Reservoir. Together, these lines have a combined capacity of approximately 7.5 mgd. Each line serves a limited number of customers along its length, in addition to supplying the City's distribution system.



The City's primary municipal groundwater wells are the Jordan Street Well, Marks Well, and Lone Pine Well. **Exhibit 2-16** summarizes the current pumping capacity from each of these wells. The Jordan Street and Marks wells pump directly into the distribution system and the Lone Pine Well has a dedicated pump line to the Intermediate Reservoir. Total current capacity of these three wells is estimated to be 6.9 mgd (10.7 cfs).

**Exhibit 2-16. Current Groundwater Pumping Capacity.**

Well	Current Capacity (gpm)	Current Capacity (mgd)	Current Capacity (cfs)
Primary Wells			
Jordan Street	1,800 (Pump rebuilt in 2012)	2.6	4.0
Marks	1,300	1.9	2.9
Lone Pine	1,700	2.4	3.8
<i>TOTAL</i>	<i>4,800</i>	<i>6.9</i>	<i>10.7</i>
Other Wells			
Mill Creek	0	0	0
Wicks	652	0.9	1.4
Stadelman	0	0	0
Kuck	210	0.3	0.5
3 Commercial Wells	176	0.25	0.4

The City's distribution system has five reservoirs, thirteen elevation zones, and three pump stations. **Exhibit 2-17** lists the reservoirs, their volume, overflow elevations, material types, and water sources. The reservoirs and the transmission pipelines feed the higher elevation zones, and the higher elevation zones feed the lower zones through pressure reducing valves. The three booster pump stations that lift water within the distribution system are summarized in **Exhibit 2-18**.

**Exhibit 2-17. Summary of System Reservoirs.**

Reservoir	Volume (million gallons)	Overflow Elevation (feet)	Material Type	Water Source
Sorosis	3	660	Steel	High Line
Garrison	6	460	Steel	Mill Creek Line
Vista*	2.7	760	Steel	Sorosis Reservoir
Columbia View	3	632	Steel	Sorosis Reservoir or Intermediate Pump Station
Intermediate	1	352	Steel	Lone Pine Well or Columbia View Reservoir

\*Constructed and placed in service in 2011.

**Exhibit 2-18. Summary of System Pump Stations.**

Pump Station	Approximate Capacity (gpm)	# of Pumps	Conveys from	Conveys to
Intermediate	3500	2	Intermediate Reservoir / 352 Zone	632 CV Zone / Columbia View Reservoir
Garrison	1200	2	Garrison Reservoir	Sorosis Reservoir
Sorosis*	1500	3	Sorosis Reservoir	Vista Reservoir

\*Constructed and placed in service in 2011.

In addition to the transmission pipelines, the City's distribution system is comprised of 531,580 feet (101 miles) of pipeline. Cast iron and ductile iron make up approximately 79 percent of the pipe material in use. **Exhibit 2-19** summarizes the diameter, total length, and percent of the system for each material in use.

Exhibit 2-19. Summary of Pipelines.

Material	Diameter (inches)	Total Length (ft)	Total Length (miles)	Percent of System (%)
Steel	4	943	0.2	0.2
	6	1,731	0.3	0.3
	10	72	0.0	0.0
	12	1,309	0.2	0.2
	Mill Creek Transmission Line 12"	35,612	6.7	6.7
	14	6,344	1.2	1.2
	High Line Transmission Line 14"	36,894	7.0	6.9
	<i>Subtotal</i>	<i>82,906</i>	<i>15.7</i>	<i>15.6</i>
AC	6	1,504	0.3	0.3
	8	1,581	0.3	0.3
	10	1,901	0.4	0.4
		<i>Subtotal</i>	<i>4,986</i>	<i>0.9</i>
Cast Iron	4	3,126	0.6	0.6
	6	161,868	30.7	30.5
	8	41,091	7.8	7.7
	10	14,517	2.7	2.7
	12	44,700	8.5	8.4
	14	335	0.1	0.1
	16	3,424	0.6	0.6
	<i>Subtotal</i>	<i>269,060</i>	<i>51.0</i>	<i>50.6</i>
Copper	1	560	0.1	0.1
	1.5	15	0.0	0.0
	2	3,942	0.7	0.7
	3	23	0.0	0.0
		<i>Subtotal</i>	<i>4,540</i>	<i>0.9</i>
Ductile Iron	3	127	0.0	0.0
	4	2,259	0.4	0.4
	6	46,841	8.9	8.8
	8	25,346	4.8	4.8
	10	16,798	3.2	3.2
	12	32,360	6.1	6.1
	16	16,554	3.1	3.1
	18	7,843	1.5	1.5
	<i>Subtotal</i>	<i>148,128</i>	<i>28.1</i>	<i>27.9</i>
Galvanized Iron	2	10,097	1.9	1.9
	4	851	0.2	0.2
		<i>Subtotal</i>	<i>10,948</i>	<i>2.1</i>
PVC	12	3,249	0.6	0.6
		<i>Subtotal</i>	<i>3,249</i>	<i>0.6</i>
Unidentified		7,763	1.5	1.5
<b>Totals</b>		<b>531,580</b>	<b>100.7</b>	<b>100.0</b>



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# 3. Water Management and Conservation

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*This section addresses the requirements of OAR 690-086-0150(1) – (6).*

*This rule requires a description of specific required conservation measures and benchmarks, and additional conservation measures implemented by the City.*

## Current Conservation Measures

### **OAR 690-086-0150(1) and (3)**

#### **Progress Report**

This is the City's first WMCP.

#### **Background**

The City has dedicated substantial time and resources towards water conservation measures over recent years. The City's water system is fully metered and the City has installed automated meter reading on all of its meters. City customers are charged for the quantity of water used beyond a base amount to encourage water conservation and the City recently increased that consumption charge substantially for residential customers. The City provides water conservation information at community events, its Billing and Public Works offices, and its Web site. In addition, the City has been improving production and consumption data collection and management in recent years.

## Use and Reporting Program

### **OAR 690-086-0150(2)**

The City's water measurement and reporting program complies with the measurement standards in OAR Chapter 690, Division 85. The City's water use records can be found at [http://apps.wrd.state.or.us/apps/wr/wateruse\\_report/](http://apps.wrd.state.or.us/apps/wr/wateruse_report/).

The City has magnetic meters at Vista Reservoir and its pump station, the Mill Creek and High Line transmission line intakes at the Wicks WTP, Jordan Street Well, Marks Well, and Lone Pine Well. The remaining City wells have in-line prop meters. Data are recorded daily and are compiled for reporting to OWRD on an annual basis.

## Required Conservation Programs

### **OAR 690-086-0150(4)**

OAR 690-086-150(4) requires that all water suppliers establish 5-year benchmarks for implementing the following water management and conservation measures:

- Annual water audit
- System-wide metering
- Meter testing and maintenance
- Unit-based billing

- Leak detection and repair (if system leakage exceeds 10 percent)
- Public education

## Five-Year Benchmarks for Required Conservation Measures

During the next 5 years, the City plans to initiate, continue, or expand the following conservation measures that are required of all municipalities.

### 1. Annual Water Audit.

OWRD defines a water audit as an analysis of the water system that includes a thorough accounting of all water entering and leaving the system to identify leaks in the system and authorized and unauthorized water uses, metered or estimated. The water audit also includes analysis of the water supplier's own water use.

To date, the City has conducted annual water audits periodically for Water System Master Plans. The City uses water production and consumption data from meters and estimates of unmetered authorized uses to calculate unaccounted-for water, both as a total volume and a percentage of production. Specifically, unaccounted-for water is the difference between production and metered consumption minus the estimated unmetered authorized uses. The unmetered authorized uses estimated by the City are detailed in Section 2. The City's unaccounted-for water was 16.5 percent in 2012 and averaged 13.6 percent from 2006 through 2012.

The City has been investing resources in its production reporting system and billing system. The City's reporting systems recently crashed, resulting in the need to manually fill in large data gaps from 2004 through 2011, primarily related to well water production. In response, the City made significant improvements to its back up procedures to avoid loss of data in the future. In addition, the City has been making regular upgrades to its billing system since 2008 to enable the City to conduct more detailed analyses of consumption. Prior to 2008, the City could not easily calculate annual consumption and other useful statistics.

The City is currently strategizing how to improve monthly collection of meter data, as well. From 2006 through 2012, the City was not able to collect data from all meters in a given month on four occasions, resulting in collection of the meter data in the following month. Consequently, consumption was either underrepresented or overrepresented in these months. Several City departments are working together to figure out how to avoid that situation as much as possible in the future.

