

WATER MANAGEMENT AND CONSERVATION PLAN

Prepared for

Tualatin Valley Water District



Delivering The Best Water  Service  Value

Washington County, Oregon

JANUARY 2015



Prepared by



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Oregon

John A. Kitzhaber, MD, Governor

Water Resources Department

North Mall Office Building
725 Summer St NE, Suite A
Salem, OR 97301
Phone (503) 986-0900
Fax (503) 986-0904
www.wrd.state.or.us

January 16, 2015

Tualatin Valley Water District
Attn: Mark Knudson
1850 SW 170th Avenue
Beaverton, OR 97006

Subject: Water Management and Conservation Plan

Dear Mr. Knudson:

Enclosed, please find the final order approving Tualatin Valley Water District's (TVWD) Water Management and Conservation Plan, and authorizing the diversion of up to 80.1 cubic feet per second of water under Permit S-49240, after a 60-day waiting period.

The attached final order specifies that TVWD's plan shall remain in effect until January 16, 2025. Additionally, TVWD is required to submit a progress report to the Department by January 16, 2020, detailing progress made toward the implementation of conservation benchmarks scheduled in the plan. Finally, TVWD must submit an updated Water Management and Conservation Plan to the Department by July 16, 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 TVWD 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 503-986-0919 or steve.w.parrett@wrdd.state.or.us if you have any questions.

Sincerely,

Steven W. Parrett
Water Management and Conservation Specialist
Water Right Services Division

Enclosure

cc: TVWD WMCP File
Application S-50693 (Permit S-49240)
Joel Plahn, District 16 Watermaster
Jake Constans, District 18 Watermaster
Adam Sussman, GSI Water Solutions, 1600 SW Western Blvd., Suite 240, Corvallis, OR 97333
Willamette River Water Coalition, 1850 SW 170th Ave., Beaverton, Oregon 97006



**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
Tualatin Valley Water District, Washington)	CONSERVATION PLAN
County)	

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. An approved water management and conservation plan may authorize the diversion and use of water under a permit extended pursuant to OAR Chapter 690, Division 315.

Findings of Fact

1. The Tualatin Valley Water District (TVWD) submitted a final draft Water Management and Conservation Plan (WMCP or “plan”) to the Water Resources Department (Department) on September 4, 2014. The plan was required by a condition set forth under TVWD’s previously approved plan (Sp. Or. Vol. 77, Pg. 845, dated June 21, 2009).
2. The Department published notice of receipt of the final draft plan on September 9, 2014, as required under OAR Chapter 690, Division 086. No comments were received.
3. The Department provided written comments on the final draft plan to TVWD on December 3, 2014. In response, TVWD submitted a revised plan on December 24, 2014.
4. The Department reviewed the revised plan and finds that it contains all of the elements required under OAR 690-086-0125.
5. The projections of future water needs in the revised plan demonstrate a need for 80.1 cubic feet per second (cfs) of water available under Permit S-49240 to help meet overall projected 20-year demands and to provide source redundancy. These projections are reasonable and consistent with applicable land use plans.

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.

6. The system is fully metered and the water billing rate structure includes a base rate and volumetric charge.
7. Unaccounted-for water is estimated at less than 10 percent; however, malfunctioning supply meters owned and maintained by Portland Water Bureau (PWB) likely reduce the accuracy of this estimate.
8. The revised plan includes the following 5-year benchmarks for implementation of the conservation programs required of all water suppliers by OAR 690-086-0150(4):
 - a) TVWD will continue to perform its rigorous annual water audit. TVWD will continue to communicate with PWB in an effort to address meter malfunctions. Once meter repairs are completed and TVWD has generated enough demand data, TVWD will carry out another Water Loss Audit to re-evaluate water loss results, and based on those results, TVWD will decide its next steps related to water auditing.
 - b) TVWD will continue to install automated meter reading (AMR) in all new meter installations. In the next five years, TVWD will begin to replace current irrigation meters with AMR meters as funding and staff time allow.
 - c) In the next five years, the 12 remaining large (non-data logging) meters will be replaced as they reach the end of their functionality or as parts become difficult to acquire. The meter testing program will continue to test large meters every two years or less and small meters (2 inches or less) upon request. TVWD will continue to coordinate with PWB to fix the Wolf Creek supply meter and Florence Lane meter.
 - d) TVWD will continue to bill customers based on meter size and the quantity of water metered at the service connection. In the next five years, TVWD will conduct another rate review and will consider adjusting charges based on recommendations in that rate review.
 - e) TVWD will continue its leak detection and repair program.
 - f) TVWD will continue its public education program. In the next five years, TVWD will update its Web site.
9. Since TVWD serves a population greater than 7,500, and has proposed expansion or initiation of the diversion of water under an extended permit for which resource issues have been identified, the revised plan includes the following additional benchmarks for conservation measures required under OAR 690-086-0150(6):
 - a) TVWD will continue its leak detection and repair program.
 - b) TVWD Conservation staff will continue to provide indoor and outdoor water use assessment upon request. TVWD will continue the other elements of its technical and financial assistance program.
 - c) TVWD will continue to fund all of its current rebate programs. As the WaterSense program develops and more products are added to the labeling program, TVWD will incorporate the new listings into the criteria for TVWD's rebate programs.

- d) TVWD will continue its rate structure and bi-monthly billing schedule, both of which encourage water conservation. TVWD will continue to provide conservation messages and show recent water use in billing statements.
 - e) TVWD will continue to support regional efforts to develop water reuse and non-potable water use opportunities. TVWD will continue working with business, industry, and government (B.I.G.) customers to investigate opportunities to improve their water reuse and recycling.
 - f) TVWD will continue its current efforts to market the use of weather-based irrigation technology in landscape irrigation practices. TVWD will continue to promote best practices for landscaping and irrigation using its Water Efficient Demonstration Garden. TVWD will continue to use several tools to evaluate conservation programs and measures by cost/benefit value analysis for both TVWD and its customers. TVWD will continue to investigate measures to evaluate and report on rebate and outreach performance from actual customer meter data. TVWD will continue to explore and implement pilot programs with the focus on irrigation scheduling and ET technology. TVWD will continue its active participation and leadership in the promotion of water conservation in the region. TVWD will continue its efforts to provide high quality customer service to facilitate customer participation in water conservation efforts.
10. The revised plan includes a section titled “Willamette River Fish Flows: Public Education and Voluntary Conservation” that contains the elements required by Development Limitation Condition #4 within the *Final Order Incorporating Settlement Agreement Extension of Time for Permit S-49240*, issued on June 26, 2007.
11. The revised plan identifies the sources for TVWD’s water rights as being groundwater, the Willamette River, and aquifer storage and recovery (ASR). The plan accurately and completely describes the following listed fish species present in the Willamette River: Fall Chinook, Spring Chinook, Coastal Cutthroat, Coho Salmon, Winter Steelhead, Chum Salmon, Western Brook Lamprey, and Pacific Lamprey. The plan accurately and completely describes the parameters for which the Willamette River at TVWD’s point of diversion is listed as being water-quality limited by the Oregon Department of Environmental Quality. These listed water quality parameters are: biological criteria, Chlorophyll a, Aldrin, DDT, Dieldrin, PCB’s, Dioxin, and Iron. TVWD’s groundwater sources are located within the boundaries of the Cooper Mountain-Bull Mountain Critical Groundwater Area.
12. The water curtailment element included in the revised plan includes a list of four stages of alert with corresponding curtailment actions.
13. TVWD’s diversion of water under Permit S-49240 will be initiated during the next 20 years and is consistent with OAR 690-086-0130(7), as follows:
- a. As evidenced by the 5-year benchmarks described in Findings of Fact 8 and 9, the revised plan includes a schedule for the continuation and/or development of conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.

- b. The revised plan describes TVWD's systematic analysis, conducted during 2012 and 2013, of four supply options: Portland Water Bureau contract water, Mid-Willamette River, Tualatin Basin Water Supply Project, and Northern Groundwater. TVWD's evaluation of supply options considered the following criteria: demand uncertainty, source reliability, source redundancy, implementation risk, public acceptance, community impacts, Metzger fluoridation, finished water quality, sustainability, and governance. TVWD determined that the Willamette River is the most feasible and appropriate supply source based on the evaluated criteria.
 - c. As evidenced by the above Finding of Fact #10, the plan contains documentation that TVWD is complying with the requirements to educate the public and voluntarily conserve water to address fish persistence flows established by the *Final Order Incorporating Settlement Agreement Extension of Time for Permit S-49240*, issued on June 26, 2007.
14. Permit S-49240, for use of up to 202.0 cfs from the Willamette River, is held by the Willamette River Water Coalition (WMWC), which currently consists of the Cities of Sherwood, Tigard, Tualatin and TVWD. The Development Limitations in the 2007 *Final Order Incorporating Settlement Agreement Extension of Time for Permit S-49240* provides that the initial diversion of water by each municipal water provider under Permit S-49240 is authorized only after a 60-day period following issuance of a final order approving a Water Management and Conservation Plan that requests access to the water.
 15. The City of Sherwood submitted a Water Management and Conservation Plan on September 5, 2006. The Department issued Special Order Volume 76, Page 869, on December 19, 2008, approving the City of Sherwood's plan and granting the City of Sherwood access to divert up to 23.20 cfs under Permit S-49240.

Conclusion of Law

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

Now, therefore, it is ORDERED:

Duration of Plan Approval:

1. TVWD's Water Management and Conservation Plan is approved and shall remain in effect until January 16, 2025, unless this approval is rescinded pursuant to OAR 690-086-0920.

Plan Update Schedule:

2. TVWD shall submit an updated plan meeting the requirements of OAR Chapter 690, Division 086 within 10 years and no later than July 16, 2024.

Progress Report Schedule:

3. TVWD shall submit a progress report containing the information required under OAR 690-086-0120(4) by January 16, 2020.

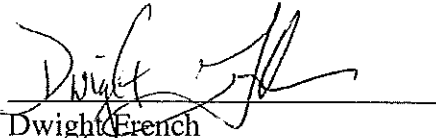
Other Requirements for Plan Submittal:

4. 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 TVWD from any existing or future requirements for submittal of a Water Management and Conservation Plan at an earlier date as established through other final orders of the Department.

Development Limitation(s):

5. This final order, together with Special Order Volume 76, Page 869, establishes a new Development Limitation totaling 103.3 cfs under Permit S-49240. The City of Sherwood remains authorized to divert up to 23.20 cfs. TVWD is now authorized to divert up to 80.1 cfs under Permit S-49240, after a period of 60 days from the date of issuance of this final order.

Dated at Salem, Oregon this 16 day of January, 2015.



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

Mailing date: JAN 23 2015

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- Exhibit 5-8. Projected Medium-Growth MDD and Water Source.

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- Appendix B TVWD Interconnections
- Appendix C TVWD Intergovernmental Agreements
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Executive Summary

The Tualatin Valley Water District (TVWD or the District) is the second largest water provider in Oregon and has received many awards recognizing its achievements in the areas of management, sustainability, communications, and safety. This Water Management and Conservation Plan (WMCP) highlights some of these achievements, as well as meeting all other requirements for this plan.

The purpose of this WMCP is to guide development, financing, and implementation of water management and conservation programs that facilitate sustainable water use. This WMCP also functions to analyze the District's future water needs and the timelines for obtaining access to Willamette River water under the Willamette River Water Coalition's (WRWC) water use permit S-49240.

The District has an existing WMCP. The order approving the existing WMCP required an updated plan within five years. This WMCP meets that requirement. This WMCP also meets all of the requirements of the Oregon Administrative Rules (OAR) adopted by the Water Resources Commission regarding WMCPs (OAR Chapter 690, Division 86).

Finally, this WMCP meets the requirements to use water under the WRWC permit. The use of water under the WRWC permit is conditioned (as the result of a settlement agreement on a protested extension of time for the permit) to require additional sections in the WMCP of municipal water providers using water under the permit. The additional section is titled "Willamette River Fish Flows: Public Education and Voluntary Conservation." This WMCP contains the special section and the various elements required as a result of the conditions.

Municipal Water Supplier Description

The District's service area spans approximately 45 square miles and supplies portions of the Cities of Beaverton, Hillsboro, and Tigard, and Unincorporated Washington County. For the purposes of analysis and management, the District's service area is often considered as two sub-areas (Wolf Creek and Metzger) due to their geographic isolation, and their differing customer base and anticipated growth. In 2013, the District supplied water to approximately 191,201 customers in the Wolf Creek service area and 20,160 in the Metzger service area, for a total population served of 211,361.

The District's primary water supply sources are water from the Joint Water Commission (JWC), and wholesale water supply purchased from the City of Portland, as administered by the Portland Water Bureau (PWB). In addition, the District is expanding its aquifer storage and recovery (ASR) program and can obtain back-up water supply from groundwater under its own water rights. Finally, the District is a member of the Willamette River Water Coalition (WRWC), which holds water use permit S-49240 for the use of up to 202 cfs from the Willamette River for municipal and industrial purposes, but has not yet initiated its use of water from the Willamette River.

Section 2 of this WMCP provides more details regarding the District'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 District's existing WMCP described its existing conservation programs and 5-year benchmarks for implementing new conservation measures. This WMCP provides an update on the District's conservation measures and its progress toward implementing its benchmarks. The following is a summary of the District's activities associated with the required conservation measures and the 5-year benchmarks for implementing those measures.

Annual Water Audits

The District performs an annual water audit that incorporates the following data: total demand (volume of water purchased that enters the distribution system), total volume of water consumed by customers through metered service connections, wheeled water (i.e. "PWB overlap;" which is water moved through the District's water distribution system for PWB customers), and estimated non-revenue authorized uses (i.e. unmetered water uses, such as hydrant use or pipeline flushing).

Water audits in 2007 and 2008 revealed that the calculated water loss for the entire service area was 3 percent and 4.5 percent, respectively. However, from 2009 through 2013 water loss ranged from -2.0 percent to -15.1 percent, which the District attributes to malfunctioning of the main Wolf Creek supply meter on the Washington County Supply Line (WCSL) and to the Florence Lane meter, which is the primary meter for the Metzger service area. Based on water audits prior to the meter errors, the District estimates that its unaccounted for water was less than 10 percent over the past five years.

The Wolf Creek supply meter and the Florence Lane meter are owned by the PWB. Consequently, the District is only able to investigate meter errors and then recommend to PWB that PWB investigates the meter and completes any necessary maintenance. PWB has made efforts to recalibrate the Wolf Creek intertie meter with limited success, and the District assisted with these efforts. PWB plans to install a parallel meter that should provide more accurate flow data. The District is currently investigating the Metzger meter.

Five-Year Benchmarks:

- The District will continue to perform its rigorous annual water audit.
- The District will continue to communicate with the PWB in an effort to address meter malfunctions. Once meter repairs are completed and the District has generated enough demand data, the District will carry out another Water Loss Audit to re-evaluate water loss results, and based on those results, the District will decide its next steps related to water auditing.

System-wide Metering

The District's system is fully metered, including its non-emergency sources of water: all permanent connections to the City of Portland water system, the JWC, and the District's back-up supply from groundwater wells. The District installs AMR meters in all new customer meter installations, as well.

Five-Year Benchmarks:

- The District will continue to install AMR in all new meter installations.
- In the next five years, the District will begin to replace current irrigation meters with AMR meters as funding and staff time allow.

Meter Testing and Maintenance

The District tests and repairs (or replace as necessary) all meters greater than 2 inches in diameter every two years or less. As of 2014, the District has replaced nearly all large meters with new Badger ORION models. The District also tests meters 2 inches in diameter or less in response to customer inquiries or deficiencies noted by staff.

Meters with AMR can be read throughout each day, enabling the District to spot meter malfunctions much sooner than with a monthly reading system or based on customer requests. When meters can be repaired, the District will install AMR in the meter if it does not have AMR. When meters cannot be repaired, the District will replace the meter with a new AMR meter.

Five-Year Benchmarks:

- In the next five years, the 12 remaining large (non-data logging) meters will be replaced as they reach the end of their functionality or as parts become difficult to acquire.
- The meter testing program will continue to test large meters every two years or less and small meters (2 inches or less) upon request.
- The District will continue to coordinate with PWB to fix the Wolf Creek supply meter and Florence Lane meter.

Water Rate Structure and Billing Practices

The District has a base charge based on meter size and a two-tiered inclining block volume charge. The District developed this water rate structure through a comprehensive cost-of-service analysis to equitably assign costs to customers based on their demands and to create an incentive for customers to conserve water.

Customers receive their bill shortly after their meter is read, which encourages conservation. Billing statements periodically include brief conservation messages and show water use over the previous 18 months. Billing statements also breakdown Block 1 and Block 2 usage and rates.

Five-Year Benchmarks:

- The District will continue to bill customers based on meter size and the quantity of water metered at the service connection.
- In the next five years, the District will conduct another rate review and will consider adjusting charges based on recommendations in that rate review.
- The District will continue its bi-monthly billing schedule.
- The District will continue to provide conservation messages and to show recent water use in billing statements.

Leak Detection and Repair

Despite the District's low estimated unaccounted for water of less than 10 percent, the District dedicates substantial resources to maintaining its comprehensive leak detection and repair program, which consists of leak detection surveys, AMR record review, and customer education. The District performs periodic leak detection surveys. If a leak is detected in the distribution system, the District repairs the leak immediately, schedules a repair, or records and monitors the leak in future leak detection surveys. The District reviews data from AMR meter residential and AMR meter commercial consumption records for water consumption changes that may indicate a leak at a customer's premises. In addition, the District uses its Web site, newsletters, and events to educate customers about leak detection and repair.

Five-Year Benchmarks:

- The District will continue its leak detection and repair program.

Public Education

The District promotes water conservation through print and electronic media, community outreach efforts, school programs, and partnerships, and the District has been recognized for its public education efforts with numerous awards. The following describes some of the District's public education efforts:

- **Print and electronic media:** The District provides conservation information in its front lobby, bi-monthly billing statements, on its Web site, and in newsletters.
- **Community outreach:** The District has conservation staff that speaks regularly to public groups. The District also has a Speaker's Bureau that presents District policies and leads discussions with customer groups, businesses, and organizations. The District has a water efficient demonstration garden on the District's office property that provides hands-on demonstration tool to teach water efficient principles and practices, as well as an outdoor classroom for District staff to hold water conservation events. The District offers a "Water Hero" award to recognize B.I.G. (Business, Industrial, and Government) customers who have made the greatest strides or shown the most leadership in the area of water conservation.
- **School programs:** The District has a Youth Education Program that sponsors water conservation presentations and activities at elementary schools. The District contracts with professional actors for two school presentations about water conservation and District staff provides six presentations. The District has booths at various science fairs and is an active partner in the Children's Clean Water Festival. The District also has an annual Conservation Calendar contest for youths, which has received national recognition.
- **Partnerships:** The District is active in conservation planning and implementation through regional and statewide partnerships. The District also has ongoing partnerships with EPA to promote EPA's WaterSense Program to District customers and with the Regional Water Providers Consortium.

Five-Year Benchmarks:

- The District will continue its public education program.
- In the next five years, the District will update its Web site.

Technical and Financial Assistance Programs

The District offers a “Welcome Kit” to all new customers and a “Leak Kit” is available upon request to help customers reduce water use. The “Welcome Kit” includes two bathroom aerators, one kitchen aerator, two dye tablet packets, one shower timer, and brochures. The “Leak Kit” helps customers identify leaks and other potential reasons for high water bills, such as inefficient fixtures. These types of materials are also provided to customers at community events. In addition, showerheads, aerators, shower timers and toilet dye tablets are available in the District’s front lobby.

The District has the B.I.G. water conservation program to reduce water use by its commercial, production, government, irrigation, and multi-family customers. The B.I.G. program includes the following elements: technical assistance and water efficiency incentives; recommendations for improving both outdoor and indoor water conservation; rebates for upgrading to water efficient fixtures, equipment, and processes; free efficient pre-rinse spray valves for production kitchens; and financial assistance for innovative capital improvement projects to improve water efficiency.

The District has partnered with the Energy Trust of Oregon to add a home (indoor) water assessment along with the Energy Trust of Oregon’s current home energy assessment.

The District has a “leak adjustment” program that allows adjustment of the portion of a customer’s bill associated with a leak if the customer repairs the leak within 30 days of the date the leak was discovered or reasonably should have been discovered.

The District provides free watering gauge kits to interested customers, upon request or at public outreach events, to help them determine the application rate of their irrigation system and then to set an effective 1-inch of water per week base schedule in the summer.

Five-Year Benchmarks:

- The District Conservation staff will continue to provide indoor and outdoor water use assessment upon request.
- The District will continue the other elements of its technical and financial assistance program.
- The District will likely discontinue contracted home water assessments through the Energy Trust of Oregon at the end of 2014.

Supplier Financed Retrofit or Replacement of Inefficient Fixtures

The District has a fixture giveaway program, which includes low-flow showerheads, low-flow faucet aerators, and toilet tank water displacement bags. The District makes these fixtures available in its office front lobby, in “Welcome Kits,” and at outreach events. The District also offers rebates for upgrading to water efficient fixtures, equipment, and processes. The rebates include: toilets, urinals, weather-based irrigation controllers, sprinkler nozzles, and B.I.G. customer organized water efficiency projects.

Five-Year Benchmarks:

- The District will continue to fund all of its current rebate programs.
- As the WaterSense program develops and more products are added to the labeling program, the District will incorporate the new listings into the criteria for the District's rebate programs.

Water Reuse, Recycling, and Non-potable Opportunities

As a regional participant in major water resource projects and the largest water supplier in Washington County, the District will continue to support regional efforts to develop water reuse and non-potable water use opportunities. The District's B.I.G. program and rebates encourage commercial and production customers to recycle and reuse water, and to reduce their water consumption.

Five-Year Benchmarks:

- The District will continue to support regional efforts to develop water reuse and non-potable water use opportunities.
- The District will continue working with B.I.G. customers to investigate opportunities to improve their water reuse and recycling.

Other Conservation Measures

The District has used several software tools to track the number of customers participating in the rebate programs since their inception and to estimate the potential conservation savings. The District has explored and implemented various pilot programs, which have focused largely on irrigation technology and evapotranspiration (ET) based irrigation scheduling. The District is very active in professional groups and dedicates much effort and leadership into the promotion of water conservation in the region. Staff is active in the development of regional conferences and trainings to ensure technical sessions in water conservation are represented. As part of the District's mission is to provide quality customer service, staff provides assistance to customers with concerns about high bills, general conservation questions, and water efficient fixture and device questions. The District also hosts various workshops, trainings and presentations.

Five-Year Benchmarks:

- The District will continue its current efforts to market the use of weather-based irrigation technology in landscape irrigation practices.
- The District will continue to promote best practices for landscaping and irrigation using its Water Efficient Demonstration Garden.
- The District will continue to use several tools to evaluate conservation programs and measures by cost/benefit value analysis to both customers and the District.
- The District will continue to investigate measures to evaluate and report on rebate and outreach performance from actual customer meter data.
- The District will continue to explore and implement pilot programs with the focus on irrigation scheduling and ET technology.

- The District will continue its active participation and leadership in the promotion of water conservation in the region.
- The District will continue its efforts to provide high quality customer service given that it facilitates customer participation in water conservation efforts.

Section 3 of this WMCP also includes the special section “Willamette River Fish Flows: Public Education and Voluntary Conservation.”

Water Curtailment

The District’s curtailment plan outlines proactive measures that the District may take to respond to short-term water supply shortages. The District’s curtailment plan consists of four stages of increasing severity that are designed to be implemented in progressive steps. Each stage is triggered by initiating conditions that are summarized in **Exhibit ES-1**. Section 4 of this WMCP details the initiating conditions and response actions associated with each curtailment stage.

Exhibit ES-1. Curtailment Stages 1 through 4.

Curtailment Stages	Initiating Conditions
Stage 1: Routine Summer Advisory	<ul style="list-style-type: none"> • PWB issues a “notice of drawdown,” announcing the release of stored water in the Bull Run System. • PWB activates groundwater wells as part of its supplies. • Hagg Lake fails to fill 100 percent by May 1. • Barney Reservoir fails to fill 100 percent by May 1. • The JWC issues a “notice of drawdown,” announcing the release of stored water.
Stage 2: Moderate Water Supply Shortage	<ul style="list-style-type: none"> • PWB is operating under a warm-dry scenario. • Hagg Lake is filled to less than 80 percent before May 1. • District customer use reaches contractual and/or facility capacity for seven consecutive days.
Stage 3: Severe Water Supply Shortage	<ul style="list-style-type: none"> • PWB has only groundwater sources available. • PWB cannot meet supply demands of wholesale customers. • JWC reservoirs drop below 40 percent of “normal conditions”; under such circumstances JWC enacts mandatory curtailment for its members. • Water supplies fail to meet U.S. Environmental Protection Agency Safe Drinking Water Act standards. • The District’s distribution system experiences a significant and sustained reduction of water pressure. • District customer use reaches contractual and/or facility capacity for 14 consecutive days.
Stage 4: Critical Water Supply Shortage	<ul style="list-style-type: none"> • PWB offloads (i.e. ceases serving) the District from its system and JWC cannot meet the District’s resulting additional demands for water. • JWC offloads the District from its system, and PWB supplies cannot meet the District’s resulting additional demands for water. • Water supplies from the JWC or the PWB are either physically cut off or otherwise become unavailable. • District customer use reaches contractual and/or facility capacity for 28 consecutive days.

Water Supply

To plan for the water supply required during the next 20 years, the District first projected the population in its service area. In addition to 10-year and 20-year population projections, projected populations for the year 2026 were also developed, because the District’s regional water supply agreement with the City of Portland will need to be renewed in 2026, and the District plans to adjust its water supply sources at that time.

Exhibit ES-2 presents low-growth, medium-growth, and high-growth scenario population projections for the entire future service area, and separately for the Wolf Creek and Metzger future service areas. The low-growth scenario assumes that development was limited to properties that are currently vacant, or those that could sustain additional development. The high-growth scenario represents aggressive development projections, including some re-development of existing land use to higher densities in order to accommodate more people. The medium-growth scenario represents the average of these two extremes.

Exhibit ES-2. Projected Future Water Service Area Population, by Service Area.

	2014	2024	2026	2034
Low Growth				
Metzger	23,174	25,816	26,180	26,919
Wolf Creek	195,926	227,682	232,161	240,295
Total	219,100	253,498	258,341	267,214
Medium Growth				
Metzger	23,174	25,931	26,355	27,525
Wolf Creek	195,946	228,104	232,952	245,578
Total	219,120	254,034	259,307	273,103
High Growth				
Metzger	23,174	26,045	26,530	28,130
Wolf Creek	195,967	228,526	233,743	250,862
Total	219,141	254,571	260,274	278,992

As the next step in development of its demand projections, the District developed low-growth, medium-growth, and high-growth scenarios for its maximum day demand (MDD) projections. This approach was taken to: 1) account for the uncertainty that is inherent in demand projections as a result of the numerous factors and assumptions involved, and 2) better depict the range of possible future demands. Variables used to develop the range of demand projections included: the demographic growth scenarios, Equivalent Dwelling Units (EDU) per account, EDU water use, water loss, and a MDD- to-Average Day Demand (ADD) peaking factor.

The District’s MDD projections are shown in **Exhibit ES-3**. In addition to the 10-year and 20-year MDDs, the MDD for 2026 is also included for the reason previously stated.

The District has chosen to use the medium-growth scenario demand projections for planning purposes, because it provides the District with the ability to meet a reasonable mixture of high and low demand among the pressure zones in its service area.

Exhibit ES-3. Projected MDD (in mgd) by Service Area, in 2024, 2026, and 2034.

	2024	2026	2034
Low Growth			
Metzger	4.3	4.3	4.4
Wolf Creek	42.9	43.7	45.2
Total	47.2	48.0	49.6
Medium Growth			
Metzger	5.4	5.5	5.8
Wolf Creek	51.3	52.5	56.3
Total	56.7	58.0	62.1
High Growth			
Metzger	6.9	7.1	7.6
Wolf Creek	61.4	63.1	69.7
Total	68.3	70.2	77.3

As previously described, the District currently obtains its water supply from the JWC and the PWB. Under the current JWC agreement, the District has access to up to 12.5 mgd of supply from the JWC Water Treatment Plant. Under its current water sales agreement with the City of Portland, the District is required to purchase an average of 13.16 mgd annually and can obtain up to approximately 42.3 mgd through the existing supply line. In addition, the District is currently expanding its ASR system, and in the next 10 years, it anticipates its ASR system to have the capacity to provide up to 4.5 mgd for municipal water supply.

Exhibit ES-4 presents the District’s anticipated demand on its water sources to meet its projected medium-growth MDDs in 2024, 2026 and 2034. As shown in the exhibit, the District intends to meet its projected MDD of 56.7 mgd in 2024 through use of its full JWC allocation of 12.5 mgd, as well as up to 39.7 mgd of supply from the PWB, and 4.5 mgd from its ASR program.

The year 2026 is anticipated to be a turning point in water supply management for the District. In that year, the District expects to have access to Willamette River water supply, and it will renegotiate a regional water supply agreement with the City of Portland for a smaller amount to serve the Metzger service area. Beginning in 2026, the District intends to meet demands in the Wolf Creek service area through a combination of water supply from the JWC, the District’s ASR program, and the Willamette River supplied under the permit held by the WRWC (of which the District is a member). The District plans to continue to meet projected demands in the Metzger service area with water from the City of Portland. As part of its water supply planning process to ensure the District has an adequate water supply in an emergency, the District is planning for a scenario in which the JWC water supply would be unavailable on a peak day, as shown in ES-4.

The District’s 20-year projected demand (for 2034) is 62.1 mgd. Similar to its water supply strategy in 2026, the District plans to meet that demand by using a combination of supply sources that includes serving the Wolf Creek service area with water from the JWC, the Willamette River and its ASR program, and obtaining water from the PWB to meet the demands in the Metzger service area. For planning purposes, the District is again taking the conservative approach of assuming that supply from the JWC is not available to meet its needs.

Exhibit ES-4. Projected Medium-Growth MDD and Water Sources.

Year	Service Area	Demand by Water Source (mgd)				Total
		JWC	PWB	ASR	Willamette	
2024	Metzger	0	5.4	0	0	5.4
	Wolf Creek	12.5	34.3	4.5	0	51.3
	Total	12.5	39.7	4.5	0	56.7
2026	Metzger	0	5.5	0	0	5.5
	Wolf Creek	0	0	4.5	48.0	52.5
	Total	0	5.5	4.5	48.0	58.0
2034	Metzger	0	5.8	0	0	5.8
	Wolf Creek	0	0	4.5	51.8	56.3
	Total	0	5.8	4.5	51.8	62.1

The WRWC permit (permit S-49240) is conditioned to require water users to obtain approval from the Oregon Water Resources Department, through submission of a WMCP, prior to using water under the permit. The District’s WMCP, therefore, requests to use water (up to 51.8 mgd) under permit S-49240.

Section 5 details the District’s future service area, population projections, demand projections, and demand on its water sources to meet demand projections.

1. Municipal Water Supplier Plan Elements

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

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

Introduction

Tualatin Valley Water District (TVWD or the District) provides water to a population of over 211,000 through approximately 60,000 customer connections which makes it the second largest water provider in Oregon. The District's service area spans approximately 45 square miles and supplies portions of the Cities of Beaverton, Hillsboro, and Tigard, and Unincorporated Washington County. For the purposes of analysis and management, the District's service area is often considered as two sub-areas (Wolf Creek and Metzger) due to their geographic isolation, and their differing customer base and anticipated growth. The District has received many national, state, local, and individual awards for a variety of its practices, including recognition for: exceptional management, sustainability, communications, and safety.