*Five-Year Benchmarks:* The City will annually compare metered water production to metered consumption and estimated unmetered authorized uses to calculate unaccounted-for water. In the next five years, the City will put in place practices to reduce the occurrence of missed meter reads, which result in higher use attributed to the next month's consumption. In the next five years, the City will continue to improve its billing system to provide more detailed consumption records.



## **2. System-wide Metering.**

The City's water system is fully metered.

*Five-Year Benchmarks:* The City will continue to require meters on all new connections.

## **3. Meter Testing and Maintenance.**

The City's Water Distribution Division is has installed automated meter reading (AMR) on all of its meters, which involves attaching an Itron radio transmitter to the water meter. The City replaced any meter found not functioning at the time of AMR installation.

The City annually tests 10 to 12 of the large (3-inches or greater) and/or high volume water meters in the system, which represents about one-fifth of the City's large meters. Consequently, every large meter is tested every 5 to 6 years. The City repairs or replaces any meter found to be malfunctioning or operating outside of their rated accuracy. The City replaces meters less than 3-inches in size on a schedule instead of testing them. Beginning in 2013, the City will replace 10 percent of the residential water meters on an annual basis. In addition, a monthly meter malfunction report is generated from the meter reading software and the City repairs all meters on this list. The City also replaces any meter upon its failure.

The City has magnetic meters at Vista Reservoir and its pump station, which were installed in 2011, and at Wicks WTP, which was installed in 2007. The City has not tested these meters yet. The City has magnetic meters on the Marks Well, Jordan Street Well, and Lone Pine Well. The meters on the Marks Well and Jordan Street Well were installed in 2013 and the meter on the Lone Pine Well was installed in 2014. Well meters are not currently tested.

*Five-Year Benchmarks:* Over the next five years the City will continue all of the meter testing and repair activities described above, including an annual test of large meters and residential meter repair and replacement. In addition within 5 years the City will implement a program to test its well meters and its magnetic meters.

**4. Water Rate Structure.**

The City has a monthly basic service charge per month based on meter size and a consumption charge, which is \$1.60 per 1,000 gallons (G) over 10,000 G per month for residential users and \$3.44 per 1,000 G over 5,000 G per month for commercial users. **Exhibit 3-1** shows the current service and consumption charges.

**Exhibit 3-1. Monthly Service and Consumption Charges as of September 2013.**

Meter Size (inches)	Basic Charge	Consumption Charge
<b>Residential</b>	<b>Up to 10,000 G/month</b>	<b>per 1,000 G over 10,000 G/month</b>
0.75	\$52.67	\$1.60
1	\$52.67	\$1.60
1.5	\$63.20	\$1.60
2	\$80.06	\$1.60
3	\$115.89	\$1.60
<b>Commercial</b>	<b>Up to 5,000 G/month</b>	<b>per 1,000 G over 5,000 G/month</b>
0.75	\$42.44	\$3.44
1	\$47.90	\$3.44
1.5	\$58.63	\$3.44
2	\$75.19	\$3.44
2.5	\$97.00	\$3.44
3	\$113.33	\$3.44
4	\$173.27	\$3.44
6	\$309.68	\$3.44

Residential and commercial customers outside city limits are charged 1.5 times the applicable rates shown in **Exhibit 3-1** for bonded water system improvements, in lieu of debt service property taxes collected inside the City.

The City also charges contractors a hydrant water usage fee of \$3.44 per 1,000 G and a Public Works Department fill station fee of \$3.44 per 1,000 G.

*Five-Year Benchmarks:* In the next five years, the City will continue to bill customers based, in part, on the quantity of water metered at the service connection.

## **5. Leak Detection and Repair.**

As described above, the City's unaccounted-for water was 16.5 percent in 2012 and averaged 13.6 percent from 2006 through 2012. The City has a leak detection and repair program to reduce water losses in the City's water system.

The annual operations budget for the Water Distribution Division includes an allocation for leak detection. Typically, one to two miles of main line are reviewed for leaks annually using methods and technology appropriate to the size and capabilities of the individual water main. Identified leaks are repaired on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years.

The City has identified major leaks in the two approximately 7 mile-long pipelines between the WTP and the city limits and has adopted a capital improvement plan to replace the pipelines, as well as a rate schedule and project schedule. Leak repair is an on-going process.

Besides the leak detection measure mentioned above, leaks are detected by visual inspection by City staff or by customers who contact the City with concerns. City staff repairs leaks associated with customer connections promptly and repairs other leaks on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years.

The AMR system that the City has installed will enable the City to review customer water consumption and to flag customers with elevated water use that suggests a leak. If a leak is suspected, the City will investigate to address the leak.

*Five-Year Benchmarks:* Over the next 5 years, the City will conduct leak detection on approximately 26 miles of pipeline, and based on the results of that effort, the City may revisit its annual leak detection efforts. In the next 5 years, the City will continue to seek funding for major leak repairs to fix the leaks as soon as possible. The City will continue to address minor leaks on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years.

## **6. Public Education.**

The City uses a variety of approaches to educate the public about water conservation. The Public Works Department has a booth at the annual Cherry Festival community event where staff offers information and free items that promote efficient indoor and outdoor water use, including:

- For leaking toilets: Dye tablets and toilet flappers
- For efficient outdoor watering: Hose nozzles with a watering brochure, Master Gardeners information, and rain gauges to measure water applied
- For water-efficient landscaping: Master Gardeners information, AWWA brochures, and a drawing for free drought-tolerant plants
- For reduced flow: 1.5 gpm faucet aerators
- For shorter showers: Shower timers
- For leaky faucets: Leak gauge with conversion to annual gallons wasted
- For children, grades K-3 and 4-6: Booklets on water conservation in English and Spanish
- For children: Stickers and pencils with water conservation messages



The City also provides tours of the WTP to school groups, most commonly fifth graders, that promote water conservation.

Water conservation brochures are available to the public at the Public Works Department office and City Hall Finance Department where utility bills are paid.

**Appendix B** contains an example of one of the City's brochures. In addition, the City delivers an annual water quality report to every water customer that contains articles about Water Conservation and links to conservation Web sites. Excerpts from the 2010 and 2012 reports are in **Appendix C**. Water conservation tips for indoors and outdoors are included on the City's Web site, as well, which are shown in **Appendix D**.

*Five-Year Benchmarks:* The City will continue to maintain and update its print materials and Web site content about water conservation. The City will continue to provide water conservation information and items at community events. In the next 5 years, the City will seek additional partnerships to promote water conservation.

## **Expanded Use under Extended Permits**

### **OAR 690-086-0150(5)**

Under OAR 690-086-0150(5), any municipal water supplier that proposes to expand or initiate the diversion of water under an extended permit for which resource issues have been identified shall include a description of activities and five-year implementation schedule for a system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent. The City is not proposing to initiate or expand diversion of water under an extended permit.

## **Additional Conservation Measures**

### **OAR 690-086-0150(6)**

OAR 690-086-0150(6) requires municipal water suppliers that serve a population greater than 1,000 and propose to expand or initiate the diversion of water under an extended permit for which resource issues have been identified, or if the population served is greater than 7,500, to provide a description of the specific activities, along with a five-year schedule to implement several additional conservation measures. The City does not propose to expand diversion of water under its extended permits, but in 2013, the City served a population of 11,964; therefore, the City is required to address the following additional conservation measures.

#### **1. Leak Repair or Line Replacement Program**

Under this rule requirement, the City is required to implement a system-wide leak repair program or line replacement program to reduce system leakage to 15 percent, and if feasible to 10 percent. As described above, the City's unaccounted-for water was 16.5 percent in 2012 and averaged 13.6 percent from 2006 through 2012, and the City is making large investments in its leak repair and line replacement program, such as by installing AMR and preparing to repair major leaks in the transmission line between the WTP and city limits. The program includes an allocation for leak detection in the annual operations budget for the Water Distribution Division, leak detection along one to two miles of main line annually, leak detection through visual inspection as Public Works staff travel around the water service area, and installation of an AMR system.

*Five-Year Benchmarks:* Over the next 5 years, the City will conduct leak detection on 26 miles of pipeline, and based on the results of that effort, the City may revisit its annual leak detection efforts. In the next 5 years, the City will continue to seek funding for major leak repairs to fix the leaks as soon as possible. The City will continue to address minor leaks on a priority basis from the annual maintenance budget or from a capital improvement budget established for future years.

## **2. Technical and Financial Assistance Programs**

The City provides interested customers with toilet leak detection tablets and leak gauges to identify leaks and to increase customer awareness about water losses that add to their water bill. The City provides shower timers upon customer request to increase indoor water conservation. To increase outdoor water conservation, the City provides interested customers lawn-watering gauges and gives away free drought-tolerant plants through a drawing. The City considers water efficiency when upgrades are made to City-owned buildings, as well.

A City ordinance (General Ordinance No 91-1133, Section 9 (j)) allows a rate adjustment for customers who repair leaks promptly. Under the ordinance, whenever a customer has cause to believe a leak may exist between the meter and the customer's premises, it is the customer's responsibility to contact the Public Works Department to allow the Department to determine the existence of the leak. Customers that repair leaks on the customer's side of the meter within ten days after notification to the Public Works Department, or within a time schedule approved by the Public Works Department, can have their customer bill adjusted by up to one-half of the total estimated excess consumption over the previous thirty days.

*Five-Year Benchmarks:* The City will continue to offer rate adjustments for timely leak repair. The City will continue to offer toilet leak detection tablets, leak gauges, and lawn watering gauges at the annual Cherry Festival and at the Public Works Department office upon request. In the next 5 years, the City will meet with Commercial/Industrial customers to discuss water conservation opportunities.

## **3. Supplier Financed Retrofit or Replacement of Inefficient Fixtures**

The City offers its customers items that promote efficient water use indoors and outdoors at the annual Cherry Festival. The Public Education discussion above describes all of the items offered, such as 1.5 gpm faucet aerators and toilet flappers. In addition, many of these items are available at the Public Works Department, and the Finance Department distributes selected items, such as hose nozzles with a brochure about efficient watering.

*Five-Year Benchmarks:* The City will continue to offer 1.5 gpm faucet aerators and toilet flappers to customers at the annual Cherry Festival.

## **4. Rate Structure and Billing Practices that Encourage Conservation**

Since 1996, City water rates have included both a base charge and a consumptive charge. As part of a 10-year (2010-2020) water rate schedule, the City increases Commercial/Industrial and Residential base and consumption charges by 10 percent annually during this period, with an exception in 2011 when the Residential base water charges increased by 8 percent and Residential consumption charges increased by 30



percent. The City intends the substantial increase in consumption charges to encourage water conservation. The City bills customers monthly to provide relatively quick feedback on water usage to customers. Customers' bills are postcards and include usage for the month billed and for the same month in the previous year.

*Five-Year Benchmarks:* The City will continue to bill customers based, in part, on the quantity of water metered at the service connection and will maintain its monthly billing schedule. In the next 5 years, the City will periodically add water conservation messages to its bills. In the next 5 years, the City will investigate the feasibility of providing past water usage information spanning the previous 12 or 13 months on water bills. In the next 5 years, the City plans to continue to enact rate adjustments for all customer classes that will encourage water conservation.

#### **5. Water Reuse, Recycling, and Non-potable Opportunities**

The City provides non-potable water from three wells for use in the heating and cooling system of the new, LEED certified The Dalles Middle School. In addition, the school district is using water from the wells for irrigating approximately 7.9 acres. In addition, the City re-uses treated effluent at its Wastewater Treatment Plant for clarifier sprayers, gravity belt wash down, and digester gas defoaming.

*Five-Year Benchmarks:* The City will continue to explore opportunities for water reuse and recycling. In the next 5 years, the City will contact industrial users to discuss the potential for water reuse in their operations.

#### **6. Other Conservation Measures**

City staff participates actively in the American Water Works Association, including the Pacific NW Section of AWWA.

The City also has an ordinance (General Ordinance No. 91-1133, Section 6) allowing it to terminate a customer's water service in the event of an emergency or damage to the system, or when the customer has been convicted for a violation of water or sewer ordinances or rules or a violation of water restrictions.

*Five-Year Benchmarks:* In the next 5 years, the City will review City ordinances and its building permit review process to find opportunities to encourage water conservation.



## 4. Municipal Water Curtailment Element

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*This section satisfies the requirements of OAR 690-086-0160.*

*This rule requires a description of past supply deficiencies and current capacity limitation. It also requires inclusion of stages of alert and the associated triggers and curtailment actions for each stage.*

### Introduction

Water curtailment plans outline proactive measures that water suppliers may take to reduce demand and to find alternative supply during short-term water supply shortages. The intent of water curtailment plans is to minimize the impacts of water supply shortages and to ensure water supply for public health and safety.

### History of System Curtailment Episodes

#### **OAR-690-086-0160(1)**

From the 1980s through 1996, the City regularly implemented water shortage response plans several times each year during the high water use periods (typically May - September). Prior to 1996, the City charged residential customers a flat rate for water and did not meter their water use. Since achieving a fully metered residential customer base and implementing a rate structure based on the amount of water used for residential customers in late 1996, the City has not needed to curtail water use except on two occasions. Flooding in 1996 resulted in temporary loss of the City's WTP. The flood occurred in February, a low water use time of year. The WTP was off-line for 3 days due to flood debris that buried the intake and it continued to remain off-line for a total of about 1 month due to damage that occurred to numerous sections of the water transmission lines from the WTP to the City. The City was able to provide sufficient supply from its groundwater sources, but customers outside the City that are served from the transmission lines were without water service for the entire month. In 2002, a threat from wildfire necessitated that the City's WTP be taken off-line for 4 days. These two events caused the City to request voluntary water curtailment of its customers.

System capacity is currently limited by the capacity of its three primary wells, which is 12.63 cfs, or 7.13 cfs if the largest well becomes inoperable. The City's ability to maintain delivery during long-term shortages is strong due to the City's dual sources and reliability of the groundwater supply, as well as access to the Columbia River once this source is developed.

### Curtailment Event Triggers and Stages

#### **OAR-690-086-0160(2) and (3)**

The City has adopted a four-stage curtailment plan that will be implemented in the event that a water supply shortage requires the City to declare a stage of water curtailment. Situations that could create a water supply shortage include, but are not limited to: mechanical or electrical equipment failure in the system, unanticipated catastrophic events (fires, flooding, landslides, earthquakes, and source water contamination), prolonged droughts, or events not under control

of the water supplier (localized or area-wide power outages and intentional malevolent acts). The four stages of curtailment are designed to be initiated and implemented in progressive steps and include both voluntary and mandatory rationing. The type of rationing depends on the cause, severity, and anticipated duration of the water shortage.

**Exhibit 4-1** presents the four curtailment stages, as well as their initiating conditions (i.e. triggers). The City’s initiating conditions focus on reservoir water storage and water supply deficits in the water system, because conditions in the system and responses to those conditions can be clearly defined. However, initiating conditions from other supply shortage scenarios are included in **Exhibit 4-1**, as well.

**Exhibit 4-1. Curtailment Stages 1 through 4.**

<b>Curtailment Stages</b>	<b>Potential Initiating Conditions</b>
<b>Stage 1: Water Shortage Advisory</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 6.0 mgd</li> <li>• Minor maintenance work or damage repair is required at water pumps, mains, or reservoirs</li> <li>• A prolonged period of hot, dry weather is forecasted</li> </ul>
<b>Stage 2: Moderate Water Shortage Alert</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 5.0 mgd</li> <li>• Minor damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a minor part of the water system or a facility</li> <li>• Prolonged period of hot, dry weather</li> </ul>
<b>Stage 3: Severe Water Shortage Alert</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 4.0 mgd</li> <li>• Serious damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a significant part of the water system or a facility</li> <li>• Isolated contamination of the water supply</li> <li>• Serious, persistent drought</li> </ul>
<b>Stage 4: Water Shortage Emergency</b>	<ul style="list-style-type: none"> <li>• Available water supply from all sources is limited to 3.0 mgd</li> <li>• Extensive damage to the water system because of a natural disaster, fire, or vandalism</li> <li>• Failure of a critical water system or a facility</li> <li>• Contamination of the entire water supply</li> </ul>

## Authority and Enforcement

General Ordinance No. 91-1133, Section 16 states that the City Manager has the authority to declare a water emergency. The City considers a water emergency to be any occasion when any of the four stages of curtailment is deemed necessary by the City Manager. Upon that declaration, the City Manager has authority to impose water use restrictions deemed necessary to protect the health, safety, and welfare of citizens in the affected area. The City Manager is expected to use reasonable means to notify the public of the water use restrictions. At the City Council meeting following imposition of restrictions, the City Manager will present a report describing the nature of the emergency, its expected duration, and the steps taken to alleviate



the emergency. The City Council has the authority at any meeting subsequent to the emergency to confirm, change, or terminate the restrictions imposed by the City Manager through a resolution. The ordinance also states that no person shall violate the terms of any restriction or condition placed upon the use of water by the City Manager or the City Council pursuant to this provision. The water curtailment stage will remain in effect until the City Manager or City Council deems that the water shortage is over and an emergency situation no longer exists.