The District is a member of the Joint Water Commission (JWC), which also includes the Cities of Hillsboro, Beaverton, and Forest Grove. Water use by the JWC members is authorized by surface water rights from the Tualatin River basin and "secondary" rights for the use of stored water in Barney and Scoggins Reservoirs. Details about the JWC's (and its member agencies') water rights, water supply sources, water distribution system, conservation measures, and historical and future water demands can be found in the 2010 JWC Water Management and Conservation Plan, which the Oregon Water Resources Department (OWRD) approved in a Final Order issued on September 14, 2010.

The District is also a member of the Willamette River Water Coalition (WRWC), whose members include the Cities of Sherwood, Tualatin, and Tigard, and TVWD. The WRWC holds a surface water use permit for the use of up to 202 cfs of Willamette River water. This WMCP will focus on the District's anticipated use of its Willamette River supply source.

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 facilitate sustainable water use, as well as to analyze the District's future water needs and timelines for obtaining access to Willamette River water under the WRWC's "extended" water use permit S-49240. The goal in preparing this WMCP is to establish a working document, consistent with the District's Water System Master Plan, that will positively influence development of the District's water system in the future.

Plan Requirement

The Final Order dated May 21, 2009 approving the District's WMCP required an updated WMCP no later than April 30, 2014. In early March 2014, the District requested a new deadline of September 12, 2014 to submit the updated WMCP, which OWRD approved on March 14, 2014.

The Final Order dated June 26, 2007 incorporating the settlement agreement for the extension of time for Permit S-49240 required that this WMCP includes a special section titled “Willamette River Fish Flows: Public Education and Voluntary Conservation.” This WMCP contains the special section and the various elements required within it, as stated in the Final Order.

This WMCP meets all 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 District’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 District can improve its water conservation and water supply planning efforts. The WMCP also includes appendices with supporting information.

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

Affected Local Governments

OAR 690-086-0125(5)

The following local governmental agencies are considered “affected local governments” under OWRD’s WMCP administrative rules:

- City of Beaverton
- City of Hillsboro
- City of Tigard
- City of Portland
- City of Wilsonville
- Washington County
- Multnomah County
- Metro

In addition, the District provided the WRWC and the JWC with a copy of the draft plan as a courtesy.

Thirty days before submitting this WMCP to OWRD, the District made the draft WMCP available for review by each affected local governments listed above along with a request for comments relating to consistency with the local government's comprehensive land use plan.

The letters requesting comments and comments received from the Cities of Tigard, Beaverton, and Wilsonville are in **Appendix A**. The comment from the City of Tigard refers to potential zoning changes that may occur in the "Tigard Triangle," which is an area that is served by the District. These proposed changes may increase future water demands in the Tigard Triangle. However, adoption of any proposed changes is not expected to occur until 2015 and the associated increase in demand would likely be negligible compared to the overall demand projections.

Plan Update Schedule

OAR 690-086-0125(6)

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

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2. Water Supplier Description

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

This rule requires descriptions of the District'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 District's customers and their water use, the water system, interconnections with other water suppliers, and quantification of system leakage.

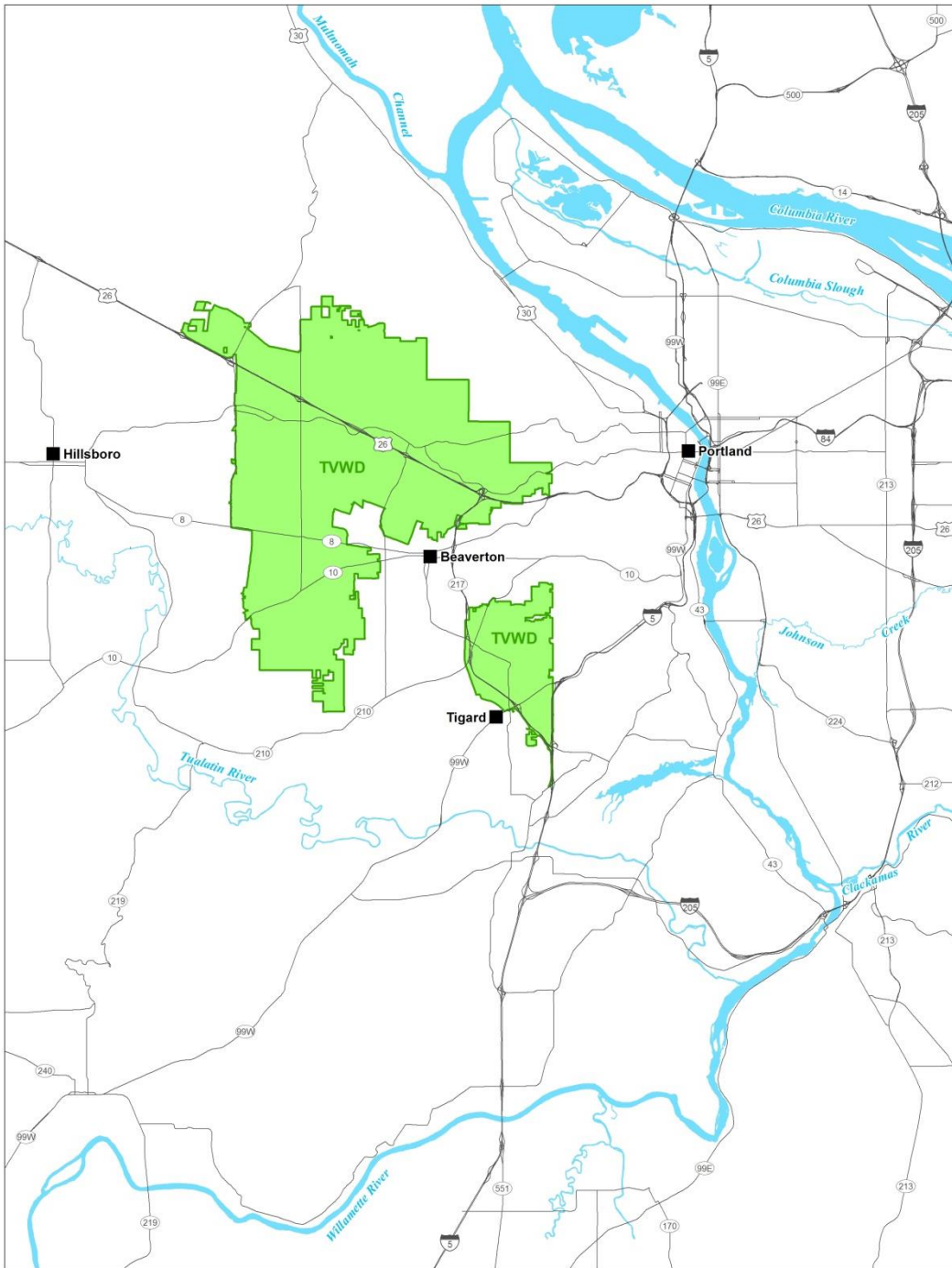
Water Sources

OAR 690-086-0140(1)

The District's primary water supply sources are water from the Joint Water Commission (JWC) and wholesale water supply purchased from the City of Portland, as administered by the Portland Water Bureau (PWB). The District also is a member of the Willamette River Water Coalition, which holds a water use permit for the use of water from the Willamette River for municipal and industrial purposes. In addition, the District is expanding its aquifer storage and recovery (ASR) program. Finally, the District is prepared to use its groundwater rights for emergency back-up water supply.

Exhibit 2-1 presents a map showing the District in relation to its water sources and neighboring water providers.

Exhibit 2-1. TVWD Location Map.





LEGEND

- Tualatin Valley Water District (TVWD) Boundary
- Cities
- Major Roads
- Major Waterbodies

MAP NOTES:
 Date: June 9, 2014
 Data Sources: METRO RLIS

**Tualatin Valley Water District
 Location Map**

The District's PWB source of supply comes from the Bull Run Watershed and the Columbia South Shore Wellfield (CSSW). The Bull Run watershed is located in the Cascade mountain range east of Portland and is an unfiltered surface water supply. The finished water is delivered to the PWB's 50 million gallon (MG) Powell Butte Reservoir. The District receives water from the PWB by gravity primarily via the Washington County Supply Line (WCSL). The District owns a 70.5 percent share in the WCSL, equivalent to 42.3 million gallons per day (mgd) of capacity in the WCSL. The WCSL splits near the intersection of Beaverton-Hillsdale Highway and Scholls Ferry Road to serve the Wolf Creek service area (metered at the Wolf Creek intertie) and the Metzger service area (metered at Florence Lane and 80th). In addition, a small portion of the Metzger service area is supplied water through a small direct line from the PWB (Garden Home meter) to provide water to a pressure zone that sits at a higher elevation than the surrounding area and cannot be served by the existing hydraulic gradeline of the distribution system.

The water supply that the District receives from the JWC is drawn from Tualatin River natural flow and from stored water released into the upper portion of the Tualatin River from Barney Reservoir on the Trask River system. Water is withdrawn from the Tualatin River at the Springhill Pumping Plant, which is located along Fern Hill Road approximately one mile south of Forest Grove, and treated at the JWC's water treatment plant (WTP). Treated water from the JWC flows by gravity via two transmission mains to the District's Wolf Creek service area, and is used to satisfy the remainder of the demand in this service area that is not met by water supply from the PWB. The District can receive up to 12.5 mgd from the JWC. This limitation is based on the District's ownership share of the 75 mgd capacity of the JWC WTP.

Service Area Description and Population

OAR 690-086-0140(2)

The District covers an area of more than 45 square miles. The District serves portions of the Cities of Beaverton, Hillsboro, and Tigard, and a portion of Washington County, including the unincorporated communities of Cedar Hills, Bethany, Rock Creek, Cooper Mountain, Progress, Metzger, and Aloha. The District's service area is comprised of two geographically distinct service areas: the Wolf Creek Service Area located to the northwest of Beaverton and the Metzger Service Area located to the southeast of Beaverton. **Exhibit 2-2** shows the District's existing service area.

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Exhibit 2-2. Current Service Area Map.

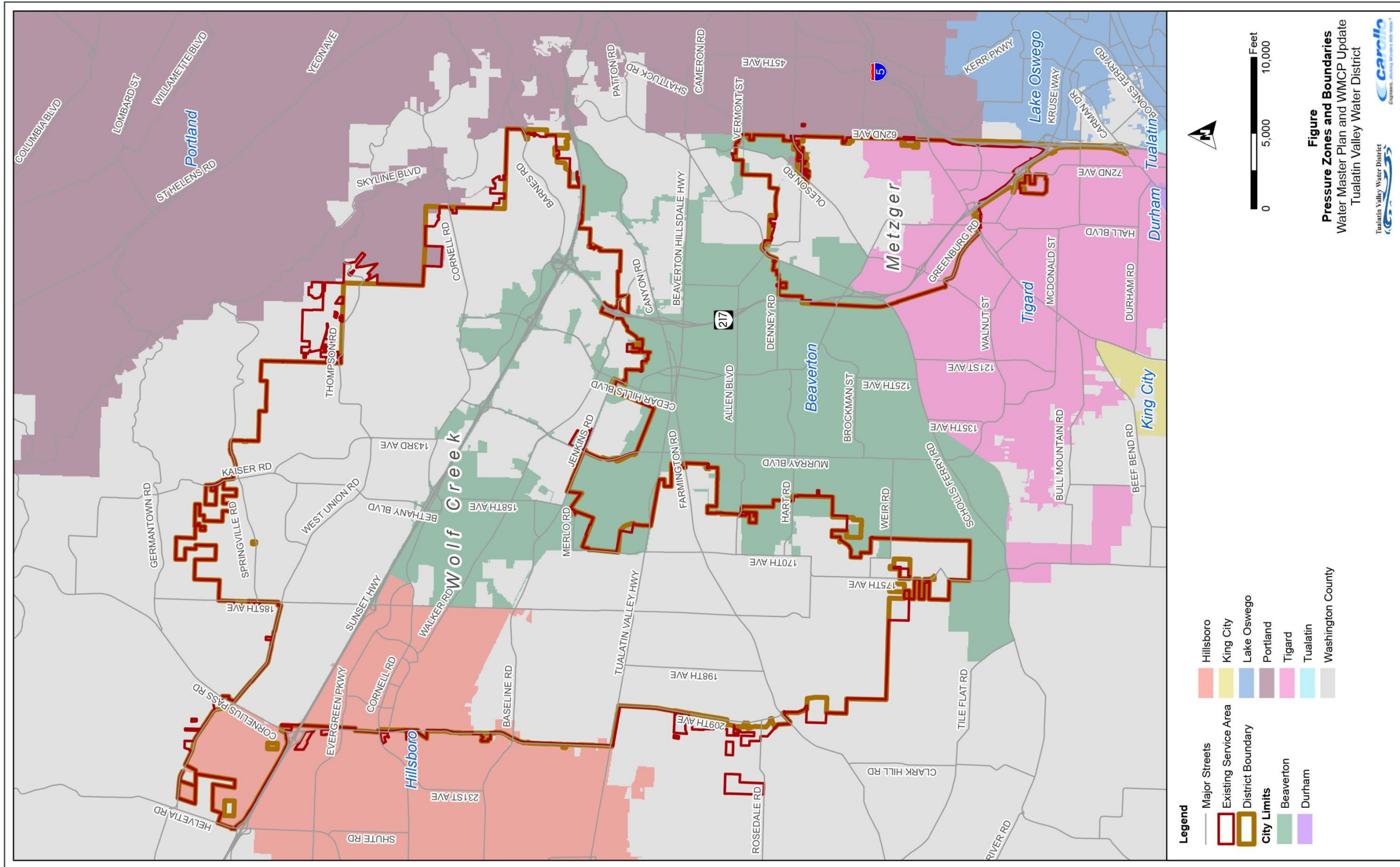


Figure
Pressure Zones and Boundaries
 Water Master Plan and WMCP Update
 Tualatin Valley Water District



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In 2013, the District served approximately 191,201 customers in the Wolf Creek service area and 20,160 in the Metzger service area, for a total population served of 211,361. **Exhibit 2-3** shows estimates of the District’s total service area populations, and the populations for the Wolf Creek and Metzger service areas from 2007 through 2013. These population estimates come from the report “Regional Water Providers Consortium Population, Housing Unit, and Household Estimates for 1990-2013” published by Portland State University’s Population Research Center in February 2014.

Exhibit 2-3. Population by Service Area and Total Population, 2007-2013.

Year	Service Area Population		Total Population
	Wolf Creek	Metzger	
2007	177,391	19,205	196,596
2008	180,227	19,436	199,663
2009	181,373	19,499	200,872
2010	182,615	19,551	202,166
2011	185,495	19,741	205,236
2012	187,920	19,929	207,849
2013	191,201	20,160	211,361

Interconnections with Other Systems

OAR 690-086-0140(7)

The District has a total of 45 interconnections, four of which provide the District with its primary water supply. **Appendix B** provides a list of the District’s interconnections.

Water Supply Connections

The Wolf Creek service area’s primary water supply connections are with the PWB and the JWC. This service area is connected to the Washington County Supply Line (a transmission line that supplies several PWB wholesale customers in Washington County) at the Wolf Creek meter. The remainder of the water supply needed to meet Wolf Creek area’s demand is supplied by the JWC. The District has two interconnections with the JWC, which are located along the western boundary of the Wolf Creek service area: the South Transmission Line entering near Tualatin Valley Highway and 75th Avenue, and the North Transmission Line entering near Cornelius Pass Road and Highway 26.

The main water supply for the Metzger service area is from the PWB, which is largely provided via an intertie with a transmission main that runs along Oleson Road and enters the Metzger service area distribution system at Florence Lane and 80th. A second connection (Garden Home) to the PWB system provides water supply to approximately 170 homes in a pressure zone.

A breakdown of water supply connections by service area is provided in **Exhibit 2-4**.

Exhibit 2-4. Water Supply Connections by Service Area.

Wolf Creek	Metzger
Wolf Creek Intertie (PWB)	80th & Florence Lane (PWB)
75 th Ave (JWC)	Garden Home (PWB)
Cornelius Pass (JWC)	

Back-up Water Supply and Emergency Interconnections

The District also has additional backup interconnections with PWB, and emergency interconnections with the Cities of Hillsboro, Beaverton, and Tigard, West Slope Water District, and Raleigh Water District.

Intergovernmental Agreements

OAR 690-086-0140(1)

A summary of all of the District’s current intergovernmental agreements is contained in **Appendix C**. These include agreements for wholesale water purchase, storage and diversion of water from the Barney and Scoggins Reservoirs, the interagency agreements related to ownership, usage, maintenance, and financing of the JWC, and agreements related to the WRWC and the construction, ownership, and operation of the Willamette River water treatment plant.

The Joint Water Commission Water Service Agreement Amendment signed in June 1994 added the District as a member of the JWC. That agreement was replaced by the October 27, 2003 Water Service Agreement between the Cities of Hillsboro, Forest Grove, and Beaverton, and the District, which also replaced previous agreements related to water transmission.

The District entered into a ten-year regional water supply agreement with the City of Portland on July 1, 2006. The agreement was continued for a second 10-year period through June 30, 2026. Under its supply agreement with the City of Portland, the District is required to purchase an average of 13.16 mgd annually.

In July 2000 and June 2001, the District entered into agreements with the City of Wilsonville regarding the construction, operation and ownership of the Willamette River water treatment plant. The District entered into an agreement with the City of Sherwood regarding the sale of a portion of its interest in the Willamette River water treatment plant and related facilities in December 2006. The WRWC’s coordinated efforts related to the development of water supply from the Willamette River were continued when the four members of the WRWC entered into the First Restated Intergovernmental Cooperative Agreement in October, 2008.

Records of Water Use

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

Terminology

Demand refers to all the water requirements within the District including metered consumption, unmetered water use, and water loss due to leakage within the system. Generally, water suppliers express demand and consumption 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).

The following terms are used 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. It is also called the one-day MDD.
- 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.

MDD is an important value for water system planning. The supply facilities (treatment plants, pipelines, reservoirs) and water rights must be capable of meeting the MDD. Moreover, water rights are typically established as a rate of diversion “at the source” and the projected rate of diversion should be planned for accordingly.

Historical Water Demands

Annual Demands

Exhibits 2-5 through 2-7 summarize historical demands (annual, ADD, MDD, and MMD), and peaking factors for the District’s entire service area and the two subdivisions of its service area: the Wolf Creek service area and the Metzger service area. A detailed discussion of these data is below. As a whole, the Wolf Creek service area has much greater demands than the Metzger service area.

Exhibit 2-5. Entire Service Area Historical Annual Water Demand, Average Day Demand, Maximum Day Demand, Peaking Factor, and Maximum Month Demand, 2007-2013.¹

Year	Annual Demand (MG)			ADD (mgd)	MDD (mgd)	Date of MDD	Peaking Factor (MDD: ADD)	MMD (mgd)	MMD (MG)
	Wolf Creek	Metzger	Total						
2007	7233.4	900.3	8133.8	22.28	45.02	7/10/2007	2.02	37.60	1165.7
2008	7178.2	859.1	8037.2	22.02	43.98	8/16/2008	2.00	36.12	1119.8
2009	6649.7	849.3	7499.0	20.55	42.52	7/29/2009	2.07	35.08	1087.4
2010	6080.5	804.0	6884.5	18.86	37.09	7/27/2010	1.97	32.70	1013.8
2011	5988.5	787.5	6776.1	18.56	32.74	8/26/2011	1.76	29.40	911.3
2012	6176.8	809.8	6986.6	19.14	35.39	8/15/2012	1.85	30.65	950.0
2013	5840.9	657.0	6497.9	17.80	35.57	7/27/2013	2.00	29.31	908.5

¹These are raw data from the meters that are not corrected for the meter malfunctions described under Water Losses.

Exhibit 2-6. Wolf Creek Service Area Historical Annual Water Demand, Average Day Demand, Maximum Day Demand, Peaking Factor, and Maximum Month Demand, 2007-2013.¹

Year	Annual Demand (MG)	ADD (mgd)	MDD (mgd)	Date of MDD	Peaking Factor (MDD: ADD)	MMD (mgd)	MMD (MG)
2007	7233.4	19.82	40.83	7/12/2007	2.06	33.81	1048.0
2008	7178.2	19.67	40	8/17/2008	2.03	32.55	1009.1
2009	6649.7	18.22	39.81	7/29/2009	2.19	31.36	972.2
2010	6080.5	16.66	34.92	7/27/2010	2.10	29.06	900.9
2011	5988.5	16.41	31.07	8/26/2011	1.89	26.18	811.7
2012	6176.8	16.92	33.23	8/17/2012	1.96	27.11	840.5
2013	5840.9	16.00	34.49	7/27/2013	2.16	18.51	823.5

¹These are raw data from the meters that are not corrected for the meter malfunctions described under Water Losses.

Exhibit 2-7. Metzger Service Area Historical Annual Water Demand, Average Day Demand, Maximum Day Demand, Peaking Factors, and Maximum Month Demand, 2007-2013.¹

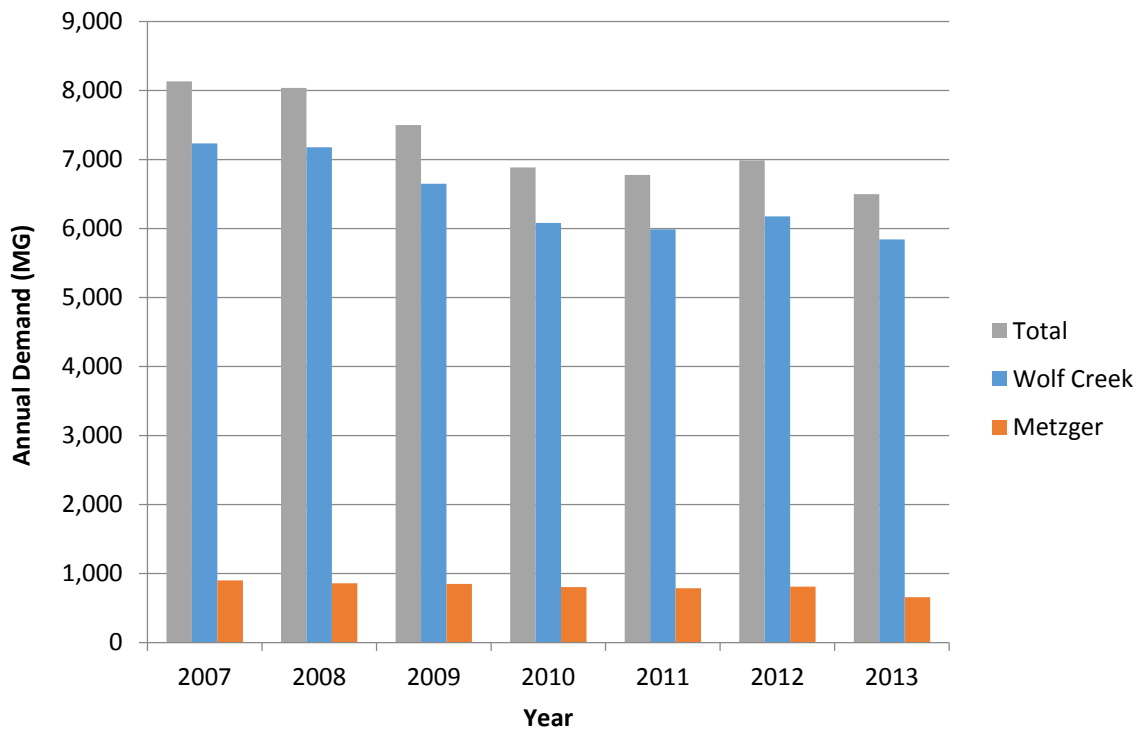
Year	Annual Demand (MG)	ADD (mgd)	MDD (mgd)	Date of MDD	Peaking Factor (MDD: ADD)	MMD (mgd)	MMD (MG)
2007	900.3	2.47	4.59	7/11/2007	1.86	3.80	117.8
2008	859.1	2.35	4.33	8/16/2008	1.84	3.57	110.8
2009	849.3	2.33	4.51	7/29/2009	1.94	3.72	115.3
2010	804.0	2.20	4.18	8/1/2010	1.90	3.64	112.9
2011	787.5	2.16	4.86	9/1/2011	2.25	3.21	99.6
2012	809.8	2.22	4.12	8/16/2012	1.86	3.53	109.5
2013	657.0	1.80	2.92	7/27/2013	1.62	2.74	85.0

¹These are raw data from the meters that are not corrected for the meter malfunctions described under Water Losses.

The following describes the District’s raw demand data. The District recognizes that meter malfunctions at supply connections (described in detail under Water Losses) has resulted in some inaccuracies in the demand data. Nonetheless, the following analyses of the raw demand data provide some valuable information about general trends in its water demands.

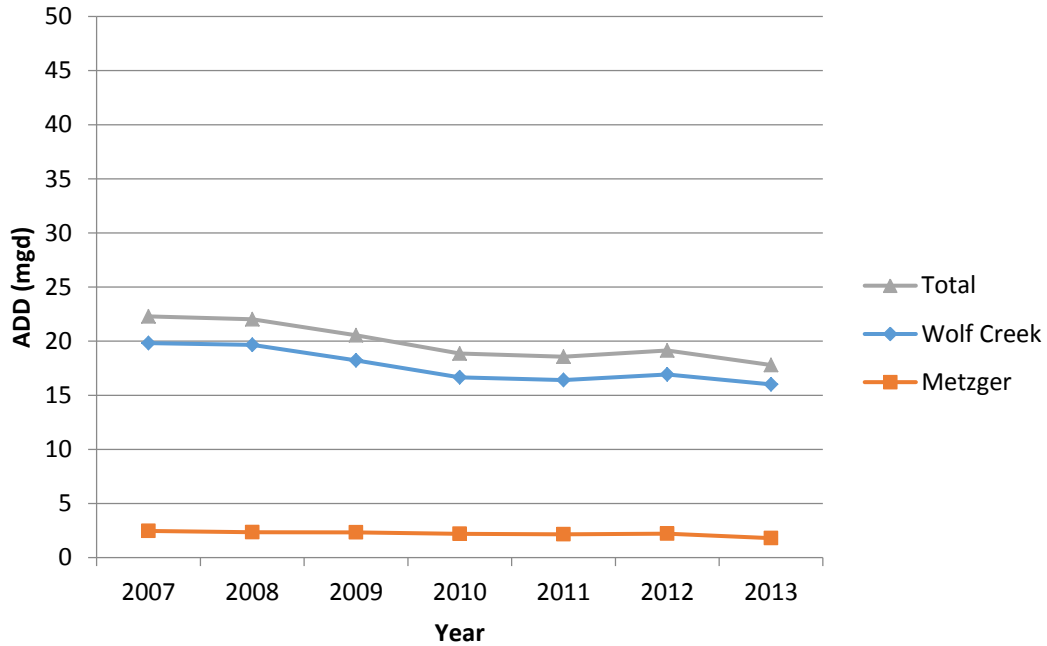
As shown in **Exhibit 2-8**, annual demand for the entire service area, and the Wolf Creek and Metzger service areas showing a general decreasing trend since 2007. From 2007 through 2013, annual demand decreased from 8,133.8 MG to 6,497.9 MG for the entire service area. By region, this equated to a reduction from 7,233.4 MG to 5,840.9 MG for the Wolf Creek service area, and from 900.3 MG to 657.0 MG for the Metzger service area. This decreasing trend likely reflects a number of factors, including the District’s aggressive efforts to promote water conservation in recent years, the economic downturn, and recent weather patterns.

Exhibit 2-8. Annual Demand (MG), 2007-2013.



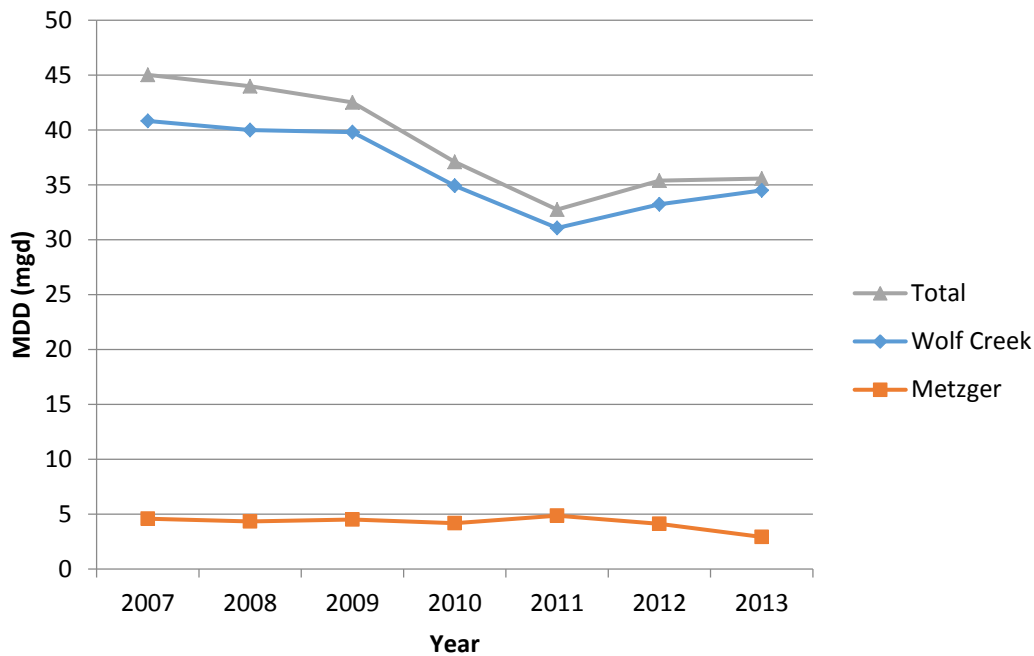
Similar to annual demand, ADD is also on a generally decreasing trend from 2007 through 2013, as shown in **Exhibit 2-9**. ADD decreased from 22.28 mgd to 17.80 mgd for the entire service area, from 19.82 mgd to 16.00 mgd for the Wolf Creek service area, and from 2.47 mgd to 1.80 mgd for the Metzger service area.

Exhibit 2-9. Average Day Demand (ADD), 2007-2013.



In contrast, **Exhibit 2-10** shows that MDD has fluctuated over time and trends have differed between the Wolf Creek service area and Metzger service area. For the entire service area and the Wolf Creek service area, MDD decreased from 2007 through 2011 and then increased thereafter. In the Metzger service area, MDD showed small annual fluctuations from 2007 to 2012 and then notably declined in 2013, which is, in part, related to malfunctioning of the Metzger meter that began September 2012. The greatest MDD for the entire service area was 45.02 mgd in July 2007. The greatest MDD for the Wolf Creek service area was 40.83 in July 2007 and for the Metzger service area was 4.86 in September 2011.

Exhibit 2-10. Maximum Day Demand (MDD), 2007-2013.