General Ordinance No. 91-1133, Section 16 states that violation of any provision of this ordinance is punishable by imprisonment for up to one year or a fine up to \$6,250, or a combination of the two penalties.

## **Curtailment Plan Implementation**

### ***OAR-690-086-0160(4)***

#### ***Stage 1: Water Shortage Advisory***

Stage 1 is activated when the water supply from all sources is limited to 6.0 mgd; minor maintenance work or damage repair at water pumps, mains, or reservoirs is required; or when a prolonged period of hot, dry weather is forecasted. Under Stage 1, the City may take the following actions to curtail water use:

- Ask customers to voluntarily decrease water use (indoor and outdoor) by 10 percent.
- Request that City staff and customers caring for large turf area, such as schools, parks, and cemeteries, voluntarily reduce water use.
- Require that customers using City water for irrigation purposes use a water delivery attachment on the end of the hose, such as a sprinkler, soaker, or other sprinkling device. Open hose irrigation is not allowed.
- Limit City water use for street sweeping and for hydrant and water line flushing.

The City will notify customers of Stage 1 activation through local newspapers or print media, local radio, television, its Web site, and/or mailings.

#### ***Stage 2: Moderate Water Shortage Alert***

Stage 2 is activated when the water supply from all sources is limited to 5.0 mgd; minor damage to the water system has occurred due to a natural disaster, fire, or vandalism; failure of a minor part of the water system or a facility has occurred; or the City is experiencing a prolonged period of hot, dry weather. In addition to curtailment actions under Stage 1, the City may take the following actions to curtail water use under Stage 2:

- Implement mandatory irrigation restrictions for all users
  - Manually-operated irrigation system use will be restricted to two periods per day: 6 am to 9 am and 6 pm to 9 pm.
  - Automatically-controlled irrigation system use will be restricted to the nighttime hours of 12 am to 4 am.
    - Automatic irrigation systems shall be adjusted to provide irrigation no more than every other day.



- Spring type time clocks do not qualify as an "automatic" system and are regulated as manually-operated systems.
      - Residents will be asked to voluntarily limit outside irrigation to twice per week.
- Encourage vehicle washing during regulated irrigation hours only and discourage vehicle washing in the street; all vehicle washing must be done using a hand-operated spray nozzle device equipped with a spring loaded trigger assembly or other mechanism in working order, which can be used to stop the flow of water.
- Restrict sprinkler irrigation of parking strips to the above established irrigation hours; water runoff into the streets should be kept to a practical minimum.
- A variance issued by the Department of Public Works must be obtained for all irrigation using City supplied water outside of irrigation hours. Examples of items requiring a variance are newly planted lawns, gardens, flowers, shrubs, or trees; fund-raising events such as car washes, and water hauls needed for dust control during construction activities. Failure to abide by established directions will result in City permit revocation and subject property owner to prosecution.
- Prohibit the use of water for cleaning or washing down sidewalks, driveways, parking lot areas, or other similar exterior cleaning uses at all times.
- Limit hydrant and water main flushing to emergencies only.
- Cease washing City vehicles except at facilities equipped with water re-circulation equipment or if necessary for public health or safety (e.g., garbage trucks or food transport) or as required by law.
- Ask commercial and industrial customers to voluntarily reduce non-essential water use by 25 to 50 percent.

The City's announcement of Stage 2 will be widely distributed to water users following the same approach as Stage 1. In addition to the information provided in Stage 1, Stage 2 announcements will emphasize the types of prohibition and will recommend water conservation measures to citizens.

### ***Stage 3: Severe Water Shortage Alert***

Stage 3 is activated when the water supply from all sources is limited to 4.0 mgd; serious damage to the water system has occurred due to a natural disaster, fire, or vandalism; failure of a significant part of the water system or a facility has occurred; isolated contamination of the water system has occurred; or the City is experiencing a serious, persisting drought. In addition to curtailment actions under Stage 2, the City may take the following actions to curtail water use under Stage 3:

- Implement additional mandatory irrigation restrictions for all users
  - Manually-operated irrigation system use will be restricted to one period per day: 6 pm to 9 pm.
  - Automatically-controlled irrigation system restrictions will remain the same as Stage 2.
- Restrict watering of parking strips to hand watering only unless permitted by the City.

- Prohibit use of City water to clean, fill, or maintain levels in decorative streams, ponds, or fountains unless they have a recirculating water system.
- Prohibit use of City water to fill swimming pools and hot tubs. However, water may be added to swimming pools to replace volume lost because of evaporation and normal loss resulting from usage.
- Prohibit the installation of new turf and landscape.
- Impose a temporary moratorium on new water delivery connections and temporary water delivery (i.e. construction operations).
- Ask commercial and industrial customers to voluntarily reduce non-essential water use by 50 to 80 percent.
- Cease use of City water to wash vehicles.

The City's announcement of Stage 3 activation will be widely distributed to water users following the same approach as Stage 2.

#### **Stage 4: Water Shortage Emergency**

Stage 4 is activated when the water supply from all sources is limited to 3.0 mgd; extensive damage to the water system has occurred due to a natural disaster, fire, or vandalism; failure of a critical part of the water system or a facility has occurred; or the entire water supply has been contaminated. Given that activation of Stage 4 acknowledges a significant water shortage, the goal of Stage 4 is to provide a minimum of 50 percent of normal supply. In addition to curtailment actions under Stage 3, the City may take the following actions to curtail water use under Stage 4:

- Prohibit outdoor irrigation except by permit issued by the City.
- Request that residential customers limit water use to those uses necessary for basic sanitation, drinking, and eating.
- Ask commercial and industrial customers to voluntarily cease non-essential water uses.
- In the event that an area of the City is without water, potable water will be made available at appropriate locations within the City limits.

The City will notify customers of Stage 4 activation through local newspapers or print media, local radio, television, its Web site, and/or automated "robo-calls."

## **Water Allocations**

The City has prioritized use of available potable water during shortages. Water allocations are established for all customers according to the following ranking system:

- 1) Minimum health and safety allocations for indoor residential needs (includes single-family, multi-family, hospital and convalescent facilities, retirement and mobile home communities, student housing, fire fighting and public safety).
- 2) Institutional/government operations (where water is used for manufacturing and for minimum health and safety allocations for employees and visitors), commercial,

industrial to maintain jobs and economic base of the community (not including landscape uses).

- 3) Newly installed landscaping or shrubbery.
- 4) Existing landscaping.
- 5) New customers, i.e., proposed projects without building permits when the shortage is declared.

In a Stage 4 emergency water shortage lasting over 4 months, the City may implement the following water allocation method for each customer type for a limited duration:

- Single-family            Hybrid of Per-capita and Percentage Reduction
- Multi-family            Hybrid of Per-capita and Percentage Reduction
- Commercial            Percentage Reduction
- Industrial                Percentage Reduction
- Govt/Institutional      Percentage Reduction
- New Customers         Per-capita (no allocation for new landscaping during Stage 4).

The percentage reduction will be based on the previous year's water bills. Customers who use more than their allotment could face imprisonment or a fine, as described above.



# 5. Water Supply

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*This section satisfies the requirements of OAR 690-086-0170.*

*This rule requires descriptions of the City's current and future water delivery areas and population projections, demand projections for 10 and 20 years, and the schedule for when the City expects to fully exercise its water rights. The rule also requires comparison of the City's projected water needs and the available sources of supply, an analysis of alternative sources of water, and a description of required mitigation actions.*

## Delineation of Service Areas

### **OAR 690-086-0170(1)**

The City's UGB, as shown in **Exhibit 2-1**, describes the boundary of the City's future water service area during the 20-year planning period of this WMCP.

## Population Projections

### **OAR 690-086-0170(1)**

The City's 2006 Water System Master Plan projected population growth rates of approximately 1.1 percent through 2030. This corresponds with U.S. census population figures for the City, which indicate annual growth rates of 1.0 percent between 1990 and 2000 and 1.2 percent between 2000 and 2010. Applying the 1.1 percent growth rate to the 2013 population of 11,964 yields projected populations of 13,347 in the year 2023 and 14,890 in the year 2033. Future population estimates for the City's service area are presented in **Exhibit 5-1**.

**Exhibit 5-1. Projected Future Water Service Area Populations.**

<b>Year</b>	<b>Population<sup>1</sup></b>	<b>Year</b>	<b>Population<sup>1</sup></b>
2014	12,096	2024	13,494
2015	12,229	2025	13,642
2016	12,363	2026	13,792
2017	12,499	2027	13,944
2018	12,637	2028	14,098
2019	12,776	2029	14,253
2020	12,916	2030	14,409
2021	13,058	2031	14,568
2022	13,202	2032	14,728
2023	13,347	2033	14,890

<sup>1</sup>All population projections presented above are for the City water service area and do not include areas served by the Chenoweth PUD.

# Demand Forecast

OAR 690-086-0170(3)

A per capita demand approach was used to project the baseline demand within The Dalles water service area. Demand was also estimated considering variation due to weather conditions and demand from anticipated industrial development.

To determine the per capita maximum day demand (MDD), the per capita MDD for several years was averaged using the following method. First, the City's 2006 Water System Master Plan divided trendline MDD values for 2002 and 2003 by the service area population for each year. (Trendline MDD values were used instead of actual MDD values for those years to minimize the effect of MDD variability.) The result of averaging those two years was a per capita MDD of 640 gpcd. Second, the actual MDD values for 2010 and 2012 were divided by the service area population for each year to get 679 gpcd and 616 gpcd, respectively. Finally, the three per capita MDD values were averaged, resulting in a per capita MDD of 644 gpcd. Those four years were used in the per capita MDD analysis due to the readily available information for those years.

The City then used the per capita MDD of 644 gpcd to develop a range of projected demands that considers potential water demands with allowances for weather conditions and industrial growth (Baseline Projected MDD + Allowances) and without these allowances (Baseline Projected MDD). The following describes how the components of the demand projections were determined:

- **Baseline Projected MDD** - To estimate the baseline projected MDD without any allowances, the average per capita MDD was multiplied by the projected population.
- **Weather Allowance** - A "Weather Allowance" of 1 mgd was added to the baseline projected MDD each year. This approach is based on water production data from 1996-2004 that revealed the MDD fluctuates from year to year and can exceed the trendline by as much as 0.9 mgd, largely due to hot summer weather conditions.
- **Industrial Allowance Projected MDD** - An "Industrial Allowance" was developed to address several factors that could significantly increase the City's industrial water demand, including: the fact that current industrial growth is already resulting in an increase in demand for water for industrial use, the substantial amount of land zoned industrial available in the near future, and the City's concerted efforts to attract industrial companies to locate in the City. Specifically, the City anticipates future water demand for three industrial areas. The Port of The Dalles is preparing to develop an approximately 60-acre business park, requiring an 18-inch waterline and an estimated 3 mgd. The City is currently pursuing an expansion of its UGB, and in the process, is annexing all lands inside the UGB, which includes 265 acres of industrial land available for redevelopment. The City is also in the process of establishing an Urban Reserve Area that includes an additional 450 acres of industrial lands for development within the next 50 years. The City estimates that each 100 acres of the lands within these latter two areas will require approximately 1 mgd of water supply, resulting in a total anticipated demand of 2.65 mgd from the developable industrial land within the UGB and 4.5 mgd from the potential Urban Reserve Area industrial demand. Based on these potential industrial demands, an "Industrial Allowance" of 5.65 mgd (3 mgd + 2.65 mgd) per year



was added to the baseline projected MDD through 2025, and 10.15 mgd (3 mgd + 2.65 mgd + 4.5 mgd) per year was added to the baseline projected MDD after 2025 to account for potential future industrial demand.

Thus, the total demand projection allowances were 6.65 mgd per year through 2025 (1 mgd Weather Allowance + 5.65 mgd Industrial Allowance) and 11.15 mgd per year after 2025 (1 mgd Weather Allowance + 10.15 mgd Industrial Allowance), which were added to the baseline projected MDD. **Exhibit 5-2** presents the City’s 10-year and 20-year demand projections with and without allowances.

**Exhibit 5-2. Projected MDD.**

Year	Population <sup>1</sup>	MDD (mgd)	MDD (cfs)	MDD + Allowances <sup>2</sup> (mgd)	MDD + Allowances (cfs)
2013	11,964	7.70	11.92	14.35	22.21
2014	12,096	7.79	12.05	14.44	22.34
2015	12,229	7.88	12.18	14.53	22.47
2016	12,363	7.96	12.32	14.61	22.60
2017	12,499	8.05	12.45	14.70	22.74
2018	12,637	8.14	12.59	14.79	22.88
2019	12,776	8.23	12.73	14.88	23.02
2020	12,916	8.32	12.87	14.97	23.16
2021	13,058	8.41	13.01	15.06	23.30
2022	13,202	8.50	13.15	15.15	23.44
2023	13,347	8.60	13.30	15.25	23.58
2024	13,494	8.69	13.44	15.34	23.73
2025	13,642	8.79	13.59	15.44	23.88
2026	13,792	8.88	13.74	20.03	30.99
2027	13,944	8.98	13.89	20.13	31.14
2028	14,098	9.08	14.04	20.23	31.29
2029	14,253	9.18	14.20	20.33	31.45
2030	14,409	9.28	14.36	20.43	31.60
2031	14,568	9.38	14.51	20.53	31.76
2032	14,728	9.48	14.67	20.63	31.92
2033	14,890	9.59	14.83	20.74	32.08

<sup>1</sup>All population projections presented above are for the City water service area and do not include areas served by the Chenoweth PUD. The 1.1% growth rate was applied to the population in the existing water service area.

<sup>2</sup>A total allowance of 6.65 mgd per year was added through 2025 (1 mgd Weather Allowance + 5.65 mgd Industrial Allowance) and of 11.15 mgd per year was added after 2025 (1 mgd Weather Allowance + 10.15 mgd Industrial Allowance).



# Schedule to Exercise Permits and Comparison of Projected Need to Available Sources

## OAR 690-086-0170(2) and (4)

The City's current conservative estimate of total reliable water supply during the period of peak summer demand is 12.1 cfs (5.4 cfs of surface water + 6.7 cfs of groundwater = 12.1 cfs), as described under Evaluation of Water Rights/Supply in Section 2. This 5.4 cfs of surface water comes from the City's three certificated surface water rights, which authorize: up to 2 cfs from South Fork Mill Creek (Certificate 5691), all the water in Dog River (Certificate 14954), and up to 955 AF of stored water from Crow Creek Reservoir stored under Certificate 44917 (Certificate 60410). The City's estimate of reliable groundwater supply of 6.7 cfs comes from groundwater rights for municipal use from the City's primary wells (Lone Pine, Marks, and Jordan Street Wells) provided under GR 4258 as modified by T-10865, Certificate 15543, Certificate 86380, Certificate 48991, and Certificate 60026. Recall, these wells have a capacity of approximately 10.7 cfs, but the City's conservative estimate of reliable supply assumes the Jordan Street Well (capacity of 4.0 cfs would be unavailable). With all primary municipal wells operating, the City's water supply capacity is 16.1 cfs (10.7 cfs + 5.4 cfs = 16.1 cfs).

The City's MDDs are projected to range between 13.3 cfs (without allowances) and 23.6 cfs (with allowances) in 10 years (2023). To meet these projected demands, the City plans to use its existing certificated water rights and its groundwater registration described above, and as needed, additional supply by upgrading the capacity of the Lone Pine Well from 3.8 cfs to 6.7 cfs by 2020 (as described in the City's Capital Improvement Plan). Assuming the upgrade of the Lone Pine Well capacity results in an additional 2.9 cfs of capacity, by 2020, the City's total reliable water supply (surface water and groundwater) capacity will be approximately 15.0 cfs (12.1 cfs + 2.9 cfs additional capacity = 15.0 cfs). If the City includes the 4.0 cfs from the Jordan Street Well, then the City will have a water supply capacity of 19.0 cfs. In the unlikely event that the City approaches the high-end of the projected demand range in the next 10 years, the City will explore additional well capacity upgrades.