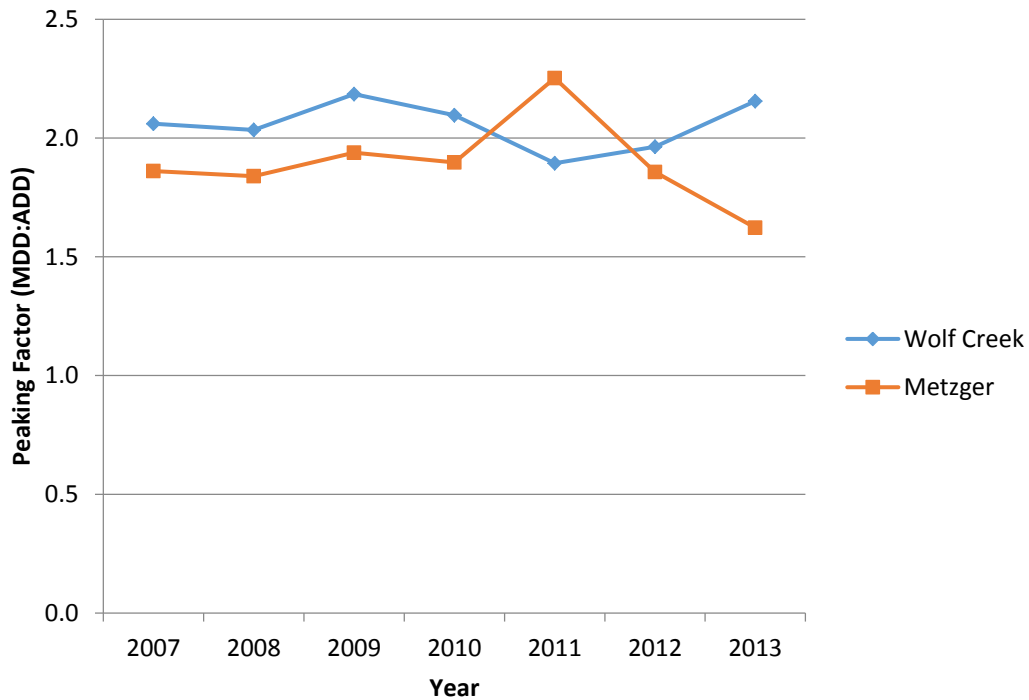


MDD is strongly influenced by weather patterns and the economy. Weather patterns often cause fluctuations in MDD from year to year. Weather patterns that influence MDD include: maximum temperatures, the number of consecutive days with high temperatures, when high temperatures occur in the summer, overall 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, as well. Customers may choose to irrigate less to save money in an economic downturn. The economy also influences 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 MDD:ADD peaking factor fluctuated from 2007 through 2013 for the Wolf Creek and Metzger service areas, as depicted in **Exhibit 2-11**. During that time period, the peaking factor for the Wolf Creek service area ranged between 1.89 and 2.19 and for the Metzger service area ranged from 1.62 to 2.25. The peaking factors for these two service areas are similar to the peaking factors of other water providers in the region. From 2002 through 2007, the peaking factor for the City of Hillsboro averaged 1.8, the City of Forest Grove and the City of Beaverton both averaged 1.9, and the City of Tigard peaking factor averaged 2.1 (*JWC WMCP 2010*).

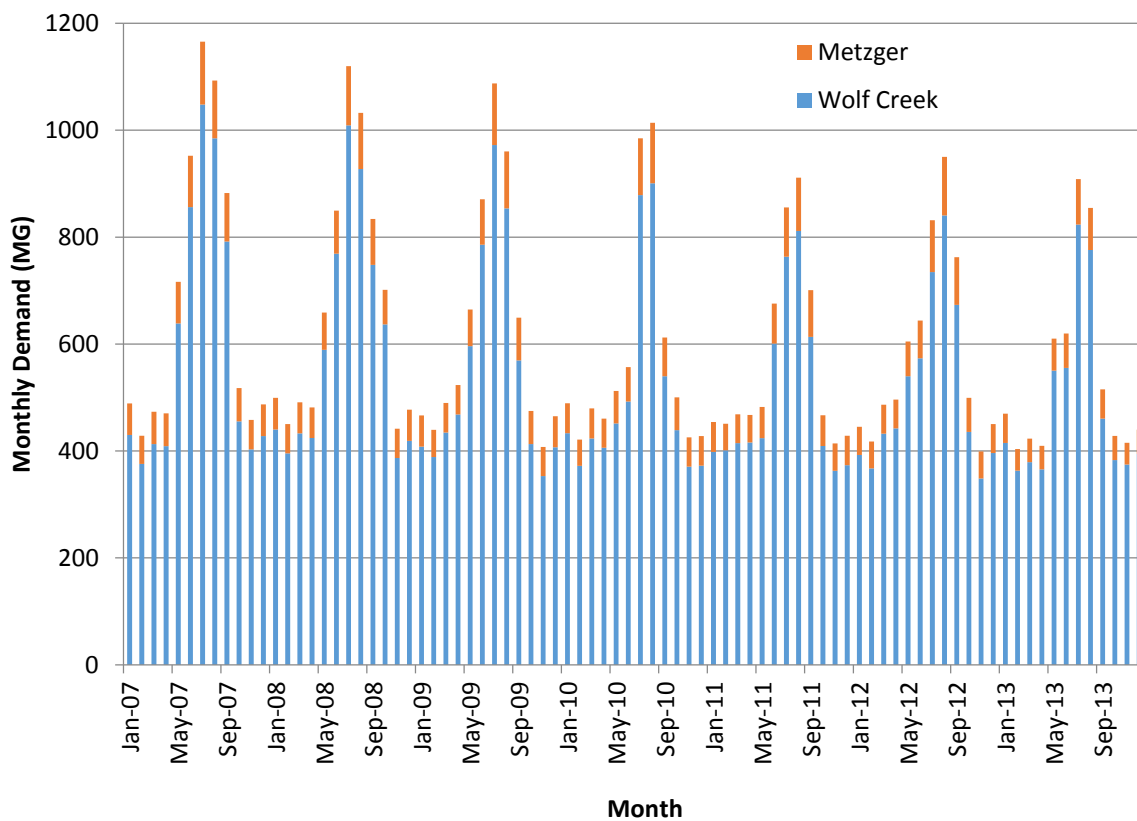
Exhibit 2-11. Peaking Factors (MDD: ADD), 2007-2013.



Monthly Demand

Exhibit 2-12 shows the monthly demand for the entire service area with blue indicating the portion associated with the Wolf Creek service area and orange indicating the portion associated with the Metzger service area. From 2007 through 2013, the greatest monthly demand for the entire service area was 1,165.7 MG, for the Wolf Creek service area was 1,048.0 MG, and for the Metzger service area was 117.8 MG. All of these maximum monthly demands (MMD) occurred in July 2007. From 2007 through 2013, the greatest MMD expressed as an average daily demand for the month for the entire service area was 37.60 mgd. The ADD of the maximum month for the Wolf Creek service area was 33.81 mgd and for the Metzger service area was 3.80 mgd. Again, all of these MMDs occurred in July 2007.

Exhibit 2-12. Monthly Demand (MG), 2007-2013.



Seasonal Demands

Exhibit 2-13 and 2-14 show seasonal demands for the District’s entire service area and for the Wolf Creek and Metzger service areas. Summer (July to October) ADD and Winter (December to March) ADD have shown a decreasing trend over time. Summer ADD decreased from 29.96 mgd to 21.97 mgd for the entire service area, from 26.99 mgd to 19.82 mgd for the Wolf Creek service area, and from 3.08 mgd to 2.14 mgd for the Metzger service area. Winter ADD decreased from 15.72 mgd in 2008 to 14.35 mgd in 2013 for the entire service area, from 13.83 mgd in 2008 to 12.83 mgd in 2013 for the Wolf Creek service area, and from 1.92 mgd in 2007 to 1.52 mgd in 2013 for the Metzger service area. The pronounced decreasing trend in Summer ADD is likely the primary reason for the previously described decreasing trends in annual demand and annual ADD. The decreasing trend may be influenced by metering errors.

Exhibit 2-13. Summer Season Demand (mgd), 2007-2013. (Summer = June to October.)

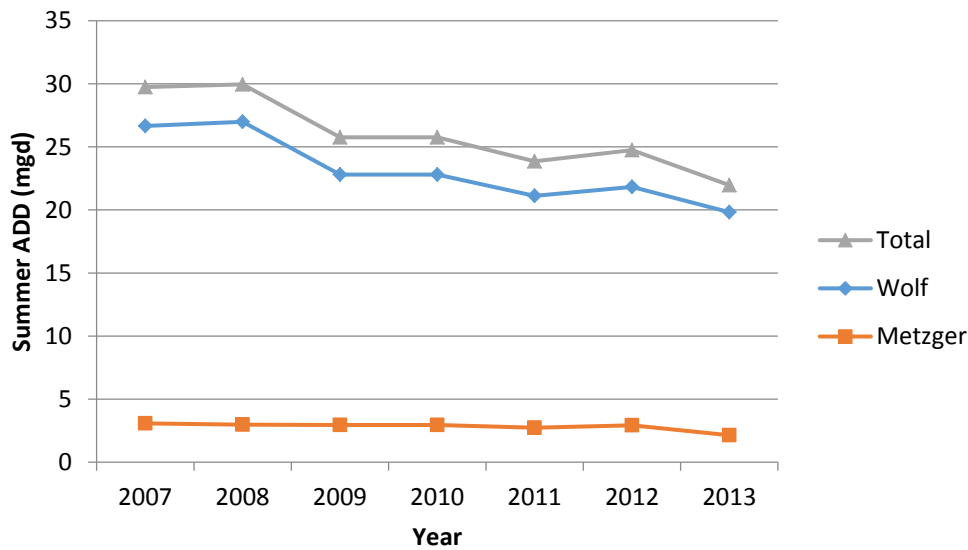
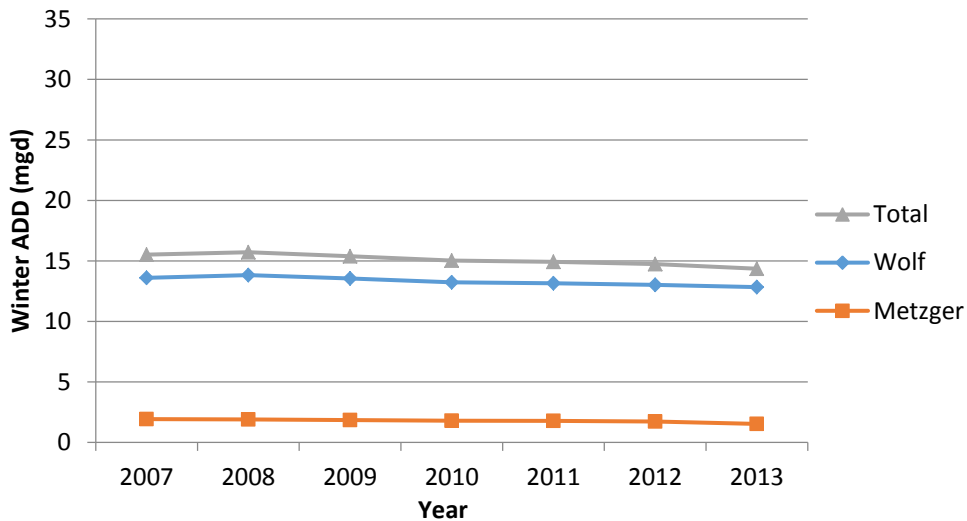


Exhibit 2-14. Winter Season Demand (mgd), 2007-2013. (Winter = December to March.)



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)

The District has eight customer categories: residential (single-family), multi-family residential, commercial, production (typically representing manufacturing), fireline, irrigation, temporary irrigation, and wholesale (these meters are typically operated as emergency interties). As shown in **Exhibit 2-15**, the greatest number of service connections in both of the District's service areas was residential in 2013. Also notable is the absence of service connections for production customers in the Metzger service area.

Exhibit 2-15. Number of Connections by Customer Category, 2013.

Customer Category	Wolf Creek	Metzger	Total
Residential	48,114	5,747	53,861
Multi-Family Residential	599	148	747
Commercial	1,097	333	1,430
Production	28	0	28
Fireline	68	68	136
Irrigation	889	85	974
Temporary Irrigation	12	1	13
Wholesale ¹	11	1	12
Total	50,818	6,383	57,201

¹Many of these wholesale meters do not fall within the Wolf Creek and Metzger service areas. As a result, the analysis of metered wholesale consumption that follows only includes a small sub-set of wholesale consumption. Also, these wholesale meters are typically operated as emergency interties.

Exhibits 2-16, 2-17, and 2-18 provide a percentage breakdown of connections by customer category for the Wolf Creek service area, the Metzger service area, and the entire service area, respectively. In the Wolf Creek service area, residential connections make up 94.7 percent of total connections, followed by commercial connections with 2.2 percent. In the Metzger service area, residential connections make up 90.0 percent of total connections, followed by commercial connections with 5.2 percent and multi-family residential with 2.3 percent. For the entire service area, residential connections make up 94.2 percent of total connections, followed by commercial connections with 2.5 percent.

Exhibit 2-16. Percentage of Connections by Customer Category for the Wolf Creek Service Area, 2013.

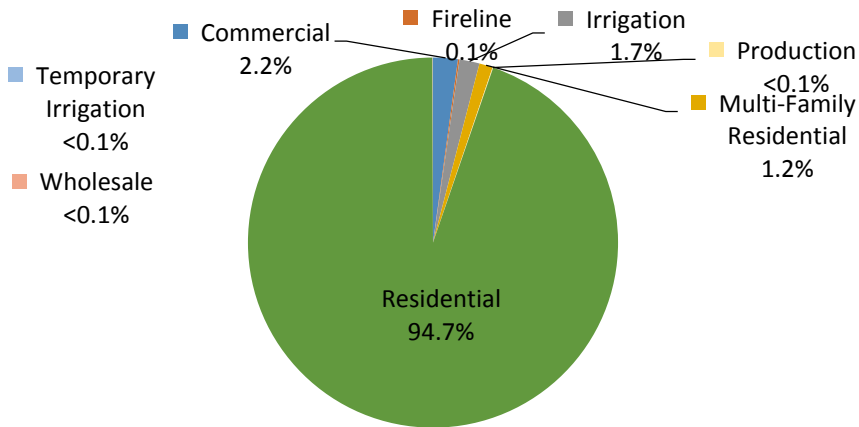


Exhibit 2-17. Percentage of Connections by Customer Category for the Metzger Service Area, 2013.

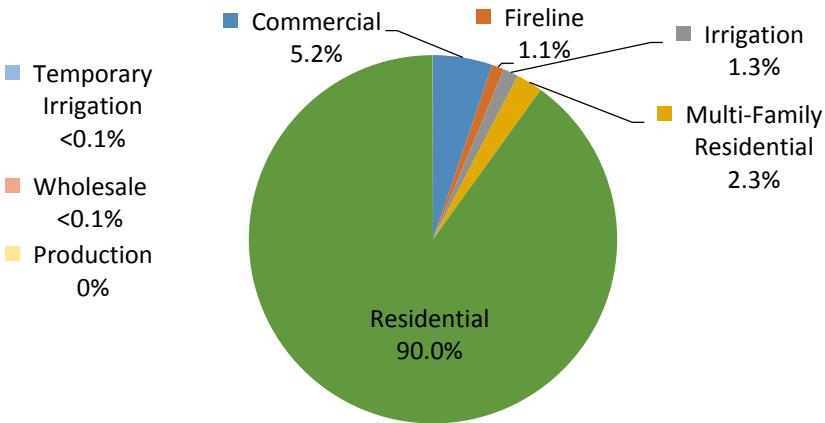
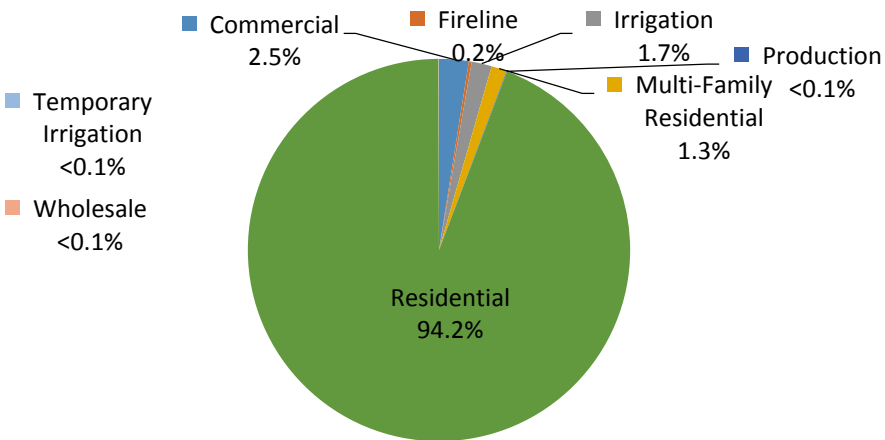


Exhibit 2-18. Percentage of Connections by Customer Category for the Entire Service Area, 2013.



Exhibits 2-19, 2-20, and 2-21 present the percentage of water used by each customer category in 2013 within the Wolf Creek service area, the Metzger service area, and the entire service area, respectively. In each case, residential customers used approximately 50 percent of the total metered water consumed. In the Wolf Creek service area, the customer categories with the next greatest percentages of water use were multi-family residential with 19.5 percent, commercial with 15.5 percent, and production with 9.1 percent. In the Metzger service area, the customer categories with the next greatest percentages of water use were commercial with 24.5 percent and multi-family residential with 21.1 percent. The proportion of use among customer categories for the District as a whole was similar to the Wolf Creek service area: residential with 50.4 percent, multi-family residential with 19.6 percent, commercial with 16.3 percent, and production with 8.3 percent.

Exhibits 2-16 through 2-21 show that although residential customers make up the vast majority of the District's customer base, the commercial, multi-family residential, and particularly production customers categories have much higher water use per connection. For example, the Wolf Creek service area had only 28 production connections (0.1 percent of the number of connections), but these customers used 9.1 percent of all water metered in 2013. Similarly, the 599 multi-family connections comprised only 1.2 percent of the customers in the Wolf Creek service area, but used 19.5 percent of all water metered in 2013. In contrast, the 48,114 residential connections in the Wolf Creek service area, which represented approximately 95 percent of the customers in that area, used only 50.4 percent of the water. Consequently, focusing water conservation efforts on production, multi-family residential, and commercial customers may yield greater water savings for the amount of effort expended than programs targeting residential customers.

Exhibit 2-19. Percent Annual Water Use by Customer Category for the Wolf Creek Service Area, 2013.

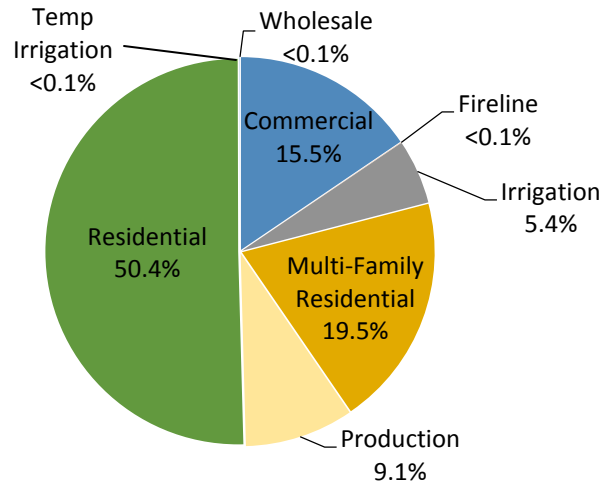


Exhibit 2-20. Percent Annual Water Use by Customer Category for the Metzger Service Area, 2013.

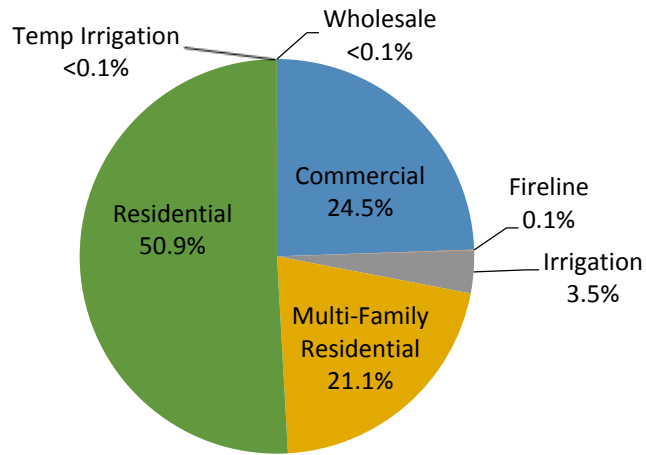
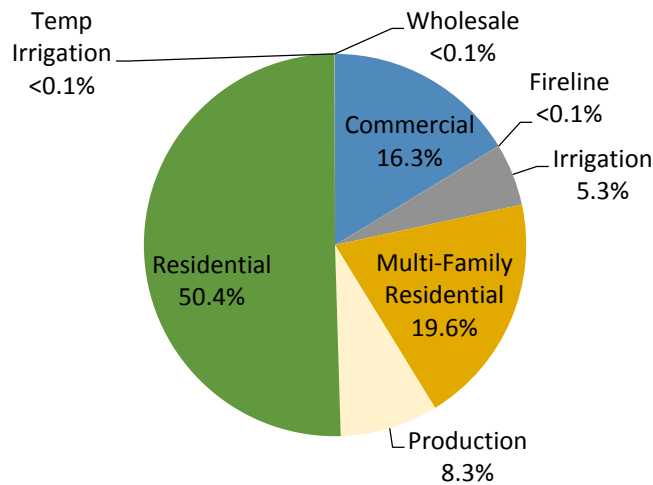
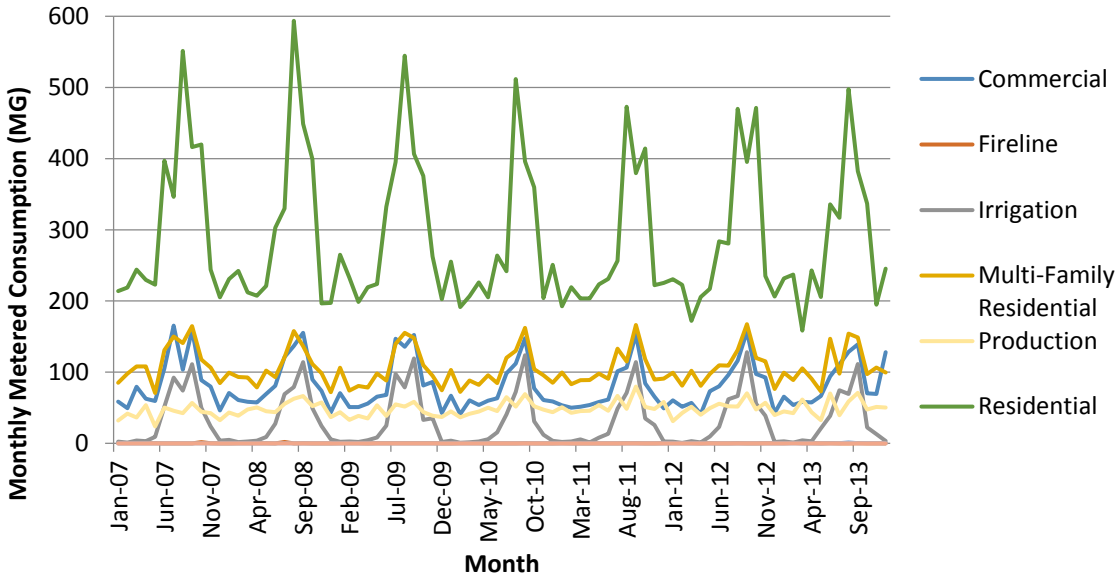


Exhibit 2-21. Percent Annual Water Use by Customer Category for the Entire Service Area, 2013.



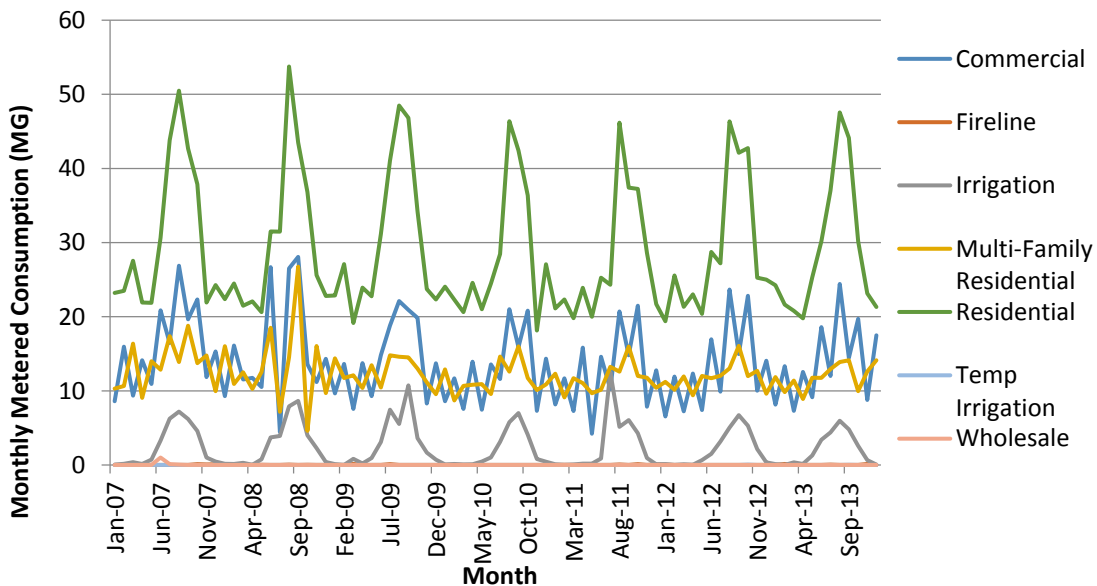
Exhibits 2-22 and 2-23 show the monthly metered consumption by customer category for the Wolf Creek service area and Metzger service area, respectively. In both cases, water use by residential, multi-family residential, commercial, and irrigation customers notably increased during the summer months.

Exhibit 2-22. Monthly Metered Consumption by Customer Category for the Wolf Creek Service Area, 2007-2013.¹



¹Residential customers are billed bi-monthly and the other customers are billed monthly. Consequently, averaging was required for the Residential category to provide monthly consumption values.

Exhibit 2-23. Monthly Metered Consumption by Customer Category for the Metzger Service Area, 2007-2013.¹



¹Residential customers are billed bi-monthly and the other customers are billed monthly. Consequently, averaging was required for the Residential category to provide monthly consumption values.

Seasonal Water Use

Exhibits 2-24 and 2-25 compare summer (July to October), winter (December to March), and annual average water use for the Wolf Creek service area and Metzger service area, respectively. During the summer season, irrigation water use increased dramatically, residential water use was approximately 1.8 times greater, and commercial water use was approximately 1.5 times greater within both service areas. These exhibits also show that multi-family residential water use increased in the summer season to a greater extent in the Wolf Creek service area (1.3 times greater) than the Metzger service area (1.1 times greater). Given these seasonal water use differences, outdoor water conservation efforts should be emphasized for irrigation, residential, commercial, and multi-family residential customers.

Exhibit 2-24. Seasonal Water Consumption by Customer Category for the Wolf Creek Service Area, 2013.

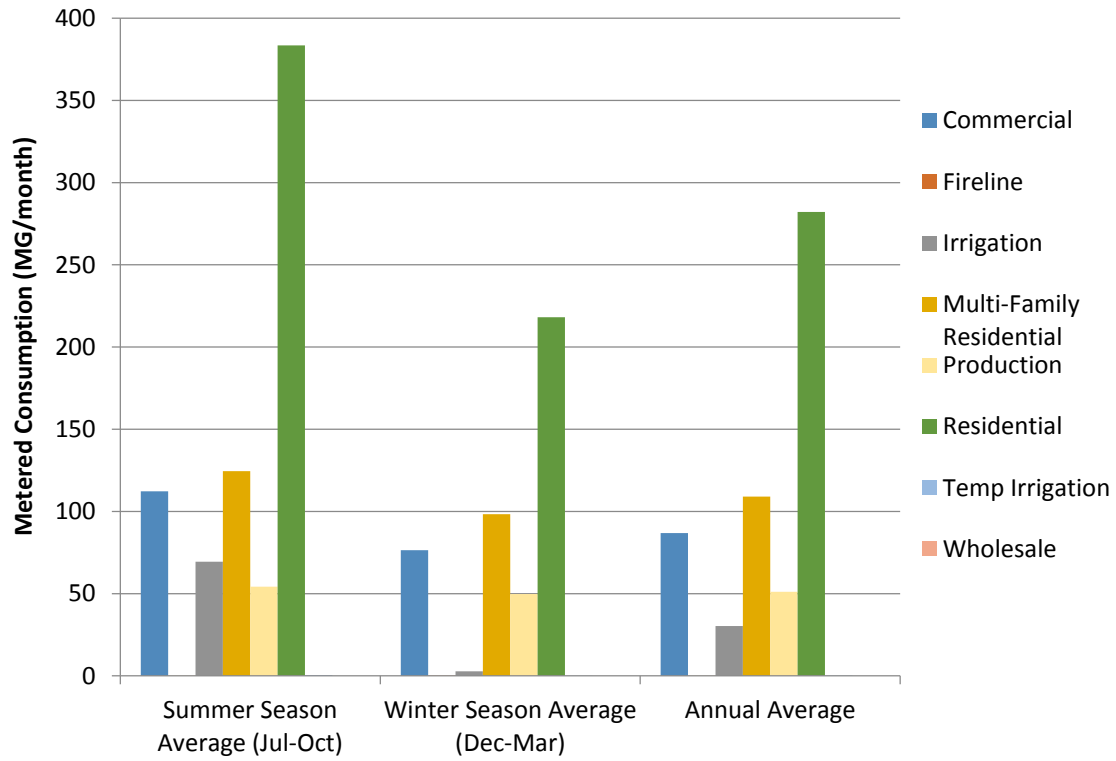
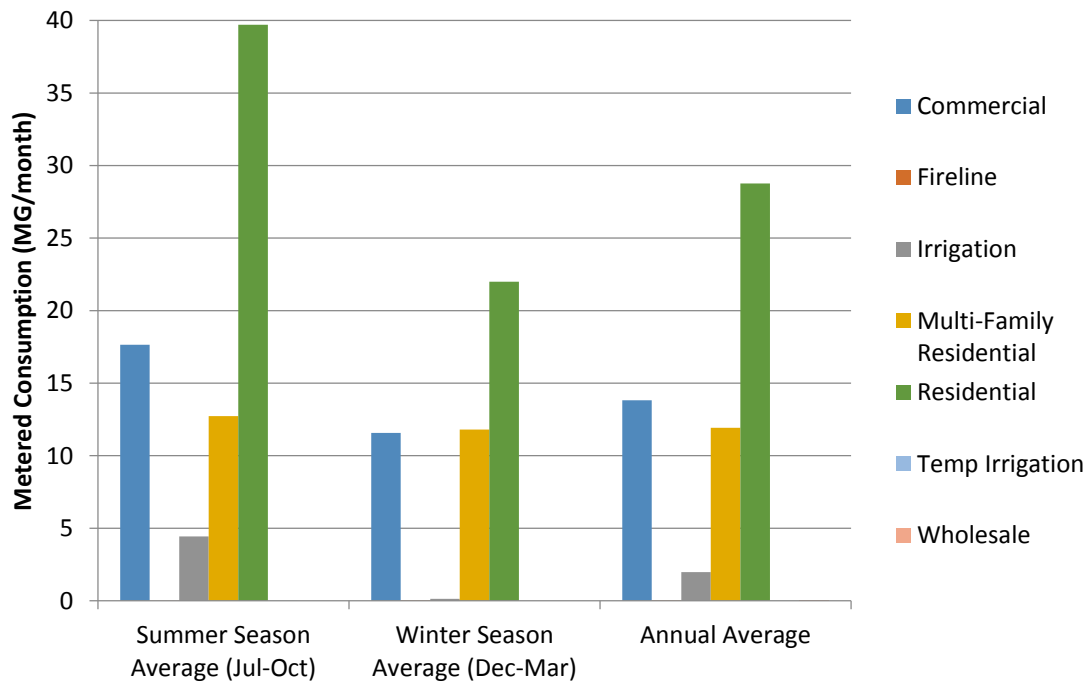


Exhibit 2-25. Seasonal Water Consumption by Customer Category for the Metzger Service Area, 2013.