The City's MDDs are projected to range between 14.8 cfs (without allowances) and 32.1 cfs (with allowances) in 20 years (2033). The City plans to meet these projected MDDs by expanding the capacity of its surface water system. Expansions of Crow Creek Dam and the Wicks Water Treatment Plant, which are now projected to be completed in 15 to 20 years (between 2028 and 2033), will allow additional storage under Permit R-13105 and use of that stored water under Permit S-53930. The City is anticipating obtaining an additional 10.1 cfs of water supply under these permits after completion of these projects, which will result in a reliable summer supply of 15.5 cfs from surface water sources (5.4 + 10.1 = 15.5). Thus, the City's total reliable summer supply after expanding the capacity of its surface water system is projected to be 25.1 cfs (15.5 cfs from surface water + 9.6 cfs (6.7 + 2.9 = 9.6) from groundwater = 25.1 cfs). Assuming the Jordan Street Well is operating, estimated supply would be 29.1 cfs. In the event that the City approaches the high-end of the projected demand range in the next 20 years, the City will likely explore additional well capacity upgrades and accelerate efforts to develop water supply from the Columbia River (under Permit S-49653).

Thus, the City anticipates meeting projected demand over the next 10 years under its existing certificated water rights and its groundwater registration, as described above, and is not requesting access to water under its "extended permits" in this WMCP. The City may need

access to extended permit S-53930 (use of water from expanded Crow Creek Reservoir) over the next 20 years, but such a request is premature given the numerous water supply variables that may come into play. As needed, the City may request access to additional stored water under extended Permit S-53930 in its 10-year update of this WMCP, when the City will have a clearer picture of the water supply situation and the most feasible approaches for providing needed water supply.

Finally, as described in the City's approved permit extensions, the City currently projects completing development of Permit R-13105 by as early as 2028 and completing development of Permit S-53930 by 2041. Permit S-49653 is intended to provide a redundant water supply for the City and also to provide water supply when water demand exceeds the City's other reliable water rights and supply. The City projects that it will fully develop Permit S-49653 by 2073, when the City will reach a water demand with allowances that exceeds the permit's maximum rate of 40 cfs (this assumes continuation of a 1.1 percent annual increase in population and continuation of the current allowances through 2073), as shown in **Appendix E**. The City does not currently anticipate needing access to this extended permit during the planning period of this WMCP.

## **Alternative Sources**

### ***OAR 690-086-0170(5)***

OAR 690-086-0170(5) requires an analysis of alternative sources of water if any expansion or initial diversion of water allocated under existing permits is necessary to meet future water demand. The City does not currently anticipate any expansion or initial diversion of water allocated under its existing permits during the planning period of this WMCP; therefore, this rule does not apply.

## **Quantification of Projected Maximum Rate and Monthly Volume**

### ***OAR 690-086-0170(6)***

OAR 690-086-0170(6) requires a quantification of the maximum rate of withdrawal and maximum monthly use if any expansion or initial diversion of water allocated under an existing permit is necessary to meet demands in the near future. The City does not currently anticipate any expansion or initial diversion of water allocated under its existing permits during the planning period of this WMCP; therefore, this rule does not apply.

## **Mitigation Actions under State and Federal Law**

### ***OAR 690-086-0170(7)***

Under OAR 690-086-0170(7), for expanded or initial diversion of water under an existing permit, the water supplier is to describe mitigation actions it is taking to comply with legal requirements of the Endangered Species Act, Clean Water Act, and other applicable state or federal environmental regulations. The City does not currently anticipate any expansion or initial diversion of water allocated under its existing permits during the planning period of this WMCP; therefore, this rule does not apply. The City currently is not required to take any



mitigation actions under state or federal law. The final order on the City's extension application for Permits S-49653, however, did include "fish persistence" conditions.

## **New Water Rights**

### ***OAR 690-086-0170(8)***

Under OAR 690-086-0170(8), if a municipal water supplier finds it necessary to acquire new water rights within the next 20 years in order to meet its projected demand, an analysis of alternative sources of the additional water is required. As shown in the above analysis, the City's water rights are sufficient to meet projected demands during the next 20 years, and consequently, the City currently has no plans to acquire additional water rights within that timeframe.



# **Appendix A**

## **Letters to Local Governments and Comments**



**Water Solutions, Inc.**

June 2, 2014

Dick Gassman  
City of The Dalles Planning Department  
The Dalles City Hall  
313 Court Street  
The Dalles, OR 97058

Subject: Water Management and Conservation Plan for the City of The Dalles

Dear Mr. Gassman:

The City of The Dalles has developed a Draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its Draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans. Enclosed is the City's Draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or e-mail them to me directly at: [asussman@gsiws.com](mailto:asussman@gsiws.com).

If you have any questions, please feel free to contact me at 541-257-9001. Thank you for your interest.

Sincerely,

Adam Sussman  
Principal Water Resources Consultant  
GSI Water Solutions, Inc.

Enclosure

cc. Dave Anderson, City of The Dalles



**Water Solutions, Inc.**

June 2, 2014

John Roberts, Planning Director  
Wasco County Planning Department  
2705 East 2nd Street  
The Dalles, Oregon 97058

Subject: Water Management and Conservation Plan for the City of The Dalles

Dear Mr. Roberts:

The City of The Dalles has developed a Draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its Draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans. Enclosed is the City's Draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or e-mail them to me directly at: [asussman@gsiws.com](mailto:asussman@gsiws.com).

If you have any questions, please feel free to contact me at 541-257-9001. Thank you for your interest.

Sincerely,

Adam Sussman  
Principal Water Resources Consultant

Enclosure

cc. Dave Anderson, City of The Dalles





**Water Solutions, Inc.**

June 2, 2014

Jeb Miller  
Chenoweth Water People's Utility District  
2312 W 8th Street, PO Box 870  
The Dalles, OR 97058

Subject: Water Management and Conservation Plan for the City of The Dalles

Dear Mr. Miller:

The City of The Dalles has developed a Draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department. Under these rules, the water supplier shall make its Draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans.

Given the relationship between the City of The Dalles and Chenoweth Water People's Utility District, we are providing you a courtesy copy of the WMCP. If you have any comments, please provide them to me within 30 days from the date of this letter. You may send your comments to me at the address on this letterhead or e-mail them to me directly at: [asussman@gsiws.com](mailto:asussman@gsiws.com).

If you have any questions, please feel free to contact me at 541-257-9001. Thank you for your interest.

Sincerely,

Adam Sussman  
Principal Water Resources Consultant  
GSI Water Solutions, Inc.

Enclosure

cc. Dave Anderson, City of The Dalles



## Wasco County Planning Department

*"Service, Sustainability & Solutions"*

2705 East Second St. • The Dalles, OR 97058  
Phone: (541) 506-2560 • [wcplanning@co.wasco.or.us](mailto:wcplanning@co.wasco.or.us)  
[www.co.wasco.or.us/planning](http://www.co.wasco.or.us/planning)

June 16, 2014

Adam Sussman  
Principal Water Resources Consultant  
1600 SW Western Blvd., Suite 240  
Corvallis, OR 97333

**Subject:** Water Management and Conservation Plan for the City of The Dalles

Dear Mr. Sussman:

Per your request, I have reviewed the Draft Water Management and Conservation Plan for the City of The Dalles. The plan is consistent with the Wasco County Comprehensive Plan and Wasco County Land Use and Development Ordinance.

Sincerely,

A handwritten signature in black ink that reads "John Roberts".

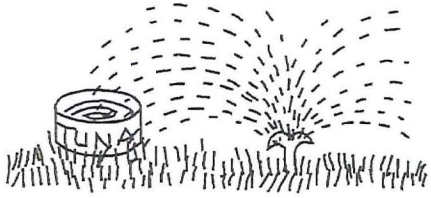
John Roberts  
Planning Director

# **Appendix B**

## **Water Conservation Brochure**



## "Tuna Can Trick"



1. Place three to five empty tuna or cat food cans at different distances from the sprinkler.
2. Run the sprinkler for 30 minutes.
3. Add the inches of water in all the cans and divide by the number of cans to get an average water depth per 30 minutes.
4. Multiply the average by two to determine how many inches are applied in one hour.
5. Use this number to determine how long it takes to apply one inch of water.
6. Check the chart on the reverse side to see how many inches of water are needed per week.
7. Take the time needed to apply the weekly amount of water, and divide by 2 if you will irrigate twice per week or by three if you will water 3 times per week.

### Water Needs of Other Plants

Water needs depend on soil, temperature and age and type of plant. Know your particular plant's requirements.

As a ballpark number, roses and rhododendrons need about 5 gallons per week, while manzanita needs none. Large trees which need supplemental water benefit from monthly deep watering (15-20 gallons), while pine trees are damaged by too much water.

Check on the needs of your plants.

City of The Dalles



## ▶ Wondering About Watering?

### Tips for Making Every Drop Count

Not a Drop to Waste!

City of The Dalles



Public Works Department  
1215 West First Street  
The Dalles, OR 97058

Phone: 541-296-5401

## Wondering about watering?



Get to the root of the matter!

### Summer Water Use

Many customers use three to four times more water in the summer months as compared with their winter water use. Most of this extra water is used for landscape irrigation. However, most landscapes could be maintained in a healthier condition with much less water.



### Water Needs for Lawns in the Mid-Columbia Area

The Wasco County Master Gardeners offer recommendations for watering specific to our area. In general, lawns in our climate need the following amounts of water:

May	1 inch per week
June	1.5 inches per week
July	2 inches per week
August	1.75 inches per week
September	1 inch per week

At this rate, a ten by ten foot patch of grass will use about 2,000 gallons of water per season.

### Tips for Drought-Proofing:

- Encourage roots to grow deeply by watering less frequently for longer periods. Use screwdriver or trowel to check for subsoil moisture down to 6-8 inches.
- If your soil is sandy or if clay soil or slopes cause runoff, you will need to water for shorter periods. Ideally, work organic material into the soil to help it retain moisture.

### Make Every Drop Count—

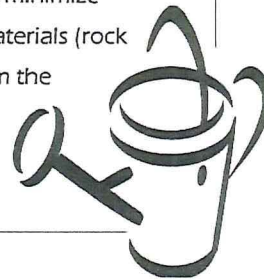
- ▶ Start with a plan that identifies sun exposure and how zones are used. Keep high watering zones small and limit lawn size.

Keep plants with similar water needs together. This will take some homework, but advice is available from your garden center or the OSU Master Gardeners.

Water only when needed and only as much as the plants in that zone require. Ideally this is done using an automatic system with a timer and rain gauge. If using hoses and sprinklers, use a timer with automatic shutoff.

Get the water on the root zone. Use drip irrigation or soaker hoses for gardens and shrubs to prevent waste from evaporation or runoff. For large areas, impact sprinklers are more water-efficient as they throw large drops of water slowly and evenly.

Use mulch. Organic mulches (bark chips or compost) cool the soil and minimize evaporation. Inorganic materials (rock or gravel) absorb heat from the sun and can actually increase loss of water from the soil.



The greatest waste of water is watering too much, too often.

# **Appendix C**

**Excerpts from the 2010 and 2012  
Drinking Water Quality Reports**



**Why do I get this report each year?**

Community water systems are required by Federal law to provide their customers with an annual water quality report. The report helps people make informed choices about the water they drink. It lets people know the source of their water, what contaminants, if any, have been detected in their drinking water, and how those contaminants may affect their health. It also gives the water systems an opportunity to inform customers about their efforts in delivering safe drinking water.

**My water sometimes has a white cloudiness when it first comes from the faucet and then it clears up. Why is that?**

The white cloudiness is caused by tiny air bubbles in the water. This type of cloudiness forms when water travels through pipes at high speed and then meets an obstruction such as a valve or elbow. After a while the air bubbles rise to the top and escape, thus clearing up the water.

**How much water is used during a typical shower?**

The Federal Energy Policy Act set a nationwide regulation that limits showerheads to a maximum flow of 2.5 gallons per minute (GPM). Showerheads made before 1980 are rated at 5 GPM. Since the average shower is estimated to last 8.2 minutes, the old showerheads use 41 gallons of water while the newer, low-flow showerheads use only about 21 gallons.

**Is it okay to use hot water from the tap for cooking and drinking?**

No. Use cold water. Hot water is more likely to contain rust, copper, and lead from your household plumbing and water heater because these contaminants generally dissolve into hot water from the plumbing faster than into cold water. To get the freshest water, let the cold water run for a few minutes before you use it if that tap has not been used for a while, overnight or all day.

**How many contaminants are regulated in drinking water?**

The US EPA regulates over 80 contaminants in drinking water. Some states may choose to regulate additional contaminants or to set stricter standards, but all states must have standards at least as stringent as the US EPA's.

**Substances That Could Be in Water**

The sources of drinking water (both tap and bottled water) can be surface water, such as rivers, lakes, streams and reservoirs, or groundwater, including springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Substances that may be present in source water include: Microbial contaminants, such as viruses and bacteria; Inorganic contaminants, such as salts and metals; Pesticides and herbicides; Organic chemical contaminants, including synthetic and volatile organic chemicals; and Radioactive contaminants, which can be naturally-occurring or a result of human activity.

To ensure that tap water is safe to drink, EPA issues regulations which limit the amount of certain contaminants in water provided by public water systems. US Food and Drug Administration regulations establish limits for contaminants in bottled water. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (800) 426-4791 or by visiting [www.epa.gov/safewater](http://www.epa.gov/safewater).

**Tap vs. Bottled Water**

Thanks in part to aggressive marketing, the bottled water industry has successfully convinced many people that water purchased in bottles is a healthier alternative to tap water. However, according to a four-year study conducted by the Natural Resources Defense Council, bottled water is not necessarily cleaner or safer than most tap water. In fact, according to government and industry estimates, about 25 to 40 percent of bottled water is actually just bottled tap water, sometimes without receiving additional treatment. The Food and Drug Administration is responsible for regulating bottled water, but these rules allow for less rigorous testing and purity standards than those required by the US EPA for community tap water. For instance, the high mineral content of some bottled waters makes them unsuitable for babies and young children. Further, the FDA completely exempts bottled water that's packaged and sold within the same state, which accounts for about 70 percent of all bottled water sold in the United States. People spend as much as 10,000 times more per gallon for bottled water than they typically do for tap water. If you get your recommended eight glasses a day from bottled water, you could spend up to \$1,400 annually. The same amount of tap water would cost about 49 cents. For a detailed discussion on the NRDC study results, check out their website at [www.nrdc.org/water/drinking/bw/exesum.asp](http://www.nrdc.org/water/drinking/bw/exesum.asp).



# Q & A

## Our New Meter Reading System



Water Meters



Mobile Data Collection



The new Automated Meter Reading (AMR) system was fully deployed in May 2013 after about one year of changing out the equipment on every water meter. Previously, meters were read by two water operators walking the routes for two weeks every month and physically touching all 4,850 meters in the system with an electronic wand. The new AMR system uses a small radio installed on each meter to broadcast the meter reading as a radio signal, which is captured by a receiver mounted in a service truck. Now the 4,850 meters can be read by one person in two days by driving through town to collect the radio signals. The readings are then downloaded to the computerized billing system to generate monthly water bills.

*Automated Meter Reading is a drive-by system using radio waves to transmit data.*

### What phone number do I call for help with water issues?

Contact the Public Works Department at (541) 506-2001 during office hours (7am - 4pm)

- Emergency water shutoff
- Concerns about water quality
- Problems with low water pressure or volume
- Investigation of water leaks
- Assistance with meter insulation
- Questions about installation and testing of backflow prevention assemblies

For after hours emergencies contact the On Call Service person at (541) 980-7703. There is no charge for these services.

Contact the Finance Department at City Hall at (541) 506-2031 (8am-5pm)

- Billing questions
- Request to disconnect water/sewer service
- Questions about initiating water/sewer service
- Request for vacation shutoff
- Leak concerns related to high water bills

*Customers must go to City Hall at 313 Court Street in person to sign up for service. Hours are 9am to 4:30pm.*

### Is it OK to open my water meter box?

We don't advise opening the meter box yourself. The radio transmitter and wiring inside of the meter box are easily damaged. Customers are encouraged to contact the Public Works office for assistance.