Largest Water Users

The District's 20 largest water users for the entire service area in 2013 are shown in **Exhibit 2-26**. These customers used 1,045.7 MG in 2013, which represented 16.1 percent of the 6,498 MG of water used in the District's entire service area that year. All of these customers are production, commercial, or multi-family residential customers.

Exhibit 2-26. Largest Water Users for the Entire Service Area, 2013.

Customer Category	Annual Volume Used, Entire Service Area (MG)	Percent of Annual Volume, Entire Service Area (%)
Production	215.8	3.3
Production	214.5	3.3
Production	77.6	1.2
Commercial	75.8	1.2
Commercial	72.8	1.1
Multi-Family Residential	55.0	0.8
Commercial	39.5	0.6
Multi-Family Residential	35.4	0.5
Production	32.8	0.5
Production	31.6	0.5
Multi-Family Residential	23.5	0.4
Commercial	23.1	0.4
Multi-Family Residential	22.8	0.4
Multi-Family Residential	22.0	0.3
Multi-Family Residential	21.8	0.3
Multi-Family Residential	19.2	0.3
Multi-Family Residential	18.1	0.3
Commercial	16.9	0.3
Multi-Family Residential	15.6	0.2
Multi-Family Residential	11.8	0.2
Total	1,045.7	16.1

Water Losses

OAR 690-086-0140(9)

The District calculates water loss as the difference between total water demand and total consumption, including metered and unmetered water use. To calculate water loss, the District tracks annual water demand, metered water consumption, wheeled water (i.e. PWB overlap; water moved through the District's water distribution system for PWB customers), and estimated non-revenue authorized uses (i.e. unmetered water), such as hydrant use or pipeline flushing.

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 water loss approaches the net volume lost to actual leakage.

In 2007 and 2008, water loss for the entire service area was 3.0 percent and 4.5 percent, respectively, as shown in **Exhibit 2-27**. However, from 2009 through 2013 water loss ranged from -2.0 percent to -15.1 percent, which the District attributes to malfunctioning supply meters that are owned and maintained by the PWB.

Exhibit 2-27. Water Losses, 2007-2013.

Year	Total Demand (MG)	Metered to customers (MG)	Wheeled Water (MG)	Unmetered Water (MG)	Total Consumption (MG)	Water Loss (MG)	Water Loss (%)
2007	8133.8	7857.5	23.3	11.8	7892.6	241.2	3.0
2008	8037.2	7626.0	26.2	22.9	7675.2	362.0	4.5
2009	7499.0	7601.2	24.9	19.5	7645.7	-146.7	-2.0
2010	6884.5	7022.1	23.7	9.8	7055.6	-171.1	-2.5
2011	6776.1	7030.7	19.5	11.4	7061.6	-285.5	-4.2
2012	6986.6	7322.4	24.0	20.7	7367.1	-380.5	-5.4
2013	6497.9	7434.9	22.7	21.5	7479.0	-981.1	-15.1

Exhibit 2-28 presents the estimated water losses by service area. This exhibit demonstrates that water losses for the entire system were low in 2007 and 2008, but that an opportunity to decrease water loss in the Metzger service area still exists.

The Wolf Creek water losses shown in **Exhibit 2-28** are considered reliable until 2009 when the Wolf Creek meter began to malfunction. The Metzger water losses are considered reliable until September 2012 when Metzger’s primary meter (Florence Lane meter) began to malfunction. This exhibit demonstrates that metering in both service areas needs to be addressed to provide accurate water loss estimates for the separate service areas and for the entire system. Given that the meters are owned by PWB, the District is only able to investigate meter errors and then recommend to PWB that PWB investigates the meter and completes any necessary maintenance. The District has worked with PWB to identify possible issues with the main Wolf Creek supply meter on WCSL. PWB has made efforts to recalibrate the meter with limited success, and the District assisted with these efforts. PWB plans to install a parallel meter at the Wolf Creek connection that should provide more accurate flow data. The District is currently investigating the Metzger meter.

Exhibit 2-28. Water Losses by Service Area, 2007-2013.

Year	Water Losses (%)		
	Wolf Creek	Metzger	System Total
2007	1.9	16.1	3.0
2008	4.0	14.7	4.5
2009	-3.4	15.1	-2.0
2010	-4.7	18.9	-2.5
2011	-6.6	17.7	-4.2
2012	-7.7	17	-5.4
2013	-15.7	-3.2	-15.1

Given that the water loss calculations after 2008 are not reliable, the best estimate of water losses in the District’s water system are based on meter data from 2003 through 2008.¹ These data show average water loss of 5.1 percent. For a system of this size, achieving water loss below 5 percent is considered not economically feasible in most cases, because the amount of additional investment would far exceed the value of water lost to leakage. Consequently, water loss near 5 percent indicates that the system is well maintained.

¹ The PWB conducted an analysis to develop corrections that allow estimation of metered demand at the Wolf Creek meter from 2009 through 2013, but the methodology used to develop the corrections did not represent general operating conditions, and therefore, the demand estimates and subsequent water loss estimates are not considered in this WMCP.

Water Rights

OAR 690-086-0140(5)

As previously described, the District's primary water supply sources are water from the JWC and wholesale water supply purchased from the City of Portland. The District is also part of the Willamette River Water Coalition (WRWC), which holds a water use permit for the use of surface water. Additionally, as further described below, the District is expanding an aquifer storage and recovery (ASR) program. Finally, the District is prepared to obtain back-up water supply from groundwater under its own water rights.

The District is a member of the JWC, which manages numerous water rights. For the most part, these water rights are in the name of individual JWC member agencies. One water right (Permit S-54737) is in the name of the JWC. Permit S-54737 authorizes the use of up to 75 cfs from Scoggins Creek for municipal use during the period from October 1 through May 31. The current development timeline for this permit is October 1, 2071. The JWC's water rights are described in detail in the JWC's 2010 approved WMCP.

The District is also a member of the WRWC, which holds Permit S-49240. This permit authorizes use of up to 202 cfs from the Willamette River year-round for municipal and industrial purposes. The current development timeline for this permit is October 1, 2047. To date, the City of Sherwood is the only WRWC member that is appropriating water under Permit S-49240.

Finally, the District holds three water right certificates for the use of groundwater: Certificates 36440, 36441, and 86081. The District's Certificates 36440 and 36441 authorize the use of up to 1.1 cfs and 2.2 cfs of groundwater, respectively, for municipal purposes. The water rights authorize the use of water year-round. Certificate 86081 authorizes the use of up to 0.58 cfs of groundwater from one well for municipal purposes. This water right originally authorized the use of groundwater for irrigation use. As a result, it has a period of use limited to May 1 through September 30 and an annual volume limitation of 116 acre-feet. A transfer application (T-11612) is currently pending at the OWRD, which requests to add additional points of appropriation (wells) to these water rights.

Exhibit 2-27 summarizes the WRWC permit and the District's groundwater rights. The exhibit also describes the ASR limited licenses that the District holds in partnership with other municipal water providers. These ASR programs are further described below.

TVWD/ Beaverton ASR Program

The District and the City of Beaverton were issued ASR Limited License #002 (LL 002) in 1998, which authorized ASR pilot testing for 5 years (until 2003). OWRD subsequently renewed the limited license three times (2003, 2009, and 2013). Most recently, OWRD extended LL-002 to July 22, 2018.

In its current form, ASR LL-002 authorizes the storage of up to 1.5 billion gallons, which can be injected using up to 13 wells. The project's water sources are the Tualatin River, as authorized under Beaverton's existing municipal water right Certificate 85914, and the Bull Run River, as authorized by ORS 538.420. Water can be diverted from these sources for ASR purposes at a combined rate of 12.5 mgd, with diversion from the Bull Run River limited to 2 mgd. LL-002 authorizes the recovery of the stored water for municipal use at a rate of up to 14.4 mgd. The

limited license specifies recovery rates of 1.5 mgd or 3.0 mgd for each of the 13 recovery wells, which also serve as the injection wells. To date, the District's pilot testing under this ASR limited license has occurred at one well (the Grabhorn ASR well). Water from the JWC water treatment plant has been injected at approximately 1,200 gallons per minute (gpm) (1.7 mgd), and recovery occurs at a rate of approximately 1,736 gpm (2.5 mgd).

JWC ASR Program

In September 2011, ASR Limited License #019 (LL-019), was issued in the name of the JWC to authorize ASR pilot testing. ASR LL-019 authorizes the storage of up to 2.1 billion gallons, which can be injected using up to 14 wells. Water can be injected at a maximum rate of 8,100 gpm (11.7 mgd). The JWC ASR limited license authorizes recovery of the stored water at a combined rate of up to 28,000 gpm (40.3 mgd). Recovery is limited to 2,000 gpm (2.9 mgd) at each of the 14 recovery wells, which are also the injection wells.

The District and its JWC member partners, the Cities of Hillsboro and Beaverton, requested ASR LL-019 to assess the feasibility of developing a regional ASR project in the vicinity of Cooper Mountain. Development under ASR LL-019, to date, has included initiating conversion of a test well to an ASR well and construction of associated infrastructure and conducting ASR feasibility studies to investigate the potential of developing other ASR facilities within the District's service area.

Exhibit 2-29. TVWD Water Rights.

Source	Application	Permit	Claim, Decree, or Transfer	Certificate	Priority Date	Type of Beneficial Use	Entity Name on Water Right	Authorized Rate (cfs)	Authorized Annual Volume	Authorized Date for Completion	Maximum Rate of Withdrawal to Date		2013 Average Withdrawal		Five-Year (2009-2013) Average Withdrawal		Comments	
											Instantaneous (cfs)	Annually (MG)	Monthly (MG)	Daily (mgd)	Monthly (MG)	Daily (mgd)		
Groundwater																		
Groundwater, tributary to Beaverdam Creek	G-1351	G-1229	Application T-11612 pending	86081	1/21/1959	Municipal	TVWD and Aloha Huber Water District	0.58 ¹	116 acre-feet	N/A	0.58							Season of use limited to: May 1 - Sept. 30
Groundwater, a tributary to Beaverton Creek	G-637	G-588	Application T-11612 pending	36440	5/2/1957	Municipal	Aloha Huber Water District	1.10	N/A	N/A	1.10							
Groundwater, a tributary to Butternut Creek	G-2242	G-2064	Application T-11612 pending	36441	2/23/1962	Municipal	Aloha Huber Water District	2.2	N/A	N/A	2.2							
Surface Water																		
Willamette River	S-50693	S-49240	Permit amendment T-10477		6/19/1973	Municipal and Industrial	Willamette River Water Coalition	202	N/A	10/1/2047	0 ²	0	0	0	0	0		
ASR																		
Bull Run River and Tualatin River		ASR LL-002				ASR	City of Beaverton and TVWD	Recovery: up to 14.4 mgd total (limited to 1.5 or 3.0 mgd from each of 13 wells)	1.5 billion gallons	7/22/2018	Recovery 4.45 cfs (2.9 mgd)	211.1	40.07	1.31	43.66	1.42		
Sain Creek, Tualatin River, Scoggins Creek and tributaries, Bull Run River, Willamette River, Tualatin River, Sandy River.		ASR LL-019				ASR	Joint Water Commission	Recovery: up to 28,000 gpm (40.3 mgd) total (2,000 gpm (2.9 mgd) from each of 14 wells)	2.1 billion gallons	9/27/2016	0							

¹Total diversion, in combination with the remaining irrigation right (Certificate 44119), is limited to 1.31 cfs.

²Although the City of Sherwood has used water under the WRWC permit S-49240, TVWD has not diverted any water under this permit to date.

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Aquatic Resource Concerns

OAR 690-086-140(5) requires municipal water suppliers to identify the following for each of its water sources: 1) any listing of the source as water quality limited (and the water quality parameters for which the source was listed); 2) any streamflow-dependent species listed by a state or federal agency as sensitive threatened or endangered that are present in the source; and 3) any designation of the source as being in a critical groundwater area.

Water Quality

Although the Willamette River has a history of pollution, stringent environmental protection laws and numerous restoration activities over the last 30 years have improved the water quality.

For decades, the Willamette River has been an important source of drinking water. The cities of Springfield, Corvallis, Adair Village, Wilsonville and Sherwood provide safe, quality water from the Willamette River. The City of Corvallis has been supplying its community with water from the Willamette River for more than 60 years (treatment plant built in 1949). The Willamette River Water Treatment Plant in the City of Wilsonville has been operating for more than 11 years and has met or exceeded every safe drinking water quality standard.

Every two years, Oregon Department of Environmental Quality's (DEQ) is required to assess water quality and report to EPA on the condition of Oregon's waters. The Clean Water Act Section 303(d) requires the DEQ to identify waters that do not meet water quality standards and where a Total Maximum Daily Load (TMDL) pollutant load limit needs to be developed. The reach of the Willamette River containing the District's point of diversion, the Willamette River Water Treatment Plant in the City of Wilsonville at approximately River Mile 39, is included on the DEQ's 303 (d) list for aldrin, biological criteria, chlorophyll-a (summer), DDT, DDT Metabolite (DDE), dioxin, dieldrin, iron, and PCBs (see **Exhibit 2-30** below for more information or visit www.deq.state.or.us/wq/assessment/2010Report.htm).

Water quality parameters may be removed from the 303(d) list when TMDLs or other control measures have been established that are expected to improve water quality, when data show water quality has improved, and in some cases when water quality standards are revised. For the reach of the Willamette River containing the District's point of diversion, DEQ delisted temperature, mercury, and *E. coli* (Fall/Winter/Spring) in 2010 upon approval of a TMDL.

Exhibit 2-30. Willamette River DEQ 303(d) listings from River Mile 24.8 to 54.8.

Pollutant / Record ID	Criteria	Data Source
Biological Criteria / 6125	Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.	Aquatic species are impaired. Research paper by Oregon State University (<i>Villeneuve, D.L., Curtis, L.R., et al, (2004) Environmental Stresses and Skeletal Deformities in Fish from the Willamette River, Oregon, USA. To: Oregon Watershed Enhancement Board</i>) concluded there was little evidence to suggest that chemical contaminants were responsible for elevated frequencies of deformities in fish. Evidence suggests parasitic infection was the primary cause of observed skeletal deformities.
Chlorophyll a / 24517	Reservoir, river, estuary, non-thermally stratified lake: 0.015 mg/l	EPA addition to 303(d) list 12/14/2012: Exceedence of the 0.015 mg/l criteria (average value 0.018) at LASAR station 10339, Willamette River at Canby Ferry, between 6/20/07 and 8/16/07. Exceedence of the 0.015 mg/l criteria (average value 0.021) at LASAR station 10611, Willamette River at Hawthorne Bridge, between 6/20/07 and 8/16/07
Aldrin / 9221 DDT/ 9224 DDT Metabolite (DDE) / 9225 Dieldrin / 9223 PCBs / 9220	No published EPA criteria exist. Public health advisory used to set guidance values.	Oregon Health Division fish advisory issued 11/20/01
Dioxin (2,3,7,8-TCDD) / 6767	Table 20 Toxic Substances (OAR 340-41-033)	Dioxin TMDL based on the loading capacity calculated from the water quality standard (0.013 ppq - established to protect human health), discharge estimates from 8 chlorine-bleaching pulp mills in the Columbia R Basin, and a design stream flow.
Iron / 8381	Table 20 Toxic Substances	River Mile 34.2: From 4/27/1994 to 8/6/2001, 0 out of 36 samples > applicable Table 20 criterion. River Mile 46: From 7/11/2000 to 7/11/2000, 0 out of 1 samples > applicable Table 20 criterion. River Mile 48.2: From 2/23/1994 to 9/24/2001, 7 out of 94 samples > applicable Table 20 criterion.

The Willamette River Water Treatment Plant has an active raw water quality and finished water quality monitoring program that looks at substances of concern for drinking water treatment. The results from this program have consistently demonstrated that the raw water quality of the Willamette River has been good and the water produced by the Willamette River Water Treatment Plant has been equal to or better than Safe Drinking Water Act Standards.

Listed Streamflow-dependent Species

Exhibit 2-31 shows the listed fish species in Willamette River within the reach of the District’s point of diversion (~River Mile 39).

Exhibit 2-31. Listed Fish Species in the Willamette River within the reach of the District’s Point of Diversion (~River Mile 39).

Species	Evolutionarily Significant Unit (ESU) (if applicable)	Federal Listing	State Listing
Fall Chinook	Lower Columbia River	Threatened	Sensitive-Critical
Spring Chinook	Lower Columbia River, Upper Willamette River	Threatened	Sensitive-Critical
Coastal Cutthroat	Lower Columbia River, including up to Willamette Falls		Sensitive-Vulnerable, below Willamette Falls
Coho	Lower Columbia River, including up to Willamette Falls	Threatened	Endangered
Winter Steelhead	Lower Columbia River, Upper Willamette River	Threatened	Sensitive-Critical
Chum Salmon	Columbia River		Sensitive-Critical
Western Brook Lamprey	Columbia River System		Sensitive-Vulnerable
Pacific Lamprey	Columbia River System	Petitioned for listing	Sensitive-Vulnerable

Sources:

Federal ESA listed species (T&E), from NOAA Fisheries Office of Protected Resources: <http://www.nmfs.noaa.gov/pr/species/esa/fish.htm>

Federal Sensitive species, from the Interagency Special Status/Sensitive Species Program for Oregon and Washington State: <http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/>

Oregon State ESA listed species, from the Oregon Department of Fish & Wildlife: http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp

Oregon State Sensitive Species, from the Oregon Department of Fish & Wildlife: http://www.dfw.state.or.us/wildlife/diversity/species/sensitive_species.asp

Federal Species of Concern, from the U.S. Fish & Wildlife Service, Oregon Fish & Wildlife Office: <http://www.fws.gov/oregonfwo/Species/Data/PacificLamprey/default.asp>

ODFW’s Division 315 Fish Persistence Evaluation of Municipal Extension Tualatin Valley Water District Application #S-50693

Critical Groundwater Area

The District’s groundwater rights are within the Cooper Mountain-Bull Mountain Critical Ground Water Area, the implications of which are discussed in more detail below.

Evaluation of Water Rights/Supply

OAR 690-086-0140(3)

As previously described, the municipal water supply for the District comes primarily from other municipal water providers. The District has a regional water supply agreement with the City of Portland, and receives water as part of its membership in the JWC. (The reliability of the JWC's water rights is evaluated in its 2010 approved WMCP.) The District's groundwater rights and its current ASR project provide it with a back-up source of supply and a way to address summer peak demands. Finally, the District is a member of the WRWC, which holds a 202.0 cfs permit for the use of water from the Willamette River for municipal and industrial purposes.

Groundwater

The District's groundwater rights authorize the use of a total of up to 3.88 cfs. The District is currently using three wells (Scheupbach, Grabhorn, and 189th Avenue) to appropriate groundwater under its groundwater rights. The District's current production capacity from these three wells is 3,036 gpm (6.8 cfs), which is sufficient to meet the maximum authorized rates of its existing groundwater rights. The wells are used only for backup supply when needed.

Moreover, the District's groundwater rights are within the Cooper Mountain-Bull Mountain Critical Ground Water Area (CMBM CGWA). The CMBM CGWA order limits the total use of groundwater from the basalt aquifer within the CGWA to 2,900 acre-feet per year and provides that OWRD will allocate that amount among the existing water right holders. In recent years, the use of groundwater within the CGWA has been significantly less than the 2,900 acre-foot limitation. There is, however, no guarantee that groundwater use under existing water rights in the area will not increase in the future. In that event, OWRD could limit the District's use of groundwater to maintain the 2,900 acre-foot limitation. Despite this limitation, the water supply provided by these groundwater rights is relatively secure. The groundwater levels within the CMBM CGWA are stable or rising and the District's groundwater rights provide a reliable backup water supply.

ASR Programs

The District's joint ASR limited license with the City of Beaverton authorizes a maximum storage volume of 1.5 billion gallons and a maximum combined recovery rate of 14.4 mgd (22.3 mgd). The District currently uses only the Grabhorn well for ASR and its current capacity is approximately 1,736 gpm (3.87 cfs). The JWC ASR limited license, which is shared by the District and the Cities of Beaverton and Hillsboro, authorizes a maximum storage volume of 2.1 billion gallons and a maximum combined recovery rate of 40.3 mgd (62.3 mgd). To date, water has not been stored under this ASR limited license.

Willamette River

In the future, the District will also rely on water supply from the WRWC water right permit. There is ample water available on the Willamette River to satisfy the WRWC's Permit S-49240. After considering all existing consumptive use and non-consumptive use water rights (including instream water rights), OWRD's online water availability database indicates that water is available for appropriation from the Willamette River above Molalla River every month

of the year based on an 80 percent exceedance probability. Based on priority date and abundant streamflow, the WRWC’s Willamette River water right would be expected to be highly reliable.

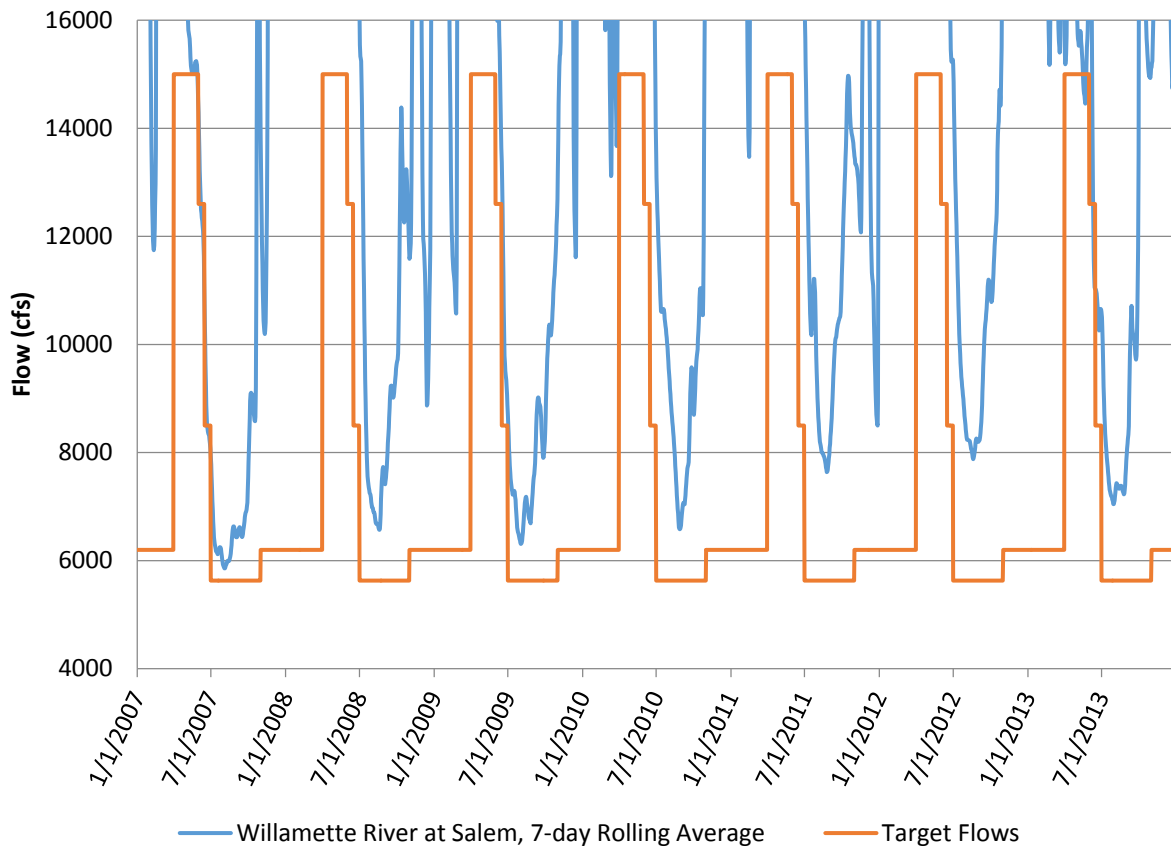
The reliability of Permit S-49240 is, however, affected by permit extension conditions. On June 26, 2007, OWRD issued a Final Order Incorporating Settlement Agreement, which extended the development deadline for Permit S-49240 to October 1, 2047. As part of the municipal permit extension process, the Oregon Department of Fish and Wildlife (ODFW) recommended conditions to OWRD intended to “maintain the persistence of listed fish.” The recommended conditions include flow targets on the Willamette River, which are shown in **Exhibit 2-32**. If the flow targets are not met, use of water under Permit S-49240 would be reduced in proportion to the amount by which the flow target is not met (based on a seven-day rolling average of mean daily flows). During the period from April 1 through June 30, the reduction in the amount that can legally be diverted will not exceed 20 percent.

Exhibit 2-32. ODFW Recommended Fish Flow Targets in the Willamette River, Measured at U.S. Geological Survey (USGS) Gage 14191000.

Month	Recommended Fish Flow Targets (cfs)
July 1 – October 31	5,630
November 1 – March 31	6,200
April 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

The U.S. Army Corps of Engineers (USACE) has managed its thirteen reservoirs within the Willamette Basin to meet fish flow targets at the Willamette River at Salem gage (USGS Gage 14191000) since the early 2000s. Analysis of 7-day rolling average streamflow records at USGS Gage 14191000 from January 2000 through December 2013 shows that flow targets on the Willamette River were missed on 142 days, or 3 percent of the time. The days that the flow targets were missed were as follows: 1 day in 2000 (June), 73 days in 2001 (April through August), 4 days in 2002 (June and December), 13 days in 2003 (May and June), 18 days in 2004 (April and May), 20 days in 2007 (May and June), and 13 days in 2013 (May and June). **Exhibit 2-33** compares the 7-day rolling average at the Willamette River at Salem gage (in blue) to target flows (in orange) for the period of January 2007 through December 2013.

Exhibit 2-33. Willamette River 7-day Rolling Average and Flow Targets, 2007-2013.



Although recent gage data indicate that the fish flow targets have generally been met in recent years, the results may be different during future low flow water years. In 2008, the Willamette Project Biological Opinion (BiOp) adopted minimum stream flow targets included in the 2007 USACE Biological Assessment. The BiOp target flows, which are measured on the Willamette River at Salem, are adjusted based on the volume of stored water in mid-May. During years considered “Adequate” or better, when at least 1.20 million acre-feet (MAF) are anticipated to be stored by mid-May, the USACE manages the reservoirs to meet Minimum Flow Objectives. (Minimum Flow Objectives are shown in **Exhibit 2-34**.) During years when storage volumes are predicted to be lower, the USACE will manage the reservoirs to meet lower flow objectives. Flow targets will be based on “Insufficient Year” requirements if 0.90 to 1.19 MAF are anticipated to be stored in the reservoirs by mid-May, and on “Deficit Year” requirements if less than 0.90 MAF are anticipated to be stored in the reservoirs by the same time period. The flow objectives during an “Insufficient Year” are adjusted in proportion to where the projected storage volume falls in the scale between 0.90 and 1.20 MAF. As an example, **Exhibit 2-33** shows “Insufficient Year” flow objectives during a year when total storage in mid-May is 0.95 MAF.

Exhibit 2-34. Flow Objectives for the Willamette River, Measured at Salem (April – October) in “Adequate,” “Insufficient” and “Deficit” Years.

Time Period	Minimum Flow Objectives in at least Adequate Years (cfs)	Example “Insufficient Year” Flow Objectives based on 0.95 MAF (cfs)	“Deficit Year” Flow Objectives (cfs)
April 1 – 15	17,800	15,467	15,000
April 16 – 30	17,800	15,467	15,000
May 1 – 31	15,000	15,000	15,000
June 1 – 15	13,000	11,333	11,000
June 16 – 30	8,700	6,033	5,500
July 1 – 31	6,000	5,167	5,000
August 1 – 15	6,000	5,167	5,000
August 16 – 31	6,500	5,250	5,000
September 1 – 30	7,000	5,333	5,000
October 1 – 31	7,000	5,333	5,000

The impacts of reduced flow objectives during “Insufficient” and “Deficit” years on the ability to meet fish flow targets at the Salem gage are expected to vary throughout the year. During April and May, even the “Deficit Year” flow objectives are equal to fish flow targets. During late June, however, “Deficit Year” flow objectives are 3,000 cfs (35 percent) lower than the fish flow targets. During July and August, “Deficit Year” flow objectives are 630 cfs (11 percent) lower than the fish flow targets. Therefore, during “Deficit Years,” the likelihood of curtailment during at least some portions of the year is high. According to modeling conducted by the USACE, during the 64-year period from 1936 to 1999, 10 years were designated as “deficit years.”

Finally, the Willamette River has unconverted minimum perennial streamflows (MPSFs) with both natural flow and released stored water components. The natural flow component of the unconverted MPSF at Wilsonville is 1,500 cfs, and the released stored water component is up to 4,700 cfs. Since these flows are lower than the target flows for which the USACE is already managing the reservoirs, it appears that the MPSFs will not likely impact the reliability of the

WRWC Permit S-49240. The District and the other members of the WRWC should continue to track the conversion process.

System Description

OAR 690-086-140(8)

The District operates a public drinking water system (Public Water System Identification Number is 4100665). **Exhibit 2-35** is a schematic of the District's existing water distribution system. The District currently purchases treated water from the PWB and the JWC, and therefore, the District does not have its own water treatment plant. As shown in **Exhibits 2-36 through 2-39**, the District facilities include 762.0 miles of pipelines, 13 booster pump stations, 24 reservoirs, and 3 wells. The reservoirs include pre-stressed concrete and welded steel tanks with a combined capacity of 59.35 MG. Currently, the District actively uses only one of its three wells. The Grabhorn Well is used for ASR operations, and can also be used to produce groundwater under its native groundwater right. The Schuepbach and 189th St. wells currently serve only as backup supply sources. Development of infrastructure for the Willamette River water supply is in the planning stage.

Exhibit 2-35. TVWD Water System Schematic.

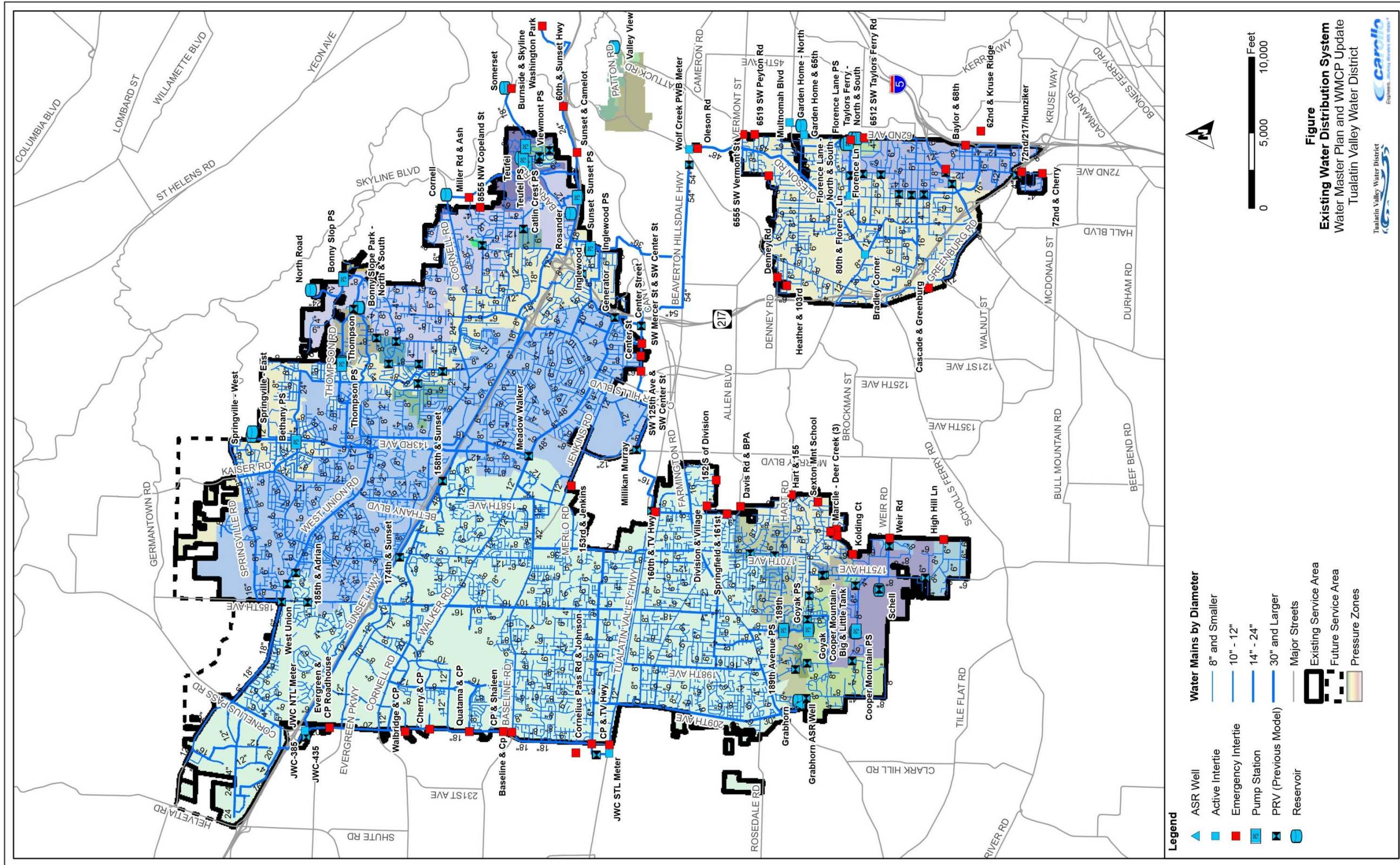
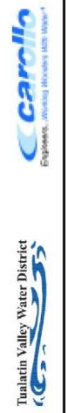


Figure
Existing Water Distribution System
 Water Master Plan and WMCP Update
 Tualatin Valley Water District



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Exhibit 2-36. Summary of System Reservoirs.

Reservoir	Nominal Volume (MG)	Calculated Volume (MG)	Overflow Elv. (ft)	Base Elv. (ft)	Diameter	Type	Year Built	Comments
189th Reservoir	2	1.91	350	321.0	106	Concrete	1958	
Bonny Slope Park No. 1	1.5	1.56	574.2	554.0	115	Concrete	1995	
Bonny Slope Park No. 2	1.5	1.56	574.2	554.0	115	Concrete	1995	
Cooper Mt. 1	2	1.91	801	776.3	106	Steel	1981	
Cooper Mt. 2	0.125	0.11	804.25	775.1	25	Steel	2004	
Cornell	0.75	0.75	820	760.0	46	Steel	1955	Offline
Florence Lane No. 1 (N)	2.1	2.15	424.79	389.3	100	Steel	1984	
Florence Lane No. 2 (S)	1.9	1.86	424.79	394.4	100	Steel	1984	
Garden Home	1.75	1.75	428	389.0	91	Concrete	2014	
Goyak	1	1.00	551.4	526.4	83	Concrete	1974	
Grabhorn	5	5.11	384.75	342.8	144	Concrete	1971	
Hyde Park	5	4.98	437.17	403.2	158	Concrete	1971	Offline, to be replaced with 8 MG Ridgewood View reservoir in 2015
Inglewood	5	4.47	440.70	407.6	152	Concrete	1961	
North Road	3	3.04	820	781.3	110	Concrete	1990	
Rosander	0.5	0.50	573.75	550.0	60	Steel	1998	
Schell	1	1.00	753.5	732.4	83	Concrete	1974	
Somerset	0.175	0.17	1040.5	1000.0	27	Steel		
Springville No. 1	10	9.92	433.5	396.0	213	Concrete	1991	
Springville No. 2	10	10.30	433.5	394.8	214	Concrete	2010	
Sunset	0.5	0.55	576	550.0	60	Concrete	1964	
Taylor's Ferry No. 1	1	0.97	497.5	474.5	85	Concrete		
Taylor's Ferry No. 2	2.3	2.29	497.5	458.5	100	Steel	1975	
Teufel	2	2.07	820	784.0	99	Concrete	2008	
Thompson	5	5.10	437.9	406.9	172	Concrete	1978	
Total Currently in Operation	59.35	59.31						

Exhibit 2-37. Summary of Wells.

Well/Vicinity	Pump (hp)	Capacity (gpm)	Water Right (gpm) ¹	Year Built or Rehab	Purpose
Scheupbach - 180th Ave and Division St	100	1,000	2,070	1999 (Rehab)	Emergency back-up
Grabhorn - Leland Dr and Lillian Ct	300	1,736	2,070	1964	ASR and native groundwater
189th St - 189th Ave and Hart Rd	-	300	2,070	1958	Emergency back-up

¹This rate is pending the completion of the water rights transfer T-11612.

Exhibit 2-38. Summary of Pipeline Sizes.

Pipe Diameter (in)	Length by Service Area (ft)		Total Length (ft)	Total Length (mi)	Percent of Total Pipeline (%)
	Wolf Creek	Metzger			
4 and smaller	251,677	64,132	315,809	60	7.8
6	1,032,524	187,058	1,219,582	231	30.3
8	1,229,942	144,987	1,374,929	260	34.2
10	50,140	7,910	58,050	11	1.4
12	473,141	82,740	555,881	105	13.8
14	4,340	682	5,022	0.95	0.1
16	111,360	22,182	133,542	25	3.3
18	92,767	0	92,767	18	2.3
20	48,897	466	49,363	9	1.2
24	80,151	10,373	90,524	17	2.2
30	33,367	0	33,367	6	0.8
36	2,731	3,902	6,633	1	0.2
42	26,713	0	26,713	5	0.7
48	32,975	11,498	44,473	8	1.1
54	14,918	0	14,918	3	0.4
Unknown	1,845	8	1,853	0.35	0.0
			4,023,426	762.0	100.0

Exhibit 2-39. Summary of Existing Pump Stations.

Name	Suction	Discharge	Pump #	Pump Capacity (gpm)	Power (hp)	Total Station Capacity (gpm)	Firm Capacity (gpm)																																																																																																																																																																					
Viewmont	West Hills - 1045	Closed End Zone 2B	1	250	7.5	1250	250																																																																																																																																																																					
			2	1000	30			Catlin Crest	West Hills - 1045	Closed End Zone 1H	1	256	15	1468	500	2	256	15	3	256	15	4	700	40	Teufel	West Hills - 820	West Hills - 1045	1	883	75	3220	2494	2	873	75	3	910	75	4	917	75	Bonny Slope	West Hills - 820	Closed End System	1	?	1.5	?	N/A	Sunset	West Hills - 575	West Hills - 820	1	1240	100	7954	5700	2	1208	100	3	2255	200	4	2062	200	5	1800	200	6	1750	200	Bannister	West Hills - 575	Closed End System	1	150	7.5	1900	N/A	2	1750	75	Bethany	West Hills - 435	West Hills - 575	1	1302	75	7614	4716	2	2552	150	3	2898	150	4	2788	75	Inglewood	West Hills - 435	West Hills - 575	1	1953	100	12523	10804	2	2268	100	3	4024	150	4	3319	150	5	3455	150	6	3327	150	7	1635	25	Cooper Mountain	Cooper Mt - 820	Closed End Cooper Mt - 920	1	829	40	3124	2458	2	899	40	3	915	40	4	891	40	Goyak	Cooper Mt - 550	Cooper Mt - 800	1	1331	150	6302	4169	2	2017	250	3	2133	250	4	821	75	189th Avenue	Cooper Mt - 385	Cooper Mt - 550	1	1150	75	3680	2477	2	1178	75	3
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Teufel	West Hills - 820	West Hills - 1045	1	883	75	3220	2494																																																																																																																																																																					
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Exhibit 2-39 Continued. Summary of Existing Pump Stations.

Name	Suction	Discharge	Pump #	Pump Capacity (gpm)	Power (hp)	Total Station Capacity (gpm)	Firm Capacity (gpm)
Florence Lane	Metzger - 426	Metzger - 498	1	2100	40	6152	4052
			2	2016	40		
			3	2036	40		
Thompson	West Hills-435	West Hills-820	1	902	125	3212	2047
			2	1145	150		
			3	1165	150		

3. Water Conservation

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 District.

Current Conservation Measures **OAR 690-086-0150(1) and (3)**

Progress Report

This is the District’s third WMCP. OWRD approved the District’s first WMCP in May 2002 and its second WMCP in May 2009. In addition, the JWC’s WMCP was approved by OWRD in 2010 and includes information about the conservation programs of each of the JWC member agencies, including the District. Since approval of its 2009 WMCP, the District has diligently pursued implementation of its conservation benchmarks, as well as other conservation measures, as shown in **Exhibit 3-1**.

Background

The District has a comprehensive water conservation program with creative and effective measures. Highlights include the following:

- The District has AMR installed in over 12,687 residential (12,557 single family and 130 multi-family) meters and nearly all 3-inch to 10-inch commercial meters. Meters 3-inches or greater have the new generation of Badger “ORION” AMR meters that have a data logging capability that enhances the District’s ability to confirm leaks.
- The District has a base charge based on meter size and a two-tiered inclining block volume charge.
- The District has the Business, Industry, & Government (B.I.G.) water conservation program to reduce water use by its commercial, production, government, irrigation, and multi-family customers. The B.I.G. program includes on-site technical assistance and rebates for high efficiency toilets, weather-based irrigation control and multi-stream rotating sprinkler nozzles.
- The District offers up to \$5,000 for water efficiency projects organized by B.I.G. customers through its Customer Organized Proposal Rebate program (COPR). Under this program, a customer provides the District with a proposal that describes the proposed water conservation project and the estimated water savings, which the District will evaluate for merit and incentive funding.
- The District has the Residential water conservation program to reduce water use by its single-family residential customers. The residential program includes technical assistance and rebates for high efficiency toilets, weather-based irrigation control and multi-stream rotating sprinkler nozzles.

- The District offers a “Water Hero” award to recognize B.I.G. customers who have made the greatest strides or shown the most leadership in water conservation.
- The District has an annual Conservation Calendar contest for youths, which has received national recognition.
- The District offers a “Welcome Kit” to all new customers to encourage water conservation, and a “Leak Kit” upon request from customers to reduce water loss from leakage.
- The District supports education programs for landscape contractors in the areas of efficient irrigation practices and evapotranspiration (ET) technology.
- The District maintains a Water Efficient Demonstration Garden at the headquarters facility. The demonstration garden is used as a hands-on outdoor classroom where our customers learn about water efficient irrigation and landscaping techniques.
- The District has several software tools to track the number of customers participating in its rebate programs since their inception and to estimate the potential conservation savings.

Use and Reporting Program

OAR 690-086-0150(2)

The District has a water use measurement and reporting program that complies with the measurement standards in OAR Chapter 690, Division 85. The District’s water use records can be found on the OWRD webpage: http://apps.wrd.state.or.us/apps/wr/wateruse_report/.

Water enters the District’s supply system at four primary locations: two from the JWC (Cornelius Pass and 75th Ave) and two from the City of Portland (primary Wolf Creek supply meter at Beaverton-Hillsdale Hwy and the primary Metzger service area meter at Florence Lane). The District has magnetic meters at each of these four locations and these meters are on the District’s SCADA system. The SCADA system reports water demand in one minute intervals and these data are summarized for the District’s annual water use reporting to OWRD.

Exhibit 3-1. Water Conservation Progress Report.

Conservation Measures	Future Actions (Benchmarks) in 2009 approved WMCP	Status 2014
Required Existing or Expanded Conservation Measures		
Annual water audit	If the level of unaccounted for water exceeds 10 percent, a more detailed record-keeping program and analysis would be appropriate and will be considered.	The District believes that unaccounted for water has remained below 10 percent annually based on water audits in 2007 and 2008, but this cannot be confirmed due to faulty meter readings. The main Wolf Creek supply meter on the WCSL and the Florence Lane meter are owned by the PWB. Consequently, the District is only able to investigate meter errors and then recommend to PWB that PWB investigates the meter and completes any necessary maintenance. The District has worked with PWB to identify possible issues with the Wolf Creek supply meter and PWB completed flow corrections in the winter of 2013. The District has contacted PWB to recommend investigation of the Metzger meter. In 2010, the District realized that its water audit did not address ASR and created a new process to account for ASR in 2011. As of 2014, water loss calculations remain negative. The District has worked with adjoining water agencies to verify intertie valves are accounted for and in the "OFF" (or correct) position. In an effort to enhance the water auditing process, the District also has recently used the AWWA System Water Audit Software and is evaluating the M36 Water Audit procedures for future water system audits.
System-wide Metering	AMRs will be installed for all commercial accounts within 3 years. The benefits, costs and feasibility of a broader scale AMR program as it relates to conservation will be studied.	Based on an assessment of the benefits, costs and feasibility of a broader scale AMR program, the District has expanded its AMR program. The District has installed AMR meters on approximately 96 percent of its 3-inch to 10-inch commercial accounts, which represents over 524 meters. This includes commercial (118), firelines (259), irrigation (3), multi-family residential (130) and production (14) meters. The District has been replacing non-residential class meters 3-inches and larger with Badger ORION water meters, which have a data logging capability to aid leak detection troubleshooting and conservation efforts. The District has installed AMR meters on 12,557 single-family residential accounts. As of May 2014, the District has installed approximately 13,081 AMR meters throughout the system.
Meter testing and maintenance	The District will continue its current meter testing and maintenance program.	The District has continued its current meter testing and maintenance program. The District's goal is to test large meters (3 inches to 10 inches) every two years or less. As of 2014, the District has replaced nearly all large meters with new Badger ORION models; only 12 meters remain to be replaced. The District will test small meters (2 inches or less) as requested by customers.
Rate structure	The District will continue to have a bi-monthly base rate, plus a two-tiered inclining block volume charge.	The District has continued its two-tiered inclining block rate structure. The District conducted a Rate Study to evaluate rate options in 2012, which recommended that the District increase base charges to better align with the District's fixed costs.
Leak detection program	The District will continue its leak detection program.	The District has continued its leak detection program. The District owns a leak correlator that it uses to investigate leaks on an individual basis, as needed, and the District actively repairs the leaks identified. The District continues to promote customer-side leak awareness through the Water Words newsletter, leak kits, Fix a Leak Week, its Web site, and field customer service teams actively investigating and contacting customers with unusual readings on their meter or high usage. Badger ORION data logging meters have been very helpful in diagnosing leaks on non-residential meters 3-inches and larger.
Public education	Work within the district schools to develop new and creative programs that foster water stewardship.	The District continues to conduct youth education programs in its K-5 schools and to develop new programs to foster water stewardship. The District has a very active and strong relationship with teachers and principals. The District has had contracts with professional actors for three school presentations about water conservation: <i>Where's the Water, Watson?</i> , <i>What Do You Know About H2O</i> , and <i>Where's Rosie</i> (Discontinued in June 2014). District staff has provided six presentations: <i>Source to the Home</i> , <i>Peat Pot Planting</i> , <i>Incredible Journey</i> , <i>Incredible Edible Aquifer</i> (Discontinued May 2014), <i>What's the Matter In The Water Industry?</i> , and <i>Tasting, Tasting, 1, 2, 3</i> .
	Using the EPA WaterSense Program materials and ideas are one more way the District makes water conservation concepts and messaging simple for customers.	The District updated its Web site in 2008 to create a more usable interface and to provide new information. The District's Web site provides links to the EPA WaterSense program, as well as other water conservation resources, such as the Alliance for Water Efficiency, the Regional Water Providers Consortium, and Maximum Performance Toilet test reports. The District remains an active partner with EPA in promoting EPA's WaterSense Program.
	The District maintains a water efficient demonstration garden on the District's office property to showcase water efficiency for its customers and local professionals.	The District continues to maintain and improve its Water Efficient Demonstration Garden to educate its customers about water efficiency in the landscape. The garden is used for hands-on workshops where our customers "learn by doing" about water efficient irrigation and landscaping practices. The garden is available for guided or self-guided tours and opportunities to learn about The Seven Steps to Water Efficient Landscaping.

Conservation Measures	Future Actions (Benchmarks) in 2009 approved WMCP	Status 2014
Additional Conservation Measures		
Leak detection and pipeline repair and replacement	The District will continue its current replacement program	The District performs periodic leak detection surveys using leak noise correlation equipment. If a leak is detected in the distribution system, the District repairs the leak immediately, schedules a repair, or records and monitors the leak in future leak detection surveys. The District budgeted \$1.6 million from 2009 to 2011 and \$2.5 million from 2011 to 2013 for replacement of old water mains. The District's capital improvement plan lays out the water line replacement projects planned by the District to decrease water lost through leaks.
Technical and financial assistance	The District will continue to promote technical and financial programs as feasible, including the B.I.G. program, kits to help homeowners detect leaks and to reduce water use, and home water assessments.	The District has continued its technical and financial program. The District has continued the B.I.G. program. The District offers a "Welcome Kit" to all new customers and a "Leak Kit" upon request from customers to help customers reduce water use. The "Welcome Kit" includes two bathroom aerators, one kitchen aerator, two dye tablet packets, one shower timer, and brochures. The "Leak Kit" helps customers identify leaks and other potential reasons for high water bills, such as inefficient fixtures. These types of materials are also provided to customers at community events. In addition, shower timers and toilet dye tablets are available in the District's front lobby. The District evaluated its home water assessment pilot program by looking at metered consumption charges in accounts that participated in the program. The program did result in modest water savings and was a great customer service tool to help customers with high bills save water. Consequently, the District decided to continue funding assessments through 2014 (three years) after the pilot phase ended in 2011. On-site assessments remain a popular and effective water efficiency improvement measure.
Supplier financed retrofit/replacement of inefficient fixtures	Develop and investigate measures to evaluate and report on rebate and outreach performance from actual customer meter data.	The District has used ConEast benefit/cost modeling and rebate goal setting to evaluate rebate programs. The District conducted a residential metered consumption analysis for each of its rebate programs to gauge effectiveness in 2009 and used this data to project new goals. As a member of the Alliance for Water Efficiency (AWE), the District has access to AWE's conservation tracking software, as well, which will replace and/or improve the District's benefit/cost modeling. The District also conducted a customer metered analysis of rebate consumption savings through the BIG program. Average BIG program participant water saving was approximately 20 percent from 2006-2010.
	The District will also investigate opportunities to promote EPA Water Sense labeled products.	The District has promoted EPA WaterSense labeled products through its rebate programs, the WaterSense logo on its business cards, its Web site, and presentations the District delivers. The District also modified its toilet rebate program to only provide rebates for EPA WaterSense labeled toilets.
Water rate and billing structure	The District will continue to have a bi-monthly base rate, plus a two-tiered inclining block volume charge. No billing structure benchmark was specified.	In 2012, the District began the process to improve the quality and detail of information provided for customers on utility billing statements. Billing statements now have a small space available for brief conservation messages. Greater detail and itemization of bill costs have been incorporated into District invoices.
Reuse, recycling, and non-potable water opportunities	Develop opportunities to work with B.I.G. customers that will encourage water conservation and water efficiency	The District's B.I.G. program encourages commercial and production customers to recycle and reuse water, and to reduce their water consumption. District staff has ongoing relationships with its 20 largest water consumption customers. The Customer Organized Proposal Rebate program (COPR) provides rebates for water reuse and recycling projects, such as the elimination of single-pass cooling and improved cooling tower water treatment. The COPR is designed to be flexible and open enough to encourage innovative water reuse and recycling proposals from customers.
Other conservation measures	Pilot Programs. Continue to explore and implement programs with the focus on irrigation technology and ET	The District actively looks for opportunities to test new conservation methods and technologies. Various pilot programs have been explored and implemented, and these programs have focused largely on irrigation technology and evapotranspiration (ET) based irrigation controllers.
	Professional Groups. Continue active participation and leadership into the promotion of water conservation in the region	Staff belongs to the AWWA PNWS Conservation Committee, RWPC, Tualatin River Watershed Council and is a partner with the EPA WaterSense program and the Alliance for Water Efficiency. District staff is active in the development of regional conferences and training programs to ensure technical sessions in water conservation are represented.
	Customer Service. Continue current efforts to market the use of evapotranspiration to be used in landscape irrigation practices	The District hosts various workshops, training sessions, and presentations that cover various topics including water efficient irrigation, evapotranspiration, soil composition, and seven steps to a water efficient landscape. Staff efforts reach all customer classes, as well as landscape professionals and other trade ally groups. The District partners with private businesses collaborating to create long term and sustainable changes in the landscape and irrigation products market.

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 District plans to initiate, continue, or expand the following conservation measures that are required of all municipal water suppliers.

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, either metered or estimated. The water audit also includes analysis of the water supplier's own water use.

The District performs an annual water audit that incorporates the following data: total demand (volume of water purchased that enters the distribution system), total volume of water consumed by customers through metered service connections, wheeled water (i.e. "PWB overlap;" which is water moved through the District's water distribution system for PWB customers), and estimated non-revenue authorized uses (i.e. unmetered water uses, such as hydrant use or pipeline flushing).

Water audits in 2007 and 2008 revealed that water loss for the entire service area was 3 percent and 4.5 percent, respectively. However, from 2009 through 2013 water loss ranged from -2.0 percent to -15.1 percent, which the District attributes to malfunctioning of the main Wolf Creek supply meter on the WCSL (starting in 2009) and to the Florence Lane meter, which is the primary meter for the Metzger service area (starting in September 2012). Based on water audits prior to the meter errors, the District estimates that its unaccounted for water was less than 10 percent over the past five years.

As described in Section 2, the Wolf Creek supply meter and the Florence Lane meter are owned by the PWB. Consequently, the District is only able to investigate meter errors and then recommend to PWB that PWB investigates the meter and completes any necessary maintenance. The District has worked with PWB to identify possible issues with the Wolf Creek supply meter. PWB has made efforts to recalibrate the meter with limited success, and the District assisted with these efforts. PWB plans to install a parallel meter that should provide more accurate flow data. The District is currently investigating the Metzger meter.

In addition, the District has worked with adjoining water agencies to verify intertie valves are accounted for and in the "Off" or correct position. In an effort to enhance the water

auditing process, the District also has recently used the AWWA System Water Audit Software and is evaluating the M36 Water Audit procedures for future water system audits.

Five-Year Benchmarks: The District will continue to perform its rigorous annual water audit. The District will continue to communicate with the PWB in an effort to address meter malfunctions. Once meter repairs are completed and the District has generated enough demand data, the District will carry out another Water Loss Audit to re-evaluate water loss results, and based on those results, the District will decide its next steps related to water auditing.

2. System-wide Metering.

The District's system is fully metered, including its non-emergency sources of water: all permanent connections to the City of Portland water system, the JWC, and the District's back-up supply from groundwater wells. The District installs AMR meters in all new customer meter installations, as well. When new meters are installed, they are basic Badger meters for approximately 6 month, the period during which activity (i.e. construction) around the meter has a greater potential to damage the meter. After that high activity period, AMR is installed in the new meters. To date, the District has installed over 12,687 residential (12,557 single family and 130 multi-family) AMR meters.

In 2010, the District began replacing non-residential class meters with Badger ORION AMR water meters, which have a data logging capability to aid in leak detection troubleshooting and conservation efforts. To date, nearly all of the District's 3-inch to 10-inch commercial accounts have AMR meters (represents approximately 270 commercial AMR meters), with the exception of firelines and irrigation meters. Fireline meters are owned by the customers and the District can only add AMR if the meter happens to be a Badger meter. The District plans to change out the current irrigation meters with AMR meters as funding and staff time allow.

To date, the District has installed approximately 13,081 AMR meters throughout its system.

Five-Year Benchmarks: The District will continue to install AMR in all new meter installations. In the next five years, the District will begin to replace current irrigation meters with AMR meters as funding and staff time allow.

3. Meter Testing and Maintenance.

The District tests and repairs (or replace as necessary) all meters greater than 2 inches in diameter every two years or less. As of 2014, the District has replaced nearly all large meters with new Badger ORION models. Only 12 meters remain to be replaced. The District also tests meters 2 inches in diameter or less in response to customer inquiries or deficiencies noted by staff.

Meters with AMR can be read throughout each day, enabling the District to spot meter malfunctions much sooner than with a monthly reading system or based on customer requests. When meters can be repaired, the District will install AMR in the meter if it does not have AMR. When meters cannot be repaired, the District will replace the meter with a new AMR meter.

Five-Year Benchmarks: In the next five years, the 12 remaining large (non-data logging) meters will be replaced as they reach the end of their functionality or as parts become

difficult to acquire. The meter testing program will continue to test large meters every two years or less and small meters (2 inches or less) upon request. The District will continue to coordinate with PWB to fix the Wolf Creek supply meter and Florence Lane meter.

4. Water Rate Structure.

The District has a base charge based on meter size and a two-tiered inclining block volume charge. The District developed this water rate structure through a comprehensive cost-of-service analysis to equitably assign costs to customers based on their demands and to create an incentive for customers to conserve water. The District periodically reviews the rate structure. The most recent review in 2012 found that fixed costs were not aligned with base charges and recommended raising base charges.

Exhibit 3-2 presents the District’s base charge, which applies to all customer categories. The District’s block volume charges apply to all of its customer categories, but the point at which Block 2 charges apply varies. For residential customers, Block 1 charges are \$2.74 per hundred cubic feet (CCF) up to 28 CCF and Block 2 charges are \$3.91 per each CCF above 28 CCF. For multi-family, commercial (non-production), production (production processes), and irrigation customers, Block 1 charges are \$2.74 per CCF up to 140 percent of the customer’s yearly average water usage (calculated by multiplying the customer’s 12 month moving average by 1.4) and Block 2 charges of \$3.91 per CCF apply to water use that exceeds the Block 1 threshold. Firelines do not have an inclining block volume charge and are charged \$2.74 per CCF.

Exhibit 3-2. Monthly Base Charge for All Customer Categories, as of November 1, 2013.

Meter Size	Base Charge
5/8"	\$8.43
3/4"	\$9.19
1"	\$11.14
1 ½"	\$14.53
2"	\$21.27
3"	\$61.16
4"	\$80.63
6"	\$127.35
8"	\$181.86
10"	\$295.49

Five-Year Benchmarks: The District will continue to bill customers based on meter size and the quantity of water metered at the service connection. In the next five years, the District will conduct another rate review and will consider adjusting charges based on recommendations in that rate review.

5. Leak Detection and Repair.

Based on water audits prior to the recent metering malfunctions, which are described above, the District estimates that its unaccounted for water was less than 10 percent over the past five years. Despite the District's low estimated unaccounted for water, the District dedicates substantial resources to maintaining its comprehensive leak detection and repair program, which consists of leak detection surveys, AMR record review, and customer education.

The District performs periodic leak detection surveys using leak noise correlation equipment. If a leak is detected in the distribution system, the District repairs the leak immediately, schedules a repair, or records and monitors the leak in future leak detection surveys. The action taken depends on the severity of the leak. Since 2010, the District has spent over \$14.4 million on replacing or upgrading pipelines, which includes service and transmission lines. The District's capital improvement plan lays out the water line replacement projects planned by the District to decrease water lost through leaks.

The District reviews data from AMR meter residential consumption records on a bi-monthly basis and AMR meter commercial consumption records on a monthly basis for water consumption changes that may indicate a leak at a customer's premises. Residential AMR meters are read digitally using handheld devices. Meters 3-inches or greater are the new generation of Badger "ORION" AMR meters that are read digitally and also have a data logging capability that allows the District to capture flow readings at one hour intervals. A reading that is greater than two times the reading for the same period during the previous year, or is greater than two times the last reading, results in the customer's inclusion on a "High Read" exception list of meters with suspected leaks that need to be investigated. District staff may be sent to the service address to verify a suspected leak and the District contacts the customer if a leak is found. Badger ORION data logging meters have been very helpful in diagnosing leak conditions on non-residential meters 3-inches and larger. District staff is able to analyze time and flow values that provide clues about where to look to confirm the presence of a leak, such as in an irrigation system known to run at 5:00AM and at a specific theoretical flow rate for each zone. This method is a reliable approach for detecting leaks in most cases, but for sites like large multi-family complexes or production facilities, this method is used to indicate that further investigation is warranted.

In addition, the District uses its Web site, newsletters, and events such as Fix a Leak Week to educate customers about leak detection and repair. Fix a Leak Week is an annual event in March, promoted through the US Environmental Protection Agency's (EPA) WaterSense Program, during which the District promotes leak detection and repair among its customers using many materials provided by the EPA. The District also promotes leak detection and repair through a similar month-long effort promoted by the Regional Water Provider Consortium (RWPC).

Five-Year Benchmarks: The District will continue its leak detection and repair program.

6. Public Education.

The District promotes water conservation through print and electronic media, community outreach efforts, school programs, and partnerships, and the District has been recognized for its public education efforts with numerous awards.

Print and Electronic Media

The District provides conservation information in its front lobby, bi-monthly billing statements, on its Web site, and in newsletters. The front lobby contains a kiosk with all of the District's water conservation brochures, including information on rebates, water conservation themed calendars, and *Water-Efficient Plants for the Willamette Valley* booklets that describe the native and non-invasive water-efficient plants that can be used in landscaping. The bi-monthly billing statements periodically contain seasonal conservation messages. The District's Web site provides information about the importance of water conservation for the District and its customers, leak detection and repair, indoor and outdoor conservation, technical assistance available for commercial customers, rebates for water efficient devices, and water-efficient landscape design. The Web site also provides links to water conservation resources, such as the Environmental Protection Agency's (EPA) WaterSense program, the RWPC, the Alliance for Water Efficiency, and Maximum Performance Toilet test reports, as well as sites with information about water barrels, weather-based irrigation, and more. In addition, the Web site provides contact information for the District's Conservation Department, enabling customers to correspond directly with District conservation staff. The District sends its residential customers the bi-monthly Water Words newsletter, produced jointly by the District and Clean Water Services, which includes conservation messages. The District sends its non-residential customers the quarterly B.I.G. Newsletter, which focuses on issues that affect these customers, discusses successful conservation efforts, and highlights "Water Heros" (discussed below). Both publications are available on the District's Web site. In addition, the District created a DVD that is available for other businesses that highlight many of the District's sustainability initiatives and actions.

Community Outreach

The District has conservation staff that speaks regularly to public groups interested in learning about water efficiency in residential, commercial and multi-family settings. The District also has a Speaker's Bureau that presents District policies and leads discussions with customer groups, businesses, and organizations. Topics discussed include water efficiency, water conservation, and sustainability.