“ A major benefit of belonging to the Partnership for Safe Water is the message it sends your customers ... you care about them and are taking extra steps to assure them high quality drinking water. ”

Bill Lauer / Partnership Program Manager

## Partnership for Safe Water

*The City is a member of the Partnership for Safe Water, a nationwide voluntary effort between six drinking water organizations and about 230 water utilities throughout the United States, whose primary goal is achieving excellence in water system operation by optimizing operations rather than relying solely on significant capital improvements. The Wicks Water Treatment Plant joined the Partnership about 10 years ago and has received the Director's Award each year for meeting the requirements. The City has also enrolled as a charter member of the newly-offered Distribution System part of the program.*



# **Appendix D**

## **Web site Water Conservation Tips**





# WATER. TOO PRECIOUS TO WASTE.

## INDOORS

Typical Indoor Water use for a family of four:

- Toilet flushing 40%
- Showers and baths 32%
- Laundry 14%
- Dishwashing 6%
- Cooking and drinking 5%
- Bathroom sink 3%

Source: Plain Talk About Drinking Water, 3<sup>rd</sup> Edition, Dr. James M. Symons

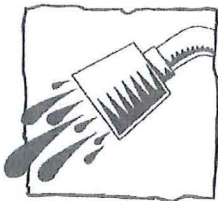
### 10 Tips for Efficient Indoor Water Use

*Toilets account for the largest percentage of indoor water use.*



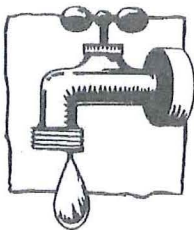
- ① Check for toilet leaks by placing a dye tablet or food coloring in the tank and looking for the color to appear in the bowl. Toilet leaks can be silent wasters of more than 50 gallons of water per day.
- ② Use less water per flush by installing a low flow toilet or by putting something in the toilet tank to take up space, such as a jar or plastic bag of water.
- ③ Don't use the toilet as an ashtray or wastebasket. Each cigarette butt, tissue or bug you flush wastes 5 to 7 gallons of water.

*Showers and baths are the second largest indoor use of water.*



- ④ Take shorter showers and save as much as 5-10 gallons per minute.
- ⑤ Install water-saving shower heads or flow restrictors.

*In the kitchen and laundry:*



- ⑥ Wash full loads in your washing machine and dishwasher.
- ⑦ When washing dishes by hand or cleaning vegetables, don't leave the faucet running.
- ⑧ Keep a bottle of drinking water in the refrigerator to avoid running gallons of water down the drain to get a cold drink.
- ⑨ Install a water saving faucet aerator.
- ⑩ Check faucets and pipes for leaks. Even the smallest drip can waste 20 gallons per day. Larger leaks can waste hundreds of gallons.

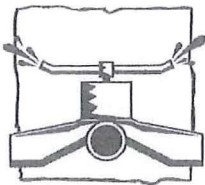


## WATER. TOO PRECIOUS TO WASTE.

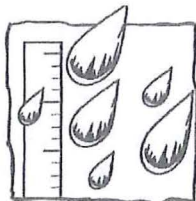
# OUTDOORS

### 10 Tips for Efficient Outdoor Water Use

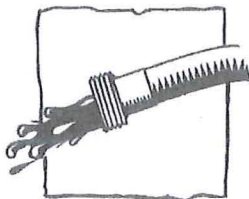
In the summer, 50-70% of a typical water bill is for outdoor use. Overwatering is the number one waste of water during the summer, and the leading cause of plant disease and insect problems. Here are some tips for watering efficiently and preventing waste.



- ① Water in the evening or early morning to minimize waste to evaporation. Mornings are usually less windy.
- ② Adjust sprinklers to avoid watering the street and sidewalk, and use a timer to avoid forgetting to turn sprinklers off.
- ③ Use sprinklers that throw big drops of water close to the ground. Small drops and mist often evaporate before reaching the ground.



- ④ Measure water applied to lawn to apply 1" of water per week.
- ⑤ Check the soil 2-4" deep to see when your lawn needs watering.
- ⑥ Set mower blades to 1 ½ -2 inches and keep them sharp to cut grass cleanly. Longer grass loses less water to evaporation.



- ⑦ Use a broom, not a hose, to clean sidewalks and driveways.
- ⑧ Use a bucket and automatic shut-off nozzle to wash cars. Washing your car on the grass will water the lawn at the same time.
- ⑨ Check outdoor faucets, pipes and hoses for leaks.
- ⑩ Install a water-efficient drip irrigation system for trees and shrubs.

Free water conservation devices are available at the Public Works office at 1900 W. 6<sup>th</sup> Street, while supplies last. To help save water outdoors: Rain gauges to measure how much water sprinkler apply and Master Gardeners information about water needs of grass and plants. For indoor conservation: Reduced flow faucet aerators, and toilet leak detection kits, flappers and tank displacement devices.

# **Appendix E**

## **Water Demand Projections**



Year	Population <sup>1</sup>	Add'l Population from Previous Year (1.1 % Annual Growth) <sup>2</sup>	MDD (mgd)	MDD (cfs)	MDD + Allowance <sup>3</sup> (mgd)	MDD + Allowance (cfs)
2013	11,964	-	7.70	11.92	14.35	22.21
2014	12,096	132	7.79	12.05	14.44	22.34
2015	12,229	133	7.88	12.18	14.53	22.47
2016	12,363	135	7.96	12.32	14.61	22.60
2017	12,499	136	8.05	12.45	14.70	22.74
2018	12,637	137	8.14	12.59	14.79	22.88
2019	12,776	139	8.23	12.73	14.88	23.02
2020	12,916	141	8.32	12.87	14.97	23.16
2021	13,058	142	8.41	13.01	15.06	23.30
2022	13,202	144	8.50	13.15	15.15	23.44
2023	13,347	145	8.60	13.30	15.25	23.58
2024	13,494	147	8.69	13.44	15.34	23.73
2025	13,642	148	8.79	13.59	15.44	23.88
2026	13,792	150	8.88	13.74	20.03	30.99
2027	13,944	152	8.98	13.89	20.13	31.14
2028	14,098	153	9.08	14.04	20.23	31.29
2029	14,253	155	9.18	14.20	20.33	31.45
2030	14,409	157	9.28	14.36	20.43	31.60
2031	14,568	159	9.38	14.51	20.53	31.76
2032	14,728	160	9.48	14.67	20.63	31.92
2033	14,890	162	9.59	14.83	20.74	32.08
2034	15,054	164	9.69	15.00	20.84	32.25
2035	15,220	166	9.80	15.16	20.95	32.41
2036	15,387	167	9.91	15.33	21.06	32.58
2037	15,556	169	10.02	15.50	21.17	32.75
2038	15,727	171	10.13	15.67	21.28	32.92
2039	15,900	173	10.24	15.84	21.39	33.09
2040	16,075	175	10.35	16.02	21.50	33.26
2041	16,252	177	10.47	16.19	21.62	33.44
2042	16,431	179	10.58	16.37	21.73	33.62
2043	16,612	181	10.70	16.55	21.85	33.80
2044	16,794	183	10.82	16.73	21.97	33.98
2045	16,979	185	10.93	16.92	22.08	34.16
2046	17,166	187	11.05	17.10	22.20	34.35
2047	17,355	189	11.18	17.29	22.33	34.54
2048	17,546	191	11.30	17.48	22.45	34.73
2049	17,739	193	11.42	17.67	22.57	34.92
2050	17,934	195	11.55	17.87	22.70	35.12
2051	18,131	197	11.68	18.06	22.83	35.31
2052	18,330	199	11.80	18.26	22.95	35.51
2053	18,532	202	11.93	18.46	23.08	35.71

2054	18,736	204	12.07	18.67	23.22	35.91
2055	18,942	206	12.20	18.87	23.35	36.12
2056	19,150	208	12.33	19.08	23.48	36.33
2057	19,361	211	12.47	19.29	23.62	36.54
2058	19,574	213	12.61	19.50	23.76	36.75
2059	19,789	215	12.74	19.72	23.89	36.96
2060	20,007	218	12.88	19.93	24.03	37.18
2061	20,227	220	13.03	20.15	24.18	37.40
2062	20,450	222	13.17	20.37	24.32	37.62
2063	20,674	225	13.31	20.60	24.46	37.85
2064	20,902	227	13.46	20.82	24.61	38.07
2065	21,132	230	13.61	21.05	24.76	38.30
2066	21,364	232	13.76	21.28	24.91	38.53
2067	21,599	235	13.91	21.52	25.06	38.77
2068	21,837	238	14.06	21.76	25.21	39.00
2069	22,077	240	14.22	21.99	25.37	39.24
2070	22,320	243	14.37	22.24	25.52	39.49
2071	22,565	246	14.53	22.48	25.68	39.73
2072	22,814	248	14.69	22.73	25.84	39.98
2073	23,065	251	14.85	22.98	26.00	40.23
2074	23,318	254	15.02	23.23	26.17	40.48
2075	23,575	257	15.18	23.49	26.33	40.74

- Notes: 1) All population projections presented above are for the City water service area and do not include areas served by the Chenoweth PUD.
- 2) The 1.1% growth rate was applied to the population in the existing water system service area.
- 3) A total allowance of 6.65 mgd per year was added through 2025 (1 mgd Weather Allowance + 5.65 mgd Industrial Allowance) and of 11.15 mgd per year was added after 2025 (1 mgd Weather Allowance + 10.15 mgd Industrial Allowance).