The District has a water efficient demonstration garden on the District's office property. The garden provides a hands-on demonstration tool to teach water efficient principles and practices in landscape design, installation, and maintenance. The garden has signage, native and naturalized non-invasive plants, weather-based irrigation technology, high efficiency multi-stream nozzles, and drip systems. In addition, the garden has a plaza that serves as an outdoor classroom for District staff to hold water conservation events for youths, landscape professionals, and residential and commercial customers.

The District recognizes the value of the continuous education for landscape contractors about efficient irrigation practices and weather-based irrigation controller technology.

Therefore, the District collaborates with the Oregon Landscape Contractor's Board (LCB) and other regional water providers to provide low or no-cost educational workshops for landscape contractors that satisfy the LCB's continuing education requirement.

The District offers a "Water Hero" award to recognize B.I.G. customers who have made the greatest strides or shown the most leadership in the area of water conservation. The award consists of a certificate and recognition of the award winner in the B.I.G. newsletter and at a District board meeting.

School Programs

The District has a Youth Education Program that sponsors water conservation presentations and activities at elementary schools. Presentation themes include the natural water cycle, the path of drinking water from the source to the customer's home, and planting activities.

The District contracts with professional actors for two school presentations about water conservation: *Where's the Water, Watson?* and *What Do You Know About H₂O*. District staff also provides six presentations, which are shown in **Exhibit 3-1**. These presentations reach approximately 5,700 students annually. The District also has booths at various science fairs and is an active partner in the Children's Clean Water Festival.

The District has an annual Conservation Calendar contest for youths, which has received national recognition. The Conservation Calendar has a water conservation theme and provides tips on how to use water wisely.

Partnerships

The District is active in conservation planning and implementation through regional and statewide partnerships. Since 2006, the District has been very active (including serving as chair multiple times) in the American Water Works Association, Pacific Northwest Section (AWWA PNWS), Water Conservation Committee. A major effort of the committee has been to work with Lane Community College to develop a 2-day Water Conservation Technician Workshop. The objective of the workshop is to educate new water conservation staff and professionals interested in water conservation in the municipal water supply industry. Lane Community College purchased the license to put on the workshop and has also, with the help of the Water Conservation Committee, developed a 2-year Associate of Science Program to promote development of the skills needed to work in the municipal water supply industry. The District also has ongoing partnerships with EPA to promote EPA's WaterSense Program to District customers and with the Regional Water Providers Consortium, such as through the programs to educate children and the Water Words publication.

Awards

The District has received numerous communication awards for its public education efforts, including:

- City-County Communications and Marketing Association (3CMA) Savvy Awards
- PNWS-AWWA Excellence in Communication Awards
- Regional Water Providers Consortium (formerly the Columbia-Willamette Water Conservation Coalition) Water Conservation Awards
- PNWS-AWWA 1st Place in Public Education Competition

Five-Year Benchmarks: The District will continue its public education program. In the next five years, the District will update its Web site.

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.

Based on water audits prior to the recent metering malfunctions, as described above, the District estimates that its unaccounted for water was less than 10 percent over the past five years. Despite the District's low estimated unaccounted for water, the District dedicates resources to maintaining a comprehensive leak detection and repair program. The District performs periodic leak detection surveys using leak noise correlation equipment. These surveys typically consist of spot checks around the District and checks where problems are suspected. However, an extensive survey of the Metzger area occurred in 2011. If a leak is detected in the distribution system, the District repairs the leak as soon as possible when the leak is creating property damage, has caused loss of service to customers, or is a safety hazard. If a leak does not meet one of those criteria, it will be fixed the next business day or as the schedule of the repair crew allows. The District reviews data from residential AMR meters on a bi-monthly basis, and commercial AMR meters on a monthly basis for water consumption changes that may indicate a leak at a customer's premises. In addition, the District uses its Web site, newsletters, and Fix a Leak Week to educate customers about leak detection and repair. More details are provided under the Leak Detection and Repair above.

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.

1. Leak Repair or Line Replacement Program

Under this rule requirement the District 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.

Based on water audits prior to the metering malfunctions that began in 2009, the District estimates that its unaccounted for water was less than 10 percent during the past five years. Nevertheless, the District has a comprehensive leak detection and repair program that emphasizes leak detection surveys, AMR record review, and customer education, as previously described.

Five-Year Benchmarks: The District will continue its leak detection and repair program.

2. Technical and Financial Assistance Programs

The District offers a “Welcome Kit” to all new customers and a “Leak Kit” is available upon request to help customers reduce water use. The “Welcome Kit” includes two bathroom aerators, one kitchen aerator, two dye tablet packets, one shower timer, and brochures. The “Leak Kit” helps customers identify leaks and other potential reasons for high water bills, such as inefficient fixtures. These types of materials are also provided to customers at community events. In addition, showerheads, aerators, shower timers, and toilet dye tablets are available in the District’s front lobby, as well.

The District has the Business, Industry, & Government (B.I.G.) water conservation program to reduce water use by its commercial, production, government, irrigation, and multi-family customers. The B.I.G. program includes the following elements:

- Technical assistance and water efficiency incentives for facility and property managers that service lavatories, landscape irrigation systems, production kitchens and cooling towers.
- District conservation staff provides recommendations for improving both outdoor and indoor water conservation on its Web site, and upon request from customers, over the phone or in person at the District office. District conservation staff emphasizes how conserving water saves money.
- The District offers rebates for upgrading to water efficient fixtures, equipment, and processes, which is described under Supplier Financed Retrofit or Replacement of Inefficient Fixtures. Marketing of the rebate program to new participants currently is a primary task of the Conservation Technician.
- Production kitchens that use older inefficient pre-rinse spray valves are provided new efficient models free of charge when they participate in the District’s free commercial water use assessment program.
- Customers may request financial assistance from the District for innovative capital improvement projects to improve water efficiency by applying for the Customer Organized Proposal rebate.

The District has partnered with the Energy Trust of Oregon to add a home (indoor) water assessment along with the Energy Trust of Oregon’s current home energy assessment. The District provides the home water assessment to its residential customers at no charge. The

District evaluated its home water assessment pilot program by looking at metered consumption charges in accounts that participated in the program. Results showed that the program did produce modest water savings and provide a great customer service tool to help customer with high bills save water. Consequently, after the pilot phase ended in 2011, the District decided to continue funding assessments for an additional three years (through 2014). However, the District will likely not continue the home water assessment partnership beyond 2014 due to low customer participation.

The District also offers indoor water use assessments to its B.I.G. customers, and if an analysis of water records suggests that outdoor water use may be a source of inefficiency, the District offers an irrigation assessment at no charge. From 2010-2011, the District provided 317 landscape water assessments and 22 indoor water assessments. The District Conservation Technician actively creates and maintains relationships with B.I.G. customers to conduct indoor and outdoor water assessments.

The District also has a “leak adjustment” program that allows adjustment of the portion of a customer’s bill associated with a leak if the customer repairs the leak within 30 days of the date the leak was discovered or reasonably should have been discovered. This program is designed to encourage customers to identify and repair leaks in a timely manner.

Each summer, the District asks its customers to voluntarily limit water application to 1-inch of water per week for turf areas and less for areas with trees and shrubs. To encourage participation, the District provides a link (<http://www.conserveh2o.org/program-your-sprinkler-system>) on its Web site to the RWPC Web site that describes how to program an irrigation controller to limit water application to 1-inch of water per week. The District provides free watering gauge kits to interested customers, upon request or at public outreach events, to help them determine the application rate of their irrigation system and then to set an effective 1-inch base schedule.

As previously described, the District recognizes the value of the continuous education of landscape contractors about efficient irrigation practices and ET technology. The District, therefore, provides workshops for landscape contractors on these topics.

Five-Year Benchmarks: The District Conservation staff will continue to provide indoor and outdoor water use assessment upon request. The District will continue the other elements of its technical and financial assistance program. The District will likely discontinue contracted home water assessments through the Energy Trust of Oregon at the end of 2014.

3. Supplier Financed Retrofit or Replacement of Inefficient Fixtures

The District has a fixture giveaway program, which includes low-flow showerheads, low-flow faucet aerators, and toilet tank water displacement bags. The District makes these fixtures available in its office front lobby, in “Welcome Kits,” and at outreach events. The District recently evaluated its fixture giveaway program and determined that customers value the program, so the District will continue the program.

The District also offers rebates for upgrading to water efficient fixtures, equipment, and processes:

- up to \$75 per fixture to replace inefficient flush valves and inefficient toilets and urinals with EPA WaterSense labeled toilets and urinals,
- up to \$200 for residential customers (i.e. house, condominium, duplex/multiplex, or manufactured home with a single or master meter) to install or upgrade a weather-based (evapotranspiration) irrigation controller. up to \$400 per controller (up to a \$2,500 maximum rebate) for non-residential (business, industry, government, and multi-family) customers to install weather-based irrigation control (based on the number of zones per controller; \$200 for 1-6 zones, \$250 for 7-12 zones, \$300 for 13-18 zones, \$350 for 19-24 zones, and \$400 for 25+ zones),
- up to \$96 for customers to replace old irrigation sprinkler nozzles with multi-stream rotating nozzles (up to \$3 per nozzle, limit of 32 nozzles), and
- up to \$5,000 for B.I.G. customer organized water efficiency projects (Customer Organized Proposal Rebate program (COPR)). For COPR rebates, the customer provides the District with a proposal that describes the type of project and the estimated water savings, which the District will evaluate for merit and rebate incentive level. The District has discontinued its cooling tower rebates due to lack of demand. Customers interested in funding for in this type of conservation project can seek a rebate for customer organized water efficiency projects.

Exhibit 3-3 shows the number of rebates distributed by program to date.

Two customers exemplify successful water conservation efforts resulting from the District's rebate programs: Catlin Gabel School and West Hills Unitarian Universalist Fellowship (WHUUF). After participating in the toilet and flush valve rebate program, the Catlin Gabel School has used an average of 44 percent less water over the past six years compared to its 2002-2004 average. In 2010, the school used just 1.5 MG compared to 7.3 MG in 2000, which at current rates equates to a savings of more than \$19,000. As a result of the significant water savings, the District awarded the school with the first Water Hero Award. WHUUF's participation in the District's toilet rebate program and fixture giveaway program resulted in a 70 percent reduction in water use in the year since replacing fixtures, which amounted to a savings of more than \$700 in water and sewer expenses for one year. WHUUF received \$690 towards the purchase of five 1.28 gpf High Efficiency Toilets and two 1.6 gpf toilets, as well as twelve 0.5 gpm handwashing faucet aerators and two 1.5 gpm kitchen aerators free of charge.

The District has used creative methods to encourage participation in their rebate programs. An example of this creativity is the District's Toilet Roundup to promote its toilet rebate program. At this event, customers bring their old toilet to the District on a weekend day and District staff will recycle the old toilet. Toilet rebate program participation has increased as a result of District making toilet replacement more convenient. To date, the District has held 10 Toilet Roundups, the last being in 2011, and each event has produced an estimated savings of over 1 MG of water per year.

Exhibit 3-3. District Rebate Program Participation Summary.

Rebate Program (Inception Date)	Number of Rebates (#)							Total
	Inception- June 2008	FY 2008- 2009	FY 2009- 2010	FY 2010- 2011	FY 2011- 2012	FY 2012- 2013	7/1/13- 4/30/14	
Residential								
Washing Machine (May 2002)	6910	1284	1532	1244	930	837	2	12,739
Landscape (March 2004)	3663	596	238	427	D/C	D/C	D/C	4,924
Toilet (November 2005)	755	751	1013	1445	1557	1988	1494	9,003
Dishwasher (November 2005)	781	200	227	208	D/C	D/C	D/C	1,416
Weather-Based Irrigation (June 2006)	33	44	37	52	33	17	13	229
Multi-Stream Rotating Nozzles (July 2011)	N/A	N/A	N/A	N/A	202	140	148	490
B.I.G. (Commercial, Production, Irrigation, Government, and Multi-family) (January 2006)								
Toilet/Flush-Valve Rebates	423	6	133	151	33	103	134	983
Weather-Based Irrigation Rebates	9	20	19	6	5	8	6	73
Multi-Stream Rotating Nozzles (July 2011)	N/A	N/A	N/A	N/A	173	656	0	829
Landscape Irrigation Assessments	126	345	193	175	196	249	5	1,289
Indoor Commercial Assessments	36	12	16	17	11	6	1	99
Cooling Tower Rebate	0	0	0	1	D/C	D/C	D/C	1
Customer Organized-Proposal	0	1	0	0	2	1	0	4

Note: N/A = Not applicable; D/C = Discontinued.

Five-Year Benchmarks: The District will continue to fund all of its current rebate programs. As the WaterSense program develops and more products are added to the labeling program, the District will incorporate the new listings into the criteria for the District's rebate programs.

4. Rate Structure and Billing Practices that Encourage Conservation

As previously described, the District's rate structure consists of a base charge based on meter size and a two-tiered inclining block volume charge. Customers receive their bill shortly after their meter is read. This billing schedule balances the higher administrative cost with the benefit of providing a connection for the customer between the volume of water used and the cost of water that results from a more frequent reading cycle.

In 2012, the District began a process to improve the quality and detail of information provided for customers on utility billing statements. Billing statements now periodically

include brief conservation messages and show water use over the previous 18 months. Billing statements now also provide a breakdown of Block 1 and Block 2 usage and rates.

Five-Year Benchmarks: The District will continue its rate structure and its bi-monthly billing schedule, both of which encourage water conservation. The District will continue to provide conservation messages and to show recent water use in billing statements.

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

The District is solely a water provider. Wastewater generated by the District's customers is conveyed by the Cities of Tigard, Beaverton, and Hillsboro, and Clean Water Services (CWS) to regional treatment facilities operated by CWS of Washington County. CWS is an industry leader in developing new and innovative methods for reuse of water conveyed to the treatment facilities. As a regional participant in major water resource projects and the largest water supplier in Washington County, the District will continue to support regional efforts to develop water reuse and non-potable water use opportunities.

The District promotes water reuse and recycling among its customers, as well. The District's B.I.G. program encourages commercial and production customers to recycle and reuse water, and to reduce their water consumption. The COPR provides rebates for the elimination of single-pass cooling and improved cooling tower water treatment. Furthermore, the COPR is designed to be flexible and open enough to encourage innovative water reuse or recycling proposals from customers for their unique industrial processes.

Five-Year Benchmarks: The District will continue to support regional efforts to develop water reuse and non-potable water use opportunities. The District will continue working with B.I.G. customers to investigate opportunities to improve their water reuse and recycling.

6. Other Conservation Measures

Tracking Tools. The District has used several software tools to track the number of customers participating in the rebate programs since their inception and to estimate the potential conservation savings. The analysis conducted using these tools indicate that the District's conservation programs have been extremely successful. The software tools to track rebate program results include an in-house developed tool, the Alliance for Water Efficiency tracking tools (available through its membership;) which facilitate benefit/cost modeling, and the ConEast tracking tool, which facilitates benefit/cost modeling and rebate goal setting. The in-house tool is an excel spreadsheet in which the District tracks all conservation rebates, assessments, device giveaways, and education and outreach programs. Savings estimates per participating customer for each measure are built into the spreadsheet and the District figures in a diminishing return based on what part of the fiscal year the measure is implemented. In addition, the District conducted an analysis of water savings produced from rebates provided to B.I.G. customers from 2006 through 2010 and found that the average water savings was approximately 20 percent. From 2010 to the present, the District has used tracking tools to help develop conservation goals for specific water conservation measures.

Pilot Programs. The District actively looks for opportunities to test new conservation methods and technologies. Various pilot programs have been explored and implemented, and these programs have focused largely on irrigation technology and evapotranspiration (ET) based irrigation scheduling.

Professional Groups. The District is very active in professional groups and dedicates much effort and leadership into the promotion of water conservation in the region. Staff belongs to the AWWA PNWS Conservation Committee (several times serving as chair), RWPC, and the Tualatin River Watershed Council. The District is also a member of the Alliance for Water Efficiency. Finally, the District is a Promotional Partner of the WaterSense program and urges its customers to look for the label in their purchasing decisions. The District promotes WaterSense labeled products through its Web site content and rebate programs. The WaterSense logo on District employee business cards and WaterSense content is included in District presentations. The District recently modified its toilet rebate program to only provide rebates for EPA WaterSense labeled toilets.

Staff is active in the development of regional conferences and trainings to ensure technical sessions in water conservation are represented. Staff also attends national conferences to learn about new water conservation technologies, marketing, and various other conservation studies, and to network with other industry professionals. Partnerships are one of the best tools in water conservation and these forums promote these relationships and future opportunities.

Customer Service & Conservation Staff. The District's mission is to provide quality customer service. Staff provides assistance to customers with concerns about high bills, general conservation questions, and water efficient fixture and device questions. The District also hosts various workshops, trainings and presentations. For example, topics include weather-based irrigation technology, irrigation, soils and seven steps to a water efficient landscape. The District reaches out to all customer classes to encourage water conservation, as well as landscape professionals, plumbers, and other trade groups. The District views the involvement of private businesses as critical to implementing long-term and sustainable changes in the landscape and plumbing market. The District also networks with manufacturers and distributors of water conservation products to stay informed about new technologies and opportunities.

Five-Year Benchmarks: The District will continue its current efforts to market the use of weather-based irrigation technology in landscape irrigation practices. The District will continue to promote best practices for landscaping and irrigation using its Water Efficient Demonstration Garden. The District will continue to use several tools to evaluate conservation programs and measures by cost/benefit value analysis to both customers and the District. The District will continue to investigate measures to evaluate and report on rebate and outreach performance from actual customer meter data. The District will continue to explore and implement pilot programs with the focus on irrigation scheduling and ET technology. The District will continue its active participation and leadership in the promotion of water conservation in the region. The District will continue its efforts to provide high quality customer service given that it facilitates customer participation in water conservation efforts.

Willamette River Fish Flows: Public Education and Voluntary Conservation

The District is a member of the Willamette River Water Coalition (WRWC), which is currently comprised of four municipal water suppliers (Tualatin Valley Water District and the Cities of Sherwood, Tigard, and Tualatin). The WRWC holds water use Permit S-49240 for municipal and industrial use of up to 202 cfs from the Willamette River. The permit was applied for in 1973 and the OWRD issued the permit in 1985. In 2005, an application for an extension of time to complete development of the permit was submitted to OWRD. WaterWatch of Oregon protested the proposed final order proposing to approve the extension application. In June 2007, the WRWC entered into a Settlement Agreement with WaterWatch and the OWRD to resolve the protest. **Appendix D** contains the Final Order Incorporating Settlement Agreement on the extension of time for Permit S-49240.

The Final Order Incorporating Settlement Agreement contains a number of conditions. One condition stipulates that each member of the WRWC authorized to use water under Permit S-49240 is required to submit a WMCP with a special section titled "Willamette River Fish Flows: Public Education and Voluntary Conservation" and to receive a final order approving the WMCP before using Willamette River water under Permit S-49240. Any subsequent WMCPs submitted by WRWC members must also include the special section. The Settlement Agreement states that the special section must describe how and when public education messages will be disseminated to the public and includes a number of requirements regarding the content of the public education messages.

The following describes the District's implementation steps for initiating and disseminating a public education message to District water customers once the District plans to begin to use water from the Willamette River water right permit. Each year, the District will post a public education message on its Web site from April 1 through May 31 and mail a public education message to customers as a bill insert in March. The public education messages will contain:

- The status of river flow in relation to fish flow targets in the Willamette River, measured at Salem (USGS Gage Number 14191000).
- A description of the connection between customer water use and Willamette River flows.
- A description of the importance of Willamette River flows to fish, fish resources and listed fish present.
- A statement that the Willamette River is part of the District's source of supply.
- A list of voluntary water conservation measures commonly accepted as effective, including avoidance of outdoor watering, car washing, and washing outdoor surfaces. Curtailment Stages 1 and 2 in Section 4 of this WMCP present a variety of voluntary water conservation measures that the District may include in the list.
- A statement that emphasizes that while water conservation is important year-round, it is especially important when flow targets for fish in the Willamette River, measured at Salem, are not being met.

In the event that the 7-day rolling average of mean daily stream flow in the Willamette River at the gage near Salem falls below the fish flow targets in the settlement agreement by 10 percent or more for 15 consecutive days any time during the year (except for April 1 through May 31),

an additional public education message will be posted on the District's Web site and distributed in a bill insert if the timing coincides with the billing cycle, or through the media, such as local newspapers. The public education message will contain the information listed above for the April through May message, with suggested voluntary conservation measures tailored to the season when the fish flow targets are not met. The public education message will remain on the Web site until the minimum fish flow needs at Salem are met. Another message will be distributed as described above for each period of 15 consecutive days that the 7-day rolling average of mean daily stream flows in the Willamette River at the gage near Salem are below the fish flow targets in the settlement agreement by 10 percent or more.

Given the success that the District has had with saving water through the implementation of conservation measures described throughout Section 3 of this WMCP, the District anticipates that the actions described in this special section will reduce demand on Willamette River water in April through May and when target fish flows are not being met. The use of the District's Web site and print communication (as bill inserts or through local media) will reach many District customers. The Web site is a particularly powerful tool for education because customers that visit it will find extensive information about ways to conserve water along with the special public education message. Between the water conservation information provided on the Web site and in print, the District expects that demand reductions will be achieved.

The Final Order Incorporating Settlement Agreement also contains a condition requiring this section of the WMCP to include a "reminder to OWRD staff concerning OWRD's obligation described in Term 3 of the (Permit S-49240 extension) Settlement Agreement." Under that settlement provision, when reviewing this WMCP, OWRD is required to make a finding regarding whether the "Willamette River Fish Flows" section includes the elements in Development Limitation Condition 4. (Those elements are described on pages 2 and 3 of the Final Order Incorporating Settlement Agreement in Appendix D.)

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4. Municipal Water Curtailment Element

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

The District developed this water supply shortage plan to guide the Board of Commissioners and District staff in the event of a water shortage. Water supply shortage plans (i.e. 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, which may result from incidents such as: prolonged drought, equipment failure in the system, catastrophic events (e.g. flooding, landslides, earthquakes, and contamination), or events not under control of the water supplier (e.g., localized or area-wide power outages and intentional malevolent acts).

The District may undertake a variety of curtailment actions, depending on the time of year and the expected duration of any water supply shortage. Throughout any such shortage, the District will continue to pursue the following objectives:

- Maintain adequate volume of high-quality water supplies for all District customers.
- Provide clear customer communications and rapid customer service. Be consistent with public expectations based on information shared to date.
- Promote water use efficiency.
- Control costs that come with curtailed water use, such as losses in revenue, or higher-cost water supplies (e.g., the purchase of peaking water from the PWB or the lease of extra water from the JWC).
- Have an equitable impact on all users – public and private, urban and suburban, business and residential. Prioritize actions to have the least permanent negative impact.

History of System Curtailment Episodes

OAR-690-086-0160(1)

Assessment of Water Shortages & Limitations

In the past 10 years, the District has not implemented a curtailment stage beyond Stage 1: Summer Advisory, which it routinely implements every year during the summer (peak-demand) season. Nonetheless, the following is a description of earlier curtailment events that were Stage 2 or higher. These events prompted the District to develop an effective conservation program and to diversify its sources of supply.

Drought

Drought has been the principal cause of water shortages and resulting curtailment for the region in recent years.

1992 Drought Affecting the City of Portland

During 1992, PWB and its wholesale customers, including the District, experienced severe water supply shortages for five reasons: (1) the Bull Run watershed, which serves the Portland metropolitan region, had experienced the lowest spring rainfall and stream flows since the year 1899; (2) demand for water during May and June of that year was unusually high due to record-breaking temperatures that occurred in the region; (3) reservoir levels were low, as is typical in the late summer months; (4) the PWB back-up source, the Columbia South Shore wellfield, was unavailable because of concern that a contamination plume would move into the well field aquifer if those wells were used; and (5) voluntary requests to reduce water use were not effective. (Similar shortages also occurred in 1952, 1987, and 1991.)

In response to the severe water supply shortage, the PWB implemented mandatory water restrictions to reduce water use during the peak season. The District, as a wholesale customer of the City of Portland, was subject to the curtailment measures declared by the PWB. In response, the District prepared an ordinance in July 1992, declaring a water source emergency and imposing mandatory water conservation on its customers. The ordinance prohibited lawn watering (except in the case of newly seeded or sodded lawns and parks), washing of hard surfaces such as sidewalks and parking lots, and car washing. Following a warning, penalties for ordinance violations ranged from \$100 for the first violation to \$500 for repeat violations. The District also purchased water from the JWC to partially offset the reduced supply from the PWB and lessen the severity of water curtailment measures. In addition, the District also activated its three emergency wells and obtained additional water supply from the City of Hillsboro via an emergency connection with that city.

In the aftermath, the District formed a conservation committee and designed and installed a demonstration garden to promote the efficient use of water through innovative landscape design, construction, and maintenance principles. Furthermore, it held landscaping workshops for customers, and participated in the conservation activities of the Columbia-Willamette Water Conservation Coalition, which later merged with the Regional Water Providers Consortium. In addition, the District purchased an ownership interest in the JWC, which provides access to additional water supply from multiple sources.

2001 Drought Affecting the JWC

The summer of 2001 was not particularly hot, but Hagg Lake filled to only 51 percent. As a result, all municipalities using supplies from the JWC were asked to curtail use in order to leave supplies for more senior irrigation water rights, as well as to leave adequate water supplies for instream use. Evaporation in the lake during the summer further reduced municipal supplies. The District was able to meet its customers' demands by purchasing additional water from the City of Portland, thereby avoiding the need to ask customers to curtail water usage. Although the District ultimately did not need to curtail water use, this event has been mentioned because it demonstrates the ability of water providers in the region to work cooperatively to avoid curtailment.

Other Events Resulting in Supply Deficiencies

In addition to drought, numerous other events or conditions in the JWC's and PWB's sources of supply could cause the District to experience supply deficiencies. For example, water quality problems in the PWB's Bull Run watershed could reduce supply available to the District. Other conditions that could cause supply deficiencies for the District include requirements of the Endangered Species Act that reduce access to Bull Run water supplies, contamination of the PWB or JWC's water supply sources, long-term interruptions in power supplies, breaks in major transmission lines, or damage to reservoirs as the result of earthquakes or other causes.

Planning for Future Events

In the event of a future water shortage, the District plans to meet its customers' water needs by offsetting the reduced supply with water from another water provider, accessing its groundwater supply, utilizing emergency interconnections, and implementing curtailment.

Curtailment Event Triggers and Stages

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

The District has adopted a four-stage curtailment plan to be invoked in the event of a water supply shortage. These stages are designed to be initiated and implemented in progressive steps. The plan includes both voluntary and mandatory rationing, depending upon the cause, severity, and anticipated duration of the shortage.

Exhibit 4-1 presents the four curtailment stages, as well as their initiating conditions (i.e. triggers). Curtailment could be initiated by any of the corresponding initiating conditions.

Exhibit 4-1. Curtailment Stages 1 through 4.

Curtailment Stages	Initiating Conditions
Stage 1: Routine Summer Advisory	<ul style="list-style-type: none"> • PWB issues a “notice of drawdown,” announcing the release of stored water in the Bull Run System. • PWB activates groundwater wells as part of its supplies. • Hagg Lake fails to fill 100 percent by May 1. • Barney Reservoir fails to fill 100 percent by May 1. • The JWC issues a “notice of drawdown,” announcing the release of stored water.
Stage 2: Moderate Water Supply Shortage	<ul style="list-style-type: none"> • PWB is operating under a warm-dry scenario [see the example diagram below under Stage 2]. • Hagg Lake is filled to less than 80 percent before May 1. • District customer use reaches contractual and/or facility capacity for seven consecutive days.
Stage 3: Severe Water Supply Shortage	<ul style="list-style-type: none"> • PWB has only groundwater sources available. • PWB cannot meet supply demands of wholesale customers. • JWC reservoirs drop below 40 percent of “normal conditions”; under such circumstances JWC enacts mandatory curtailment for its members. • Water supplies fail to meet U.S. Environmental Protection Agency Safe Drinking Water Act standards. • The District’s distribution system experiences a significant and sustained reduction of water pressure. • District customer use reaches contractual and/or facility capacity for 14 consecutive days.
Stage 4: Critical Water Supply Shortage	<ul style="list-style-type: none"> • PWB offloads (i.e. ceases serving) the District from its system and JWC cannot meet the District’s resulting additional demands for water. • JWC offloads the District from its system, and PWB supplies cannot meet the District’s resulting additional demands for water. • Water supplies from the JWC or the PWB are either physically cut off or otherwise become unavailable. • District customer use reaches contractual and/or facility capacity for 28 consecutive days.

Authority

The District’s Chief Executive Officer has the authority to enact the four stages of curtailment.

Enforcement

District field staff will enforce mandatory curtailment measures, if necessary.

Curtailment Plan Implementation

OAR-690-086-0160(4)

Stage 1: Routine Summer Advisory

The District predicts that it will face Stage 1 curtailment initiating conditions each summer as warm dry weather settles into the region and drawdown of the reservoirs begins. Summer water use is much greater than winter use as a result of customers irrigating their landscapes, washing cars, and using water for cooling purposes.

Water Reduction Goal

The goal of Stage 1 curtailment is for each water user to strive to maintain, and not exceed, average summer usage levels.

Triggers (any of these)

Events causing the District to activate Stage 1 curtailment include:

- PWB issues a “notice of drawdown,” announcing the release of stored water in the Bull Run System.
- PWB activates groundwater wells as part of its supplies.
- The JWC issues a “notice of drawdown,” announcing the release of stored water.
- Hagg Lake fails to fill 100 percent by May 1. (Hagg Lake holds 53,000 acre-feet (17.3 billion gallons).)
- Barney Reservoir fails to fill 100 percent by May 1. (The holds 20,000 acre-feet (6.5 billion gallons).)

During Stage 1 curtailment, the District will implement the following curtailment actions, including providing public messages, taking identified possible actions and working with partner agencies.

Public Message: Voluntary Conservation Measures

- Each summer, the District asks its customers to voluntarily limit water application to 1-inch of water per week for turf areas and less for areas with trees and shrubs.
- The District promotes already-existing conservation messages, such as “Use Water Wisely!” Suggested water conservation measures are posted on the District’s Web site.

Possible District Actions

- Partner with Regional Water Providers Consortium and west side providers to send consistent conservation messages to the media.
- Place conservation reminders and tips in Water Words, bill message, and on the District’s Web site and conservation hotline. Use various venues to distribute information. Set up public information booths where opportunities exist and look for other opportunities for public outreach, such as speaking engagements, etc.

Partners to Contact

- Work with local agencies to coordinate resources and uniform messages for water customers, and to prepare, review and/or update local water ordinances regarding curtailment enforcement.

Stage 2: Moderate Water Supply Shortage

Stage 2 curtailment may be a temporary condition lasting several days, such as a supply shortage caused by service interruptions in the region. During this time, the District may redirect supplies to areas experiencing shortages. Alternatively, Stage 2 curtailment may be an intermediate stage in an ongoing water supply shortage, such as when regional reservoirs have begun “summer drawdown,” with no rain in the forecast.

Water Reduction Goal

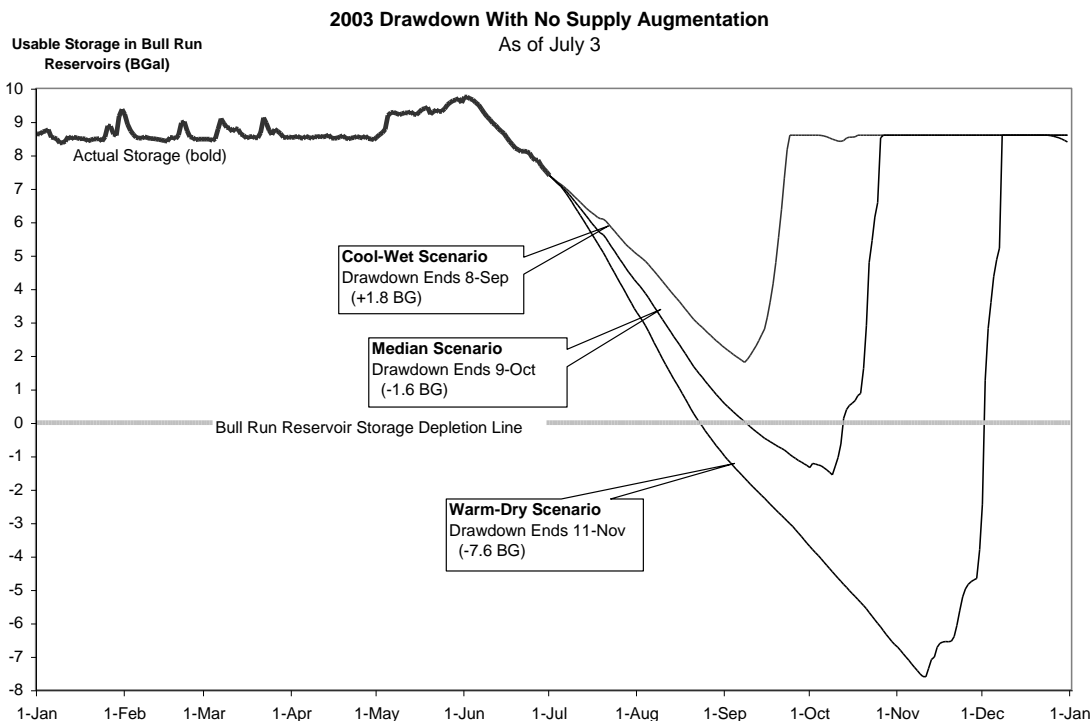
The goal of Stage 2 curtailment is to decrease overall daily water use by 10 percent. Voluntary curtailment use is intended to extend existing water supplies to last throughout the shortage.

Triggers (any of these)

Events causing the District to activate Stage 2 curtailment include:

- PWB is operating under a warm-dry scenario [see **Exhibit 4-2**, which is updated by PWB officials each year].

Exhibit 4-2. PWB Reservoir Drawdown Scenarios.



- Hagg Lake fails to fill 80 percent before May 1, which equates to 42,400 acre-feet (or 13.8 billion gallons). The JWC will only make the full allotment available to municipal users if the lake fills to at least 80 percent.
- District customer use reaches contractual and/or facility capacity for seven consecutive days.

In the event of Stage 2 curtailment, the District would take the following curtailment actions.

Public Message: Voluntary Conservation Measures

The District will provide public messages that describe the following voluntary conservation measures:

- Reduce all water use by 10 percent (as a rule of thumb, for example, residential customers in a four-person single-family household should try to reduce their use by about 20 gallons per household per day during the winter and 27 gallons per household per day during the summer).
- Limit use of water in commercial businesses (e.g., do not serve water to restaurant customers unless specifically requested).
- Reduce watering of lawns, plants, trees, gardens, shrubbery, and flora on private or public property to the minimum necessary. Conduct outdoor watering during early morning hours to reduce evaporation (preferably between 4 and 8 a.m.; must conclude by 10 a.m.).
- Eliminate all other kinds of outdoor water use, including:
 - a. Washing down of hard surface areas, decks, buildings, gutters, and vehicles;
 - b. Use of water in fountains, reflection ponds, and decorative water bodies for aesthetic or scenic purposes, except where necessary to support aquatic life;
 - c. Filling or maintaining private swimming pools (except children's wading pools);
 - d. Use of fire hydrants for any purpose other than firefighting or flushing essential to maintain water quality.

Possible District Actions

- Issue a notice to the local media that the District is in a Moderate Water Supply Shortage.
- Send postcard notification of Moderate Water Supply Shortage to District customers.
- Turn off automatic irrigation and water features in the District's Water Efficient Demonstration Garden.
- Provide reminders to non-efficient users (including customers who have been given a 30-day notice to repair one or more leaks and have failed to do so).
- Continue to encourage and educate customers to implement voluntary water conservation.

- Routinely publish in the Beaverton Valley Times, Hillsboro Argus, Tigard Times, and The Oregonian the voluntary conservation measures that the customers are requested to follow during a Moderate Water Shortage.
- Place reminder messages on in Water Words, in the bill messages and on the District Web site, as well as on billboards, signs, bus-sides, and movie theatre ads.

Partners to Contact

- Contact potential institutional partners in water conservation, including local businesses that are the most affected (e.g. landscapers/green industry, commercial carwashes, nurseries, restaurants, water-intensive manufacturers, etc.).
- Ask cities and counties to postpone enforcement of regulations that require the use of water (landscape ordinances, etc.).
- Make conservation presentations to Homeowner Associations (HOAs) and Community Planning Organizations (CPOs).

Stage 3: Severe Water Supply Shortage

Stage 3 curtailment occurs when customers still have time to prepare for and conserve water before a loss of service. Scenarios triggering Stage 3 curtailment include a protracted period of drought (similar to the drought of 1992) or multi-day disruption of service across sections of the District's service territory. Such scenarios may not affect both of the District's water sources equally.

Water Reduction Goal

The goal of Stage 3 curtailment is to decrease overall daily water use by 25 percent. Reduced water use will enable the District to re-direct unaffected water supplies without removing any customers from the system.

Triggers (any of these)

Events causing the District to activate Stage 3 curtailment include:

- PWB has only groundwater sources available.
- The PWB system cannot meet supply demands of wholesale customers.
- JWC reservoirs drop below 40 percent of "normal conditions" and JWC enacts mandatory curtailment for its members.
- Water supplies fail to meet U.S. Environmental Protection Agency Safe Drinking Water Act standards.
- The District's distribution system experiences a significant and sustained reduction of water pressure.
- District customer use reaches contractual and/or facility capacity for 14 consecutive days.

The District may take the following actions in the event Stage 3 curtailment is declared:

Public Message: Mandatory Curtailment Measures

The District will provide public messages that include the following:

- Water is in short supply.
- Reduce all water use by 25 percent (as a rule of thumb, for example, residential customers in a four-person single-family household should try to reduce their use by about 50 gallons per household per day during the winter and 70 gallons per household per day during the summer).
- The District will enforce its Water Supply Shortage Plan.
- Mandatory curtailment actions include:
 - a. Eliminate all outdoor water use, including:
 - i. Irrigation of established lawns (those at least six weeks old). Exceptions include: commercial sod farms, high-use athletic fields that are used for organized play, and daycare providers. Residents may hand-irrigate ornamental plants, flowers, and vegetable gardens during early morning hours to reduce evaporation (preferably between 4:00 a.m. and 8:00 a.m.; must conclude by 10:00 a.m.);
 - ii. Irrigation of golf courses. District water cannot be used to irrigate fairways or greens on golf courses. Hand watering of ornamental plants and flowers is permitted during early morning hours to reduce evaporation (preferably between 4:00 a.m. and 8:00 a.m.; must conclude by 10:00 a.m.);
 - iii. Washing down of hard surface areas, decks, buildings, gutters, or vehicles. Wash-down is allowed for sanitary purposes only;
 - iv. Use of water in ornamental fountains, reflection ponds, and decorative water bodies for aesthetic or scenic purposes, except where necessary to support aquatic life;
 - v. Filling or maintaining private swimming pools (except children’s wading pools); and
 - vi. Use of fire hydrants for any purpose other than firefighting or flushing essential to maintain water quality.
 - b. Prohibit chemical applications to lawns that require subsequent watering.
 - c. Limit expanding commercial nursery facilities, placing new irrigated agricultural land in production, or planting or landscaping except when required by the permitting jurisdiction.
 - d. Limit use of water in commercial businesses (e.g., do not serve water to restaurant customers unless specifically requested).
 - e. Repair leaks in hoses, faucets, and couplings.

Possible District Actions

- Issue a statement that the District is experiencing a Severe Water Supply Shortage; notify the local media and send postcard notification to District customers.
- Turn off automatic irrigation and water features in the District's Water Efficient Demonstration Garden.
- Cease water service to customers who have been given a 30-day notice to repair one or more leaks and have failed to do so.
- Implement the enforcement provisions of District's Water Supply Shortage Plan.
- Routinely publish in the Beaverton Valley Times, Hillsboro Argus, Tigard Times, and The Oregonian the mandatory restrictions to be placed on the use of water supplied by the District.
- Through the media and public outreach efforts, including door hangers, publicize widely the penalties to be imposed for violations of mandatory restrictions and the procedures to be followed if a variance in the restrictions is requested.
- Place curtailment reminder messages on in Water Words, in the bill message and on the District Web site, as well as on billboards, bus-sides, TV, radio, and movie theatre ads.
- Provide and advertise a conservation hotline that provides relevant curtailment information, such as the reason for the curtailment and information to help customers comply with the curtailment stage policy.
- Update and mail a conservation brochure to customers.

Partners to Contact

- Remind business, industrial, and government (B.I.G.) customers of any letters of cooperation that the District may have signed with them to prepare for Stage 4 curtailment situations.
- Send pre-drafted letter of intent to local jurisdictions (Portland, Tigard, Hillsboro, and Beaverton) to let them know the District plans to begin issuing fines to any of their residents who are not complying with the District's mandatory restrictions.
- Inform landscape/green industry (i.e. landscape and irrigation construction professionals, landscape maintenance service providers, landscape irrigation equipment vendors, the Oregon Landscape Contractors Association, and the Oregon Landscape Contractor's Board) of prohibitions on irrigation and chemical applications that require irrigation.
- Work with Tualatin Valley Parks and Recreation to suspend irrigation of parks where applicable.
- Work with local governments and homeowners associations to temporarily suspend regulations that require the use of water (landscape ordinances, etc.).

Stage 4: Critical Water Supply Shortage

Stage 4 curtailment may be implemented in emergency conditions under which little or no water is flowing to customers (as in the case of natural disasters that result in sudden and acute water loss). It may be necessary for the District to proceed directly to Stage 4, or this stage may be the result of an extended period of time in which demand outstrips supply.

Water Reduction Goal

The goal of Stage 4 curtailment is to decrease overall daily water use by 50 percent or more, and to protect safety, health, and economic livelihood.

Triggers (any of these)

Events causing the District to activate Stage 4 curtailment include:

- Portland “offloads” (i.e. ceases serving) the District from its system and JWC cannot meet the District’s resulting demands for water.
- JWC “offloads” the District from its system, and the PWB cannot meet the District’s additional water demands.
- Water supplies from JWC or PWB are either physically cut off or otherwise become unavailable to the District.
- District customer use reaches contractual and/or facility capacity for 28 consecutive days.

Public Message: Mandatory Curtailment Measures

The District will provide its customers with public messages about the following mandatory curtailment measures:

- Water may be used for drinking, cooking, and sanitation purposes only.
- Reduce all water use by 50 percent (as a rule of thumb, for example, residential customers in a four-person single-family household should try to reduce their use by about 100 gallons per household per day during the winter and 140 gallons per household per day during the summer).
- Eliminate use of water at construction sites.
- Enforcement of the District’s Water Supply Shortage Plan including issuance of fines.

Possible District Actions

- Issue a statement that the District is experiencing a Critical Water Supply Shortage.
- Issue media releases.
- Continue to enforce Water Supply Shortage Plan with warnings, fines, and discontinued service if necessary.
- Place reminder messages in Water Words, in the bill message and on the District Web site, as well as on billboards, bus-sides, TV, radio, and movie theatre ads.

- Provide and advertise conservation hotline.
- If necessary, conduct the following emergency actions:
 - a. Activate the District's Emergency Operations Center (EOC).
 - b. Begin rationing water as needed.
 - c. Activate any curtailment agreements previously negotiated with B.I.G. customers.
 - d. Open interconnections with neighboring water suppliers.
 - e. Bring emergency wells on-line.
 - f. Declare emergency (per District Purchasing Policy) to allow suspension of the normal bidding process.
 - g. Place a moratorium on all new water service connections and new water main extensions. Provide notice to developers of the moratorium.
- Work with partners to distribute bottled water as needed.

Partners to Contact

- Ask Tualatin Valley Fire & Rescue Fire Marshall to issue statement banning burning or construction (because these activities are possible fire hazards).
- Notify B.I.G. customers of the District's intention to activate any previously agreed upon curtailment arrangements.
- Inform developers of the moratorium on all new water service connections and water main extensions.
- Notify and work with neighboring water providers.
- Activate partnerships with bottled water manufacturers, National Guard, Red Cross or other water distributors, if needed.
- Contact the Washington County Office of Consolidated Emergency Management for additional resources, as needed.

5. Water Supply

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

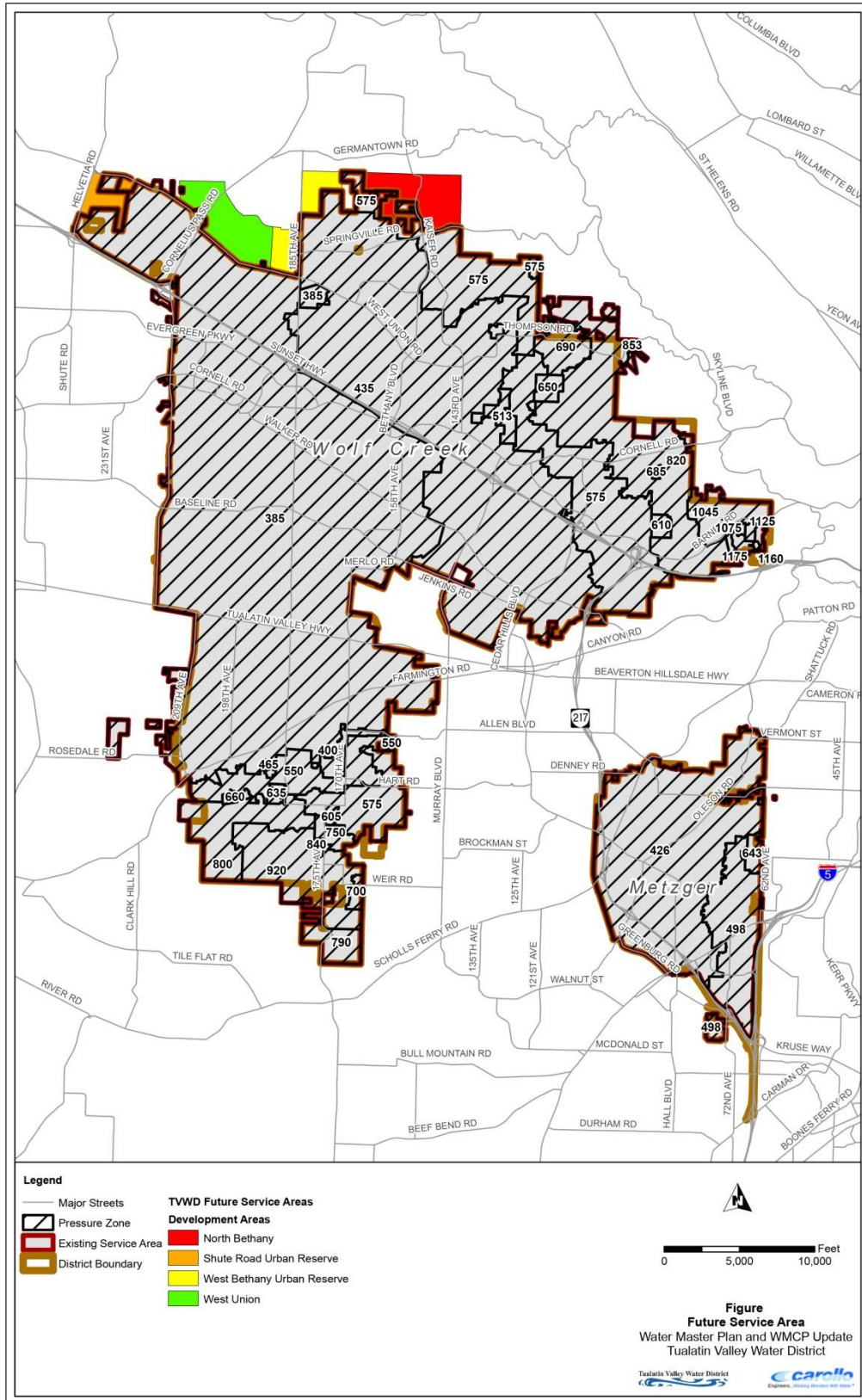
This rule requires descriptions of the District's current and future water delivery areas and population projections, demand projections for 10 and 20 years, and the schedule for when the District expects to fully exercise its water rights. The rule also requires comparison of the District's projected 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)

Exhibit 5-1 shows the District's current and future service area. The District anticipates incorporating four areas into its service area within the next 20 years: North Bethany (765 acres), West Union (908 acres), West Bethany Urban Reserve (245 acres), and the Shute Road Urban Reserve (148 acres).

Exhibit 5-1. Current and Projected Future Water Service Area.



Population Projections

OAR 690-086-0170(1)

The District's population projections were developed by Carollo Engineers, Inc. as part of the process to develop the District's 2014 Water System Master Plan.

To develop population projections for the future service area, residential and non-residential rates of growth were estimated for each pressure zone using Metro's transportation analysis zones (TAZ). These rates were limited by full build-out capacity of households and employees (as determined by analyses of tax lots). The estimated number of households was multiplied by 2.6 persons per household. The methodology used to develop the population projections is described in more detail below.

Build-out Capacity

The growth capacity of each pressure zone is determined by its future land use once all tax lots have been fully developed. This full development of tax lots within the District is referred to as "build-out." Two growth capacity scenarios (low-growth and high-growth) were evaluated under different build-out land use assumptions, along with a third scenario (medium-growth) that represents the average of these two extremes.

The low-growth scenario assumes that development was limited to properties that are currently vacant, or those that could sustain additional development. These properties were identified using Metro's current GIS tax lot data, which identifies vacant and "underutilized" lots. Using GIS, the current land use and future land use data (from the Comprehensive Land Use Plan) were overlapped, and the future land use was identified for all currently vacant and underutilized tax lots. Currently developed tax lots were left unchanged. Using this method, the total build-out acreage of each land use category was established for each pressure zone. Using density assumptions for the land use types, the total number of households and employees at build-out were calculated for each pressure zone for the low-growth scenario.

In the high-growth scenario, the build-out capacity was determined based on the land use assumptions in the most recent Comprehensive Land Use Plan maintained by Metro. (The current Comprehensive Land Use Plan is a compilation of the comprehensive land use plans of all the jurisdictions in the Metro area, which represent the planned land use for accommodating future growth. Typically, these plans represent aggressive development projections including some re-development of existing land use to higher densities in order to accommodate more people.) Using GIS, the total acreage of each customer category was calculated in each pressure zone. Using density assumptions for each category provided by Metro, the total number of households and employees were determined for each pressure zone under the high-growth scenario. In some cases, the high-growth assumption resulted in a reduction of households or employees in certain areas due to redevelopment to lower density land uses. This loss of households or employees is unlikely, thus, for planning purposes the forecasts were not allowed to fall below current conditions.

Household and Employee Growth Rates

Existing and future demographics in the Portland region are maintained in Metro's TAZ database. In February 2014, Metro released its latest set of TAZ growth projections following jurisdictional review. This database maintains target capacities for households and employees in each TAZ for the planning years of 2010, 2025, 2035, and 2040. In between these years, a linear rate of growth was assumed until capacity was reached. A single pressure zone may contain many TAZs or portions of TAZs. The projected number of households and employees was estimated for each pressure zone for 2010, 2025, 2035, and 2040 by overlapping TAZ boundaries and pressure zones in GIS.

Using the estimated TAZ projections for each pressure zone, and assuming linear growth between and beyond the years projected by TAZ, household and employee growth rates were developed for 2014 to 2064. Households and employees were increased in each pressure zone until build-out capacity was reached. The low-growth scenario limited all growth according to the low build-out scenario; while the high growth scenario allowed growth to continue until the high build-out scenario was reached. Once build-out was reached in a zone, no further growth was assumed to occur. The household and employee growth rates were thus projected for each pressure zone for each year until 2064. Because the TAZ projections and build-out capacity is unique for each zone, not all zones reach build-out by 2064.

The projected annual household growth rates were applied to the current number of residential (single-family and multi-family) accounts and projected annual employee growth rates were applied to the current number of non-residential accounts for each zone. The results were the projected number of residential and non-residential accounts for each zone each year through 2064.

Expansion Areas

As further described below, account projections for the four areas (North Bethany, West Union, West Bethany Urban Reserve (UR), and the Shute Road UR) that are anticipated to be incorporated into the District's service area were developed similarly to account projections for the District's other pressure zones (as described above). The District provided assumptions on when it plans to serve these areas, although the exact timing is unknown. The populations for each area are assumed to be those predicted by TAZ and land use data for the year that the District plans to begin to serve the area.

North Bethany: In 2013, a Carollo study determined that this area could sustain 3,922 Equivalent Dwelling Units (EDUs) at build-out, which was used as the growth capacity for demographic projections in the area. Although the land use plan calls for many land use types in North Bethany, the number of accounts was estimated by assuming each EDU represents a single-family residence. Annual growth rates were obtained via TAZ overlap percentages as described for the rest of the service area. North Bethany will likely be added to the District's service area by 2019.

West Union: The development of this area is assumed to follow the land use patterns of North Bethany. To this end, growth capacity for West Union was determined by applying the number of EDUs per acre determined in the 2013 North Bethany study. (Growth rates are assumed to follow those of the surrounding development zones.) West Union is expected to begin development in the near future and to become part of the District's service area no later than 2034.

West Bethany Urban Reserve: Growth in this area was projected by using TAZ information to develop its capacity for households and employees. As development proceeds, it is expected that there will be a mix of residential and commercial connections in this area. The District assumes that West Bethany is likely to be incorporated into the District's service area by 2034.

Shute Road Urban Reserve: Similar to West Bethany, no land use planning for Shute Road Urban Reserve has been conducted at this time, and TAZ overlaps were used to determine the demographic capacity for this expansion area. The District assumes that Shute Road is likely to be incorporated into the District's service area by 2034.

Population Growth

In addition to household and employee projections, the District's population growth in the current service area and expansion areas was also projected at the pressure zone level. Population estimates were obtained by multiplying the number of households by 2.6 persons per household. This factor is the average household density in Washington County according to the 2010 Census and is consistent with what has been reported by the Population Research Center. Future population estimates for low-, medium-, and high-growth assumptions for the entire service area, and for the Wolf Creek and Metzger service areas, are presented in **Exhibit 5-2 through 5-4**. In addition to the 10-year and 20-year population projections, estimated populations for the year 2026 are included in **Exhibit 5-4**, because the District's regional water supply agreement with the City of Portland will need to be renewed in 2026, and the District plans to adjust its water supply sources at that time.

Exhibit 5-2. Projected Future Water Service Area Population, Entire and Wolf Creek Service Areas.

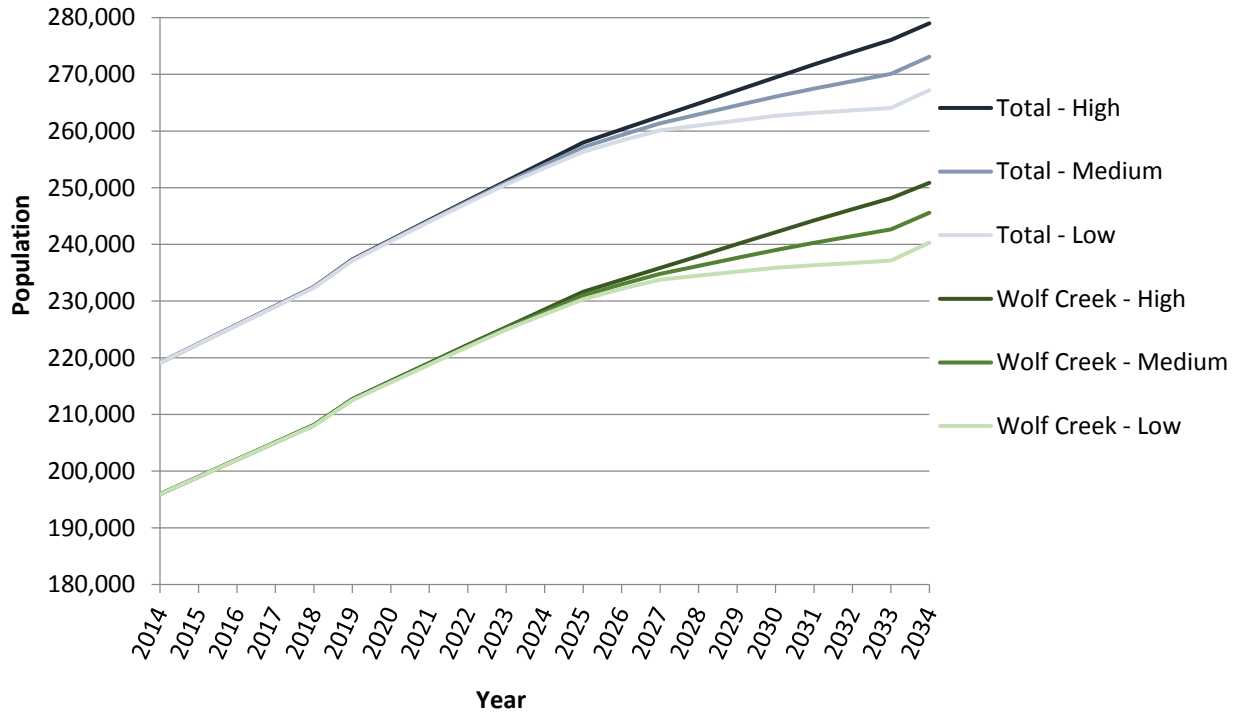


Exhibit 5-3. Projected Future Water Service Area Population, Metzger Service Area.

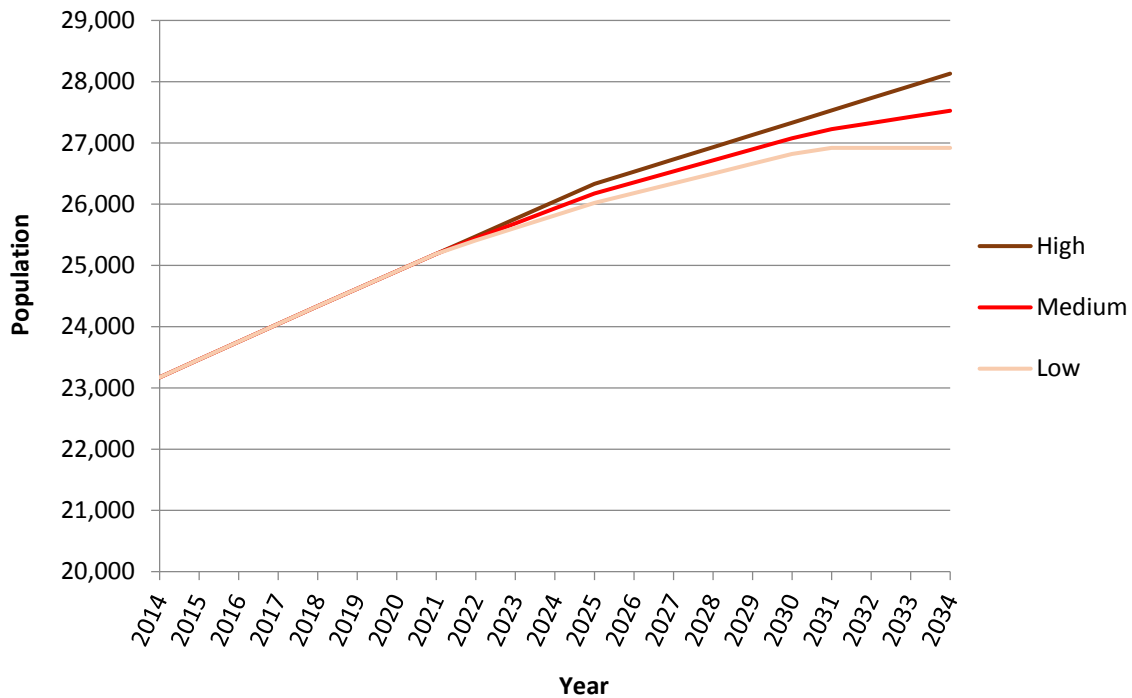


Exhibit 5-4. Projected Future Water Service Area Population, by Service Area.

	2014	2024	2026	2034
Low Growth				
Metzger	23,174	25,816	26,180	26,919
Wolf Creek	195,926	227,682	232,161	240,295
Total	219,100	253,498	258,341	267,214
Average Growth				
Metzger	23,174	25,931	26,355	27,525
Wolf Creek	195,946	228,104	232,952	245,578
Total	219,120	254,034	259,307	273,103
High Growth				
Metzger	23,174	26,045	26,530	28,130
Wolf Creek	195,967	228,526	233,743	250,862
Total	219,141	254,571	260,274	278,992

Demand Forecast

OAR 690-086-0170(3)

Potential Range of Future Water Demands

As with its population projections, the District’s demand projections were developed by Carollo Engineers, Inc. as part the development of the District’s 2014 Water System Master Plan.

The District developed low-, medium-, and high-demand scenarios to: 1) account for the uncertainty that is inherent in demand projections as a result of the numerous factors and assumptions involved, and 2) better depict the range of possible future demands. The five variables used to develop the range of demand projections are described below and the assumptions are summarized in **Exhibit 5-5**.

Demographic Growth Scenario: As discussed above, low, medium, and high demographic growth scenarios were developed for each pressure zone. The projected range of accounts provides the foundation for the demand projections. These three scenarios were applied to the low-, medium-, and high-demand scenarios.

EDUs per Account: Historical EDUs per account were developed for each customer category. The conversion factors applied represent a range of customers within each customer category. For example, one commercial account is equivalent to approximately 10.1 EDUs, but this is an average of all types of commercial customers from small stores to large office buildings that have a large range of water use. The demand projections used for the District assume that future customers will have a similar range of demands as their historical counterparts; therefore, the historical average EDUs per account are assumed. This analysis excludes the top 22 water users, which are addressed separately.

EDU Water Use: The historical per EDU water uses were 212 gpd/account and 182 gpd/account for the Wolf Creek and Metzger areas, respectively. These EDU water use values were adjusted for demand projections to capture the potential range of water use trends. For both service areas, the low-demand scenario uses an EDU water use value that is typical of the last few years (when water use was lower than preceding years), the medium scenario uses the average value for the period from 2003 to 2013, and the high-demand scenario uses the 75th percentile of the historical EDU water use. This analysis again excludes the top 22 water users.

Water Loss: From 2003 to 2009, water loss was significantly higher in Metzger than in Wolf Creek (reliable water loss data are not available after 2009). For the Metzger area, the water loss during that period represents the District’s worst-case scenario going forward (assuming no reduction), while reaching a five percent water loss represents the goal for system improvements. For Wolf Creek, it was assumed that no further water loss reductions are feasible and so 5 percent was used for the low-demand.

MDD/ADD Peaking Factor: The MDD/ADD peaking factor determines the relationship between maximum day and average day demands. Peaking values were chosen to represent the range of reported historical values. Due to metering errors in both service areas it was determined that a range of the typical values was preferable to using either the maximum or minimum reported peaking factors.

Exhibit 5-5. Planning Assumptions for the Wolf Creek and Metzger Service Areas.

Service Area	Demand Scenario	Demographic Growth Scenario	EDU Water Use (gpd/account)	Water Loss	MDD/ADD Peaking Factor
Wolf Creek	Low	Low	185	5%	2.0
	Medium	Average	200	7.5%	2.1
	High	High	223	10%	2.2
Metzger	Low	Low	165	5%	1.9
	Medium	Average	182	10%	2.0
	High	High	191	15%	2.2

Large User Demand Projections

Given that water demand by the District’s top 22 water users is distinct from other water users, separate demand projections were developed for these water users. Three demand scenarios based on the 2003 to 2013 historical water use trends were used to develop demand projections for each of the District’s top 22 water users.

The first scenario assumes demands follow the trend line of the historical data until the year 2034. This resulted in fairly high demand projections for the customers whose demands increased in the last ten years. However, for those with decreasing demands, this scenario resulted in fairly low demand projections. The second scenario assumes demands follow the trend line of the historical data from the last five years. Since the last five years of demand data was fairly flat for most customers, this resulted in little to no change. The last scenario assumes that the maximum historical demand is held constant.

The low demand projection uses whichever of the three demand scenarios gave the lowest demand for each of the 22 large users, so the low-demand projection could be a different scenario for different users. The high-demand projection uses whichever scenario gave the highest demand for each large user. The average-demand projection was the average of the three scenarios.

The maximum month to minimum month peaking factor for the top 22 users (as daily data was unavailable) was estimated to be 1.56.

Projected Equivalent Dwelling Units

The EDU projection compiles and weights the projections of all account types to provide the basis for ADD and MDD projections. The projected number of EDUs was determined by multiplying the number of accounts by the number of EDUs per account for each customer type. Wolf Creek EDU water use values were assumed for accounts associated with the expansion areas. EDU projections were developed for each pressure zone and future development area. These projections do not account for large users or gross water loss, which were accounted for separately.

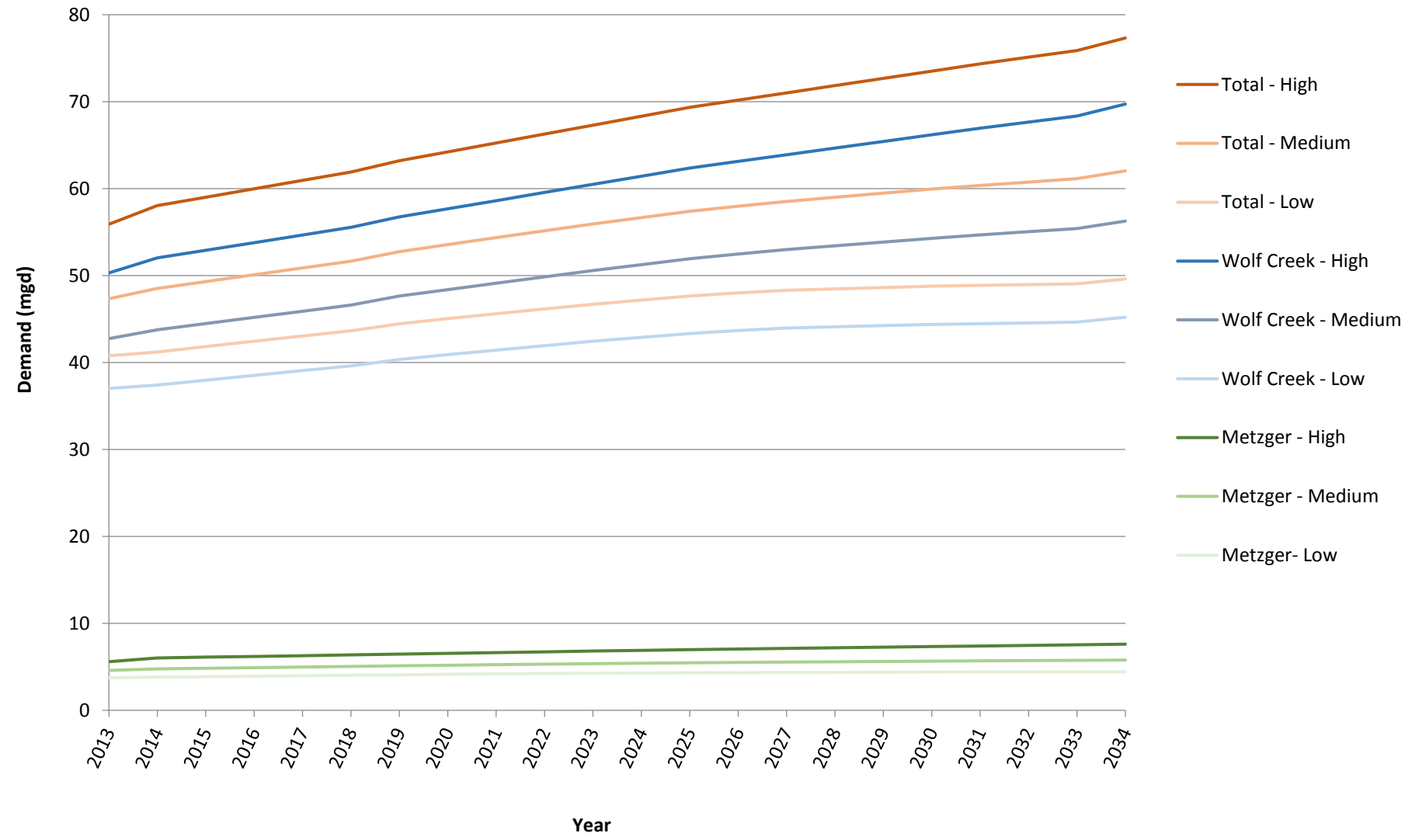
The average day demands include the projected customer demands, large user demands, and estimated water loss. The low, medium, and high projected ADD is calculated by multiplying the number of EDUs by the low, medium, and high EDU water use values. Large user demands were added to the pressure zone demands in which they are located. The low, medium, and high estimated water loss was added as a fixed percentage of the total demand using the low, medium, and high assumptions presented in **Exhibit 5-5**. The sudden increase in demand in 2034 represents the time at which West Union, West Bethany Urban Reserve, and Shute Road Urban Reserve are assumed to be brought into the District's service area.

Maximum day demands (MDD) were calculated by multiplying the ADD projections by the peaking factor for the appropriate scenario as shown in **Exhibit 5-5**. The District's MDD projections are shown in **Exhibit 5-6 and Exhibit 5-7**. In addition to the 10-year and 20-year MDDs, the MDD for 2026 is also included in **Exhibit 5-7**, for the reason previously described.

By 2064, the medium-demand scenario estimates that the District's MDD will be approximately 73.5 mgd.

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Exhibit 5-6. Projected MDD, by Service Area.



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Exhibit 5-7. Projected MDD (in mgd) by Service Area, in 2024, 2026, and 2034.

	2024	2026	2034
Low Growth			
Metzger	4.3	4.3	4.4
Wolf Creek	42.9	43.7	45.2
Total	47.2	48.0	49.6
Medium Growth			
Metzger	5.4	5.5	5.8
Wolf Creek	51.3	52.5	56.3
Total	56.7	58.0	62.1
High Growth			
Metzger	6.9	7.1	7.6
Wolf Creek	61.4	63.1	69.7
Total	68.3	70.2	77.3

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

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

As previously described, the District currently obtains its water supply from the JWC and the PWB. Under the current JWC agreement, the District has access to up to 12.5 mgd of supply from the JWC WTP. Under its current water sales agreement with the City of Portland, the District is required to purchase an average of 13.16 mgd annually and can get up to approximately 42.3 mgd through the Washington County Supply Line. In addition, the District is currently expanding its ASR system, and in the next 10 years, it anticipates its ASR system to have the capacity to provide up to 4.5 mgd for municipal water supply.

In 2024 (10 years), the District’s projected MDD under a medium-growth scenario is 56.7 mgd. The District has chosen to use the medium-growth scenario demand projections for planning purposes, because it provides the District with the ability to meet a reasonable mixture of high and low demand among the pressure zones in its service area. The District intends to meet its projected MDD of 56.7 mgd in 2024 through use of its full JWC allocation of 12.5 mgd, as well as up to 39.7 mgd of supply from the PWB, and 4.5 mgd from its ASR program.

The year 2026 is anticipated to be a turning point in water supply management for the District. In that year, the District expects to have access to Willamette River water supply, and it will renegotiate a regional water supply agreement with the City of Portland for a smaller amount to serve the Metzger service area. Beginning in 2026, the District intends to meet demands in the Wolf Creek service area through a combination of water supply from the JWC, the District’s ASR program, and the Willamette River supplied under *extended permit S-49240* (held by the WRWC, of which the District is a member). The District plans to continue to purchase wholesale water from the City of Portland to meet projected demands in the Metzger service area. The District is planning for a scenario in which JWC water would be unavailable on a peak day as a result of contamination in the Tualatin River, damage to transmission infrastructure, or for any other reason. (Planning for the loss of one of the District’s water supply sources is a

conservative method of preparing the District to have adequate water supply in an emergency.) Under that scenario, the District would meet its projected MDD of 58.0 mgd (under the medium-growth scenario) in 2026 using a combination of supply sources. The 52.5 mgd of projected demand in the Wolf Creek service area would be met by using 48.0 mgd from the Willamette River water and 4.5 mgd from its ASR program. Water from the PWB would be used to meet the Metzger service area’s projected MDD of 5.5 mgd.

The District’s 20-year projected demand (for 2034) is 62.1 mgd (under the medium-growth scenario). Similar to its water supply strategy in 2026, the District plans to meet that demand by using a combination of supply sources that includes serving the Wolf Creek service area with water from the JWC, the Willamette River and its ASR program, and obtaining water from the PWB to meet the demands in the Metzger service area. For planning purposes, the District is again taking the conservative approach of assuming that supply from the JWC is not available to meet its needs. In that circumstance, the District intends to meet its projected 2034 MDD for the Wolf Creek service area using up to 51.8 mgd from the Willamette River water and 4.5 mgd from its ASR program. Its projected 2034 MDD of 5.8 mgd for the Metzger service area would be met with water from the PWB.

As described above and shown in **Exhibit 5-8** the District is projected to need access to 74.3 cfs (48.0 mgd) of *extended permit* S-49240 in 2026 when the District plans to initiate diversion of water from the Willamette River to meet municipal water demands, and to need access to 80.1 cfs (51.8 mgd) under this permit by 2034. Currently, the District does not have access to the undeveloped portion of *extended permit* S-49240. Therefore, the District is requesting access to 80.1 cfs of “green light water” under *extended permit* S-49240. (The District understands that pursuant to the terms of the Final Order Incorporating Settlement Agreement for the extension of permit S-49240, its initial diversion of water under the permit shall only be authorized after a period of 60 days from the date of issuance of the final order approving a WMCP. The District does not, however, intend to initiate diversion of water until approximately 2026.)

Exhibit 5-8. Projected Medium-Growth MDD and Water Sources.

Year	Service Area	Demand by Water Source (mgd)				Total
		JWC	PWB	ASR	Willamette	
2024	Metzger	0	5.4	0	0	5.4
	Wolf Creek	12.5	34.3	4.5	0	51.3
	Total	12.5	39.7	4.5	0	56.7
2026	Metzger	0	5.5	0	0	5.5
	Wolf Creek	0	0	4.5	48.0	52.5
	Total	0	5.5	4.5	48.0	58.0
2034	Metzger	0	5.8	0	0	5.8
	Wolf Creek	0	0	4.5	51.8	56.3
	Total	0	5.8	4.5	51.8	62.1

The District currently projects that its build-out will occur in 2064. At that time, its MDD is projected to be 73.5 mgd. The preliminary design capacity of the District’s pipeline from the Willamette River is, however, projected to be only approximately 58 mgd, which will necessarily limit the District’s use of water under the WRWC permit S-49240.

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 District intends to begin diverting water under Permit S-49240 to meet its future water demands as described above.

In May 2012, the District's Board initiated an update of the District's water supply strategy based on changes related to its existing sources of supply. As previously described, the District currently relies almost exclusively on water provided by other municipal water providers (the JWC and the PWB). The District uses its existing groundwater rights only for backup supply when needed.

The District's first step was to develop population and demand projections. After considering these forecasts and assuming that the District would continue its aggressive conservation program (which has resulted in reductions in per-capita demands and peaking factors), the District identified four supply options: the PWB, the Willamette River, the Tualatin Basin Water Supply Project (which involved raising the dam at Hagg Lake) and obtaining groundwater supply from a well field in the Scappoose area. The District evaluated the four water supply options, considering both financial and non-financial criteria. The District's financial analyses included consideration of economics and impacts to rates. The non-financial evaluation criteria for each option included: demand uncertainty, source reliability (considering availability, water rights, and seismic vulnerability), source redundancy, implementation risk, public acceptance, community impacts, Metzger fluoridation, finished water quality, sustainability (considering energy requirements, infrastructure requirements, and environmental impacts), and governance. This evaluation process included significant public input, such as public outreach efforts to create awareness of the process and to obtain feedback. The District made information available to all District customers and interest groups. The District also held two open houses, organized a B.I.G. breakfast presentation, and requested meetings with groups and specific stakeholders to discuss the District's process.

Based on its extensive evaluation of the identified supply options, the District determined that the Willamette River is the preferred supply source based on the evaluated criteria. The Willamette River provides an available and reliable source of supply. According to OWRD's water availability analysis, water is available in the Willamette River at 80 percent exceedance every month of the year. The District's analysis also determined that obtaining water supply from the Willamette River was feasible, particularly in partnership with the City of Hillsboro. Finally, the District's intended change from the use of PWB water to the use of Willamette River water is not expected to have environmental impacts. The use of water under the WRWC Permit S-49240 has been conditioned (as part of the permit extension process) to maintain the persistence of listed fish species in the Willamette River.

As described above, the District's intention to initiate diversion of water under an existing permit (Permit S-49240) is primarily a result of a *change* in sources of supply. Unlike most municipal water suppliers that are seeking access to "green light water," the amount of water that the District intends to divert is not primarily based on increased demand over time.

Instead, the District intends to replace its primary water source for the Wolf Creek service area (currently PWB water) with water from the Willamette River.

Due to these circumstances, an analysis of conservation and interconnection related to the District's request to obtain access to Willamette River water supply is not necessarily applicable. Nonetheless, the District provides the following analysis of the extent to which the projected water needs can be met through other alternatives.

(a) Conservation Measures

As described in Section 3, the District has an extensive and award-winning conservation program. The reductions in demand that result from this conservation program were considered as part of the District's supply strategy evaluation. The result of that evaluation was a determination that the District would obtain a sustainable and reliable long-term supply from the Willamette River. It is not feasible for conservation alone to provide sufficient water supply to replace the supply from PWB. The District anticipates needing 48.0 mgd from the Willamette River starting in 2026. It goes without saying that the District cannot conserve 83 percent of its total projected demand in that year.

Moreover, conservation measures may delay, but cannot eliminate the need for additional water supply to meet the District's future demands as the result of growth within its service area. Therefore, a combination of conservation measures (as described in Section 3) and additional supply from the Willamette River (as described above) will both be required to provide the District with a secure supply to meet its water demands starting in 2026 and into the future.

(b) Interconnections

The District currently obtains its water supply almost exclusively from interconnections with other municipal water providers (the JWC and the PWB). As described above, the District recently concluded an analysis of strategies to obtain a reliable and sustainable water supply, which resulted in the selection of the Willamette River as the water source that would best meet its needs. The District intends to continue to obtain water supply from the JWC and the PWB, but to reduce its dependence on water supply from the PWB. Following extensive evaluation, the District concluded that this more balanced approach to relying on interconnections with other municipal water suppliers will be in the best interests of its customers.

(c) Cost effectiveness

OAR 690-086-170(c) requires an assessment of whether the projected water needs can be satisfied through other conservation measures that would provide water at a cost that is equal or less than the cost of other identified sources.

As described above, it is not feasible for conservation measures alone, regardless of the cost, to meet the District's need to replace water previously obtained from the PWB as part of the District's effort to obtain a secure and reliable water supply. The District's decisions to begin development of a Willamette River supply, in conjunction with cost effective conservation measures, will be used to meet the District's demands beginning in 2026.

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 20-year planning horizon. Within the next 20 years, the District is planning to need 80.1 cfs under the WRWC Permit S-49240 to help meet its projected water demands in 2034. Assuming that the water right is used at 80.1 cfs (51.8 mgd), 24 hours per day for 31 days during the maximum month (likely July or August), the maximum monthly volume for the water right would be approximately 1605.8 MG.

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 District currently is not required to take any mitigation actions under state or federal law. The final order on the extension application for the WRWC Permit S-49240, 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. The analysis must consider availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water.

At this time, the District does not intend to acquire new water rights to meet demands within the next 20 years, so the provisions of this section are not applicable.

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Appendix A

Letters to Local Governments and Comments

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Steven Sparks
City of Beaverton Planning Division
Beaverton City Hall
4755 SW Griffith Dr.
P.O. Box 4755
Beaverton, OR 97076

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. Sparks:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Colin Cooper
City of Hillsboro Planning Department
Civic Center, 4th Floor
150 E Main Street
Hillsboro, OR 97123

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. Cooper:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Chris Neamtzu
City of Wilsonville Planning Division
29799 SW Town Center
Loop E
Wilsonville, OR 97070

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. Neamtzu:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Tom McGuire
City of Tigard Permit Center Building
13125 SW Hall Blvd.
Tigard, OR 97223

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. McGuire:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Susan Anderson
City of Portland Planning and Sustainability
1900 SW 4th Avenue, Suite 7100
Portland, OR 97201

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Ms. Anderson:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Multnomah County Planning Department
1600 SE 190th Avenue
Portland, OR 97233

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Sir or Madam:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

July 14, 2014

Andy Back
Washington County Public Services Building
Land Use & Transportation Division
Planning and Development Services, Long Range Planning
155 N 1st Avenue, Suite 350
Hillsboro, Oregon 97124-3072

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Andy Back:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.



Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water  Service  Value

July 14, 2014

Willamette River Water Coalition
Kelly Ross
6745 SW Hampton, Suite 101
Portland, OR 97223

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. Ross:

The Tualatin Valley Water District 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 Tualatin Valley Water District and the Willamette River Water Coalition, 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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water  Service  Value

July 14, 2014

Niki Iverson
Water Resources Manager
City of Hillsboro
Hillsboro Civic Center
150 E. Main St., 3rd Floor
Hillsboro, OR 97123

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Niki:

The Tualatin Valley Water District 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 Tualatin Valley Water District and the Joint Water Commission, 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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

Tualatin Valley Water District



Delivering the Best Water Service Value

Robin McArthur, Director
Metro, Planning and Development
Metro Regional Center
600 NE Grand Ave
Portland, OR 97232-2736

October 22, 2014

Subject: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Robin McArthur:

The Tualatin Valley Water District 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 Tualatin Valley Water District'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.

If you have any questions, please feel free to contact me at 503-642-1511. Thank you for your interest.

Sincerely,

Mark Knudson
Chief Executive Officer

Enclosure

cc. Lisa Jaramillo, Oregon Water Resources Department



RECEIVED

AUG 15 2014

TUALATIN VALLEY
WATER DISTRICT

August 7, 2014

Mark Knudson
Tualatin Valley Water District
1850 SW 170th Avenue
Beaverton OR 97006

RE: Water Management and Conservation Plan

Dear Mr. Knudson:

Pursuant to your letter of July 14, 2014, I have reviewed the Tualatin Valley Water District's draft Water Management and Conservation Plan for consistency with the City of Beaverton Comprehensive Plan. The document appears to be consistent with the applicable provisions of the City's Comprehensive Plan concerning the future land use intensities and densities in the City.

It should be noted that this letter is not intended to make any commitment by the City in agreeing with the presumed service boundaries for the Tualatin Valley Water District as identified in the Plan. The service agreement between the City and the District is currently out of date and a new agreement needs to be negotiated.

If you have any questions, you may reach me at 503-526-2429.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven A. Sparks".

Steven A. Sparks, AICP
Principal Planner

cc: Peter Arellano, Public Works Director
David Winship, City Engineer
Bill Kirby, City Attorney



Community Development
29799 SW Town Center Loop East
Wilsonville, OR 97070
Phone 503-682-4960
Fax 503-682-7025
TDD 503-682-0843
Web www.ci.wilsonville.or.us

August 4, 2014

Mr. Mark Knutson, CEO
Tualatin Valley Water district
1850 SW 170th Avenue
Beaverton, Oregon 97006

RE: TVWD Water Management and Conservation Plan (WMCP) Review Comments

Dear Mr. Knutson:

Thanks for the opportunity to review your draft WMCP. On behalf of the City of Wilsonville, I am providing the following comments:

- The document is well organized, very readable, and appears to adequately cover the required topics for a WMCP.
- In Exhibit 2-7, the 2013 ADD/MDD/Peaking Factor for the Metzger area looks off. If the values for 2013 are potentially due to metering problems, perhaps a second footnote (on 2013) might be helpful.
- A similar comment would apply to Exhibits 2-10 and 2-11.
- In the discussion of the generally decreasing demand trend on page 2-11, it would be informative to add a sentence on the expectation of when the decreasing trend would bottom out or reverse.
- The discussion of Willamette River DEQ 303(d) listings on pages 2-31 through 2-33 appears more detailed than what we submitted in our 2013 WMCP. I've attached the applicable pages from our (approved) WMCP. Please check both documents for consistency and let me know if you find any discrepancies.
- The Water Curtailment section does not appear to address contamination events as a driver / trigger for various curtailment actions. An additional sentence or two might be beneficial.

If you have any questions on our comments, please let me know.

Sincerely,

A handwritten signature in blue ink that reads "Eric Mende".

Eric Mende PE
Capital Projects Engineering Manager

2.2.2 Population Served

According to demographic information provided by the 2010 US Census, the population of Wilsonville is 19,509. In addition, the City provides water for numerous commercial and industrial uses, as well as schools, churches and municipal facilities. For a more detailed breakdown of water usage among different categories of customers, please refer to Section 2.6 of this Chapter.

2.3 Adequacy and Reliability of Existing Supplies

A summary of the City's water rights is shown in Table 2.1. The City of Wilsonville holds surface water rights on the Willamette River for 30 cubic feet per second, which is the equivalent of 19.4 million gallons per day. These rights have a priority date of 1974, which the City considers to be reliable for purposes of municipal water supply and adequate for 20-year, and build-out (year 2045) supply needs (see Table 5.3). Furthermore, even during the most extreme low flow conditions, a withdrawal of 30 cubic feet per second represents less than 1% of the volume of the Willamette River at the point of diversion. As noted in Section 2.1.1, all components of the water treatment plant have built in redundancy and there is a backup diesel generator capable of powering the plant to meet average daily demands. Thus the City's surface water supply is considered to be both adequate and reliable for the planning timeframe covered by this Water Management and Conservation Plan.

The location of the treatment plant's intake is along a stretch of the Willamette River that is water quality limited and contains streamflow dependent species listed by state or federal agencies as sensitive, threatened, or endangered, but does not contain spawning/rearing habitat for threatened or endangered species. Water quality limitations for this portion of the Willamette River includes 303(d) listings for the following parameters: Aldrin, Biological Criteria, DDT, DDT Metabolite (DDE), Dieldrin, Iron, and PCB's. In addition, the Oregon Department of Environmental Quality (ODEQ) has approved Total Maximum Daily Loads (TMDLs) for the following parameters: Dioxin 2,3,7,8-TCDD, Mercury, Temperature, and E. Coli. STE species identified by ODFW in the vicinity of the City diversion point include:

- Upper Willamette River Chinook Salmon [*Oncorhynchus tshawytscha*]
 - State of Oregon Listing Status: N/A
 - Federal Listing Status: Threatened
- Upper Willamette River Steelhead [*Oncorhynchus mykiss*]
 - State of Oregon Listing Status: Sensitive-Vulnerable (winter run)
 - Federal Listing Status: Threatened

Water quality limitations and the presence of STE species does not impact withdrawals or operation of the Water Treatment Plant.

In addition to surface water, the City holds groundwater rights totaling 13.46 cubic feet per second, which equates to approximately 8.7 million gallons per day. Development limitations reduce allowed production rates to 10.31 CFS (6.7 MGD) until a Final Order is issued approving a revised WMCP, and access to a greater diversion is granted. However, historical experience from use of the City's wells has shown that physical limitations preclude continuous production at these rates. As the water table declined, production rates also declined. By the summer of 2001, production capability peaked at approximately 5 million gallons per day. Even though average annual water production



City of Tigard

RECEIVED

JUL 31 2014

TUALATIN VALLEY
WATER DISTRICT

July 28, 2014

Mark Knudson
Chief Executive Officer
Tualatin Valley Water District
1850 SW 170th Ave.
Beaverton, OR 97006

RE: Water Management and Conservation Plan for the Tualatin Valley Water District

Dear Mr. Knudson:

Thank you for the opportunity to review and comment on the Tualatin Valley Water District Draft Water Management and Conservation Plan (WMCP). The city is currently developing a master plan for the area known as the Tigard Triangle, which is located within the TVWD. We have a representative of TVWD on the project's technical advisory committee to ensure coordination between the two jurisdictions throughout the planning process. However, I'd also like to take this opportunity to share information with you about the Tigard Triangle Strategic Redevelopment Plan and how proposed changes may impact future water demands.

The Triangle is the area of Tigard bound by I-5, Highway 99 and Highway 217. Current uses in the area are mainly retail and office with a small number of older, single family homes. The City is developing the plan to encourage a greater mix of uses in the Triangle as was originally envisioned 20 years ago. There are two zones in the area – Mixed Use Employment (MUE) and General Commercial (C-G).

The plan shows roughly 35 acres of C-G being re-zoned to MUE, which will allow residential where it is currently not permitted. Some of the areas will have target densities of 30-50 units per acre. I've attached a map showing projected primary uses and a chart showing the estimated number of dwelling units under the proposed scenario. These additional units would be developed over a 20 plus year time frame. Adoption of any changes will not likely happen until spring 2015, and TVWD will be provided an opportunity for comment as part of the legislative process.

Please contact me if you have questions about the information I have provided.

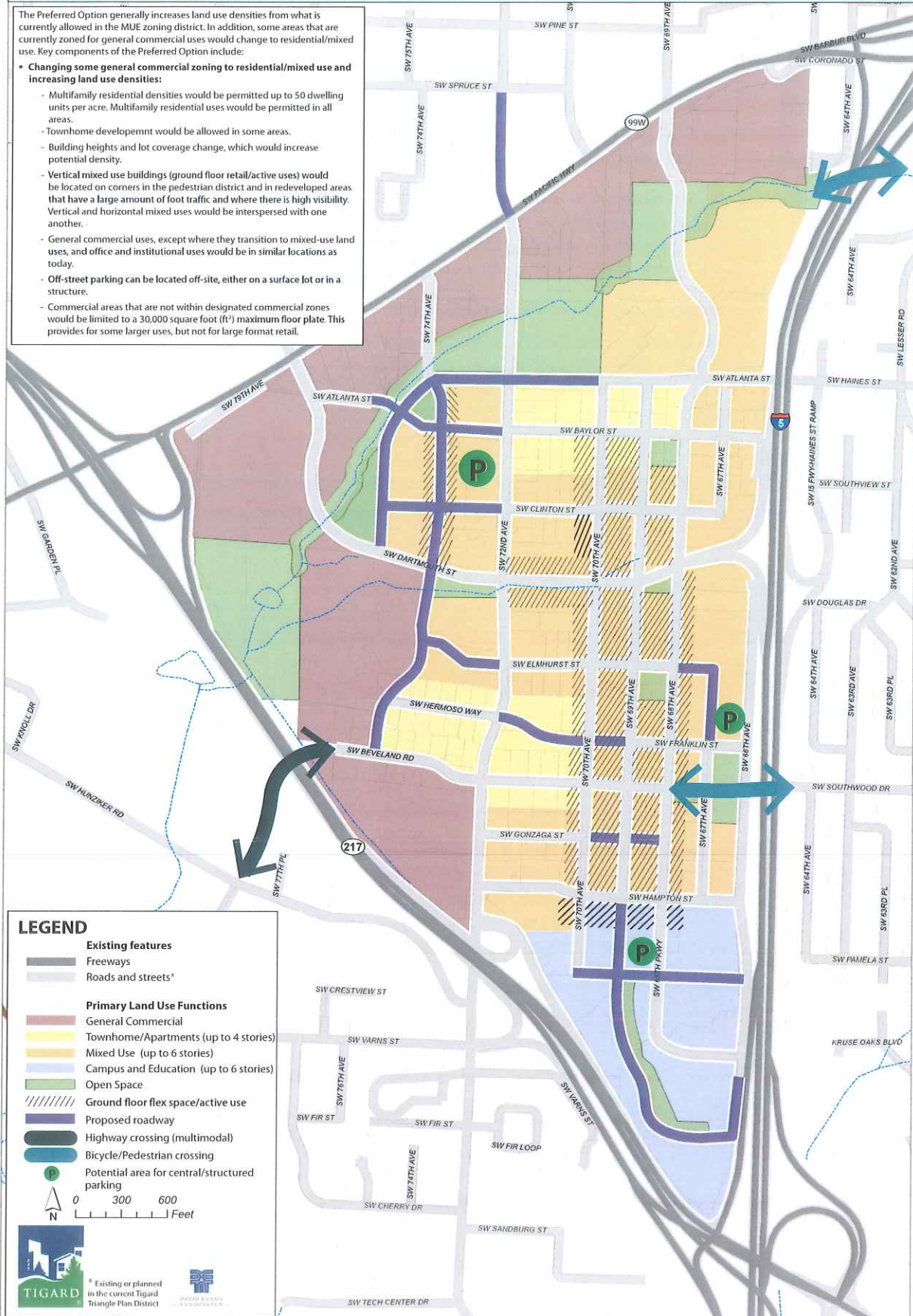
Sincerely,

Cheryl A. Caines
Associate Planner

Enclosures

The Preferred Option generally increases land use densities from what is currently allowed in the MUE zoning district. In addition, some areas that are currently zoned for general commercial uses would change to residential/mixed use. Key components of the Preferred Option include:

- **Changing some general commercial zoning to residential/mixed use and increasing land use densities:**
 - Multifamily residential densities would be permitted up to 50 dwelling units per acre. Multifamily residential uses would be permitted in all areas.
 - Townhome development would be allowed in some areas.
 - Building heights and lot coverage change, which would increase potential density.
 - Vertical mixed use buildings (ground floor retail/active uses) would be located on corners in the pedestrian district and in redeveloped areas that have a large amount of foot traffic and where there is high visibility. Vertical and horizontal mixed uses would be interspersed with one another.
 - General commercial uses, except where they transition to mixed-use land uses, and office and institutional uses would be in similar locations as today.
 - Off-street parking can be located off-site, either on a surface lot or in a structure.
 - Commercial areas that are not within designated commercial zones would be limited to a 30,000 square foot (ft²) maximum floor plate. This provides for some larger uses, but not for large format retail.



LEGEND

Existing features

- Freeways
- Roads and streets*

Primary Land Use Functions

- General Commercial
- Townhome/Apartments (up to 4 stories)
- Mixed Use (up to 6 stories)
- Campus and Education (up to 6 stories)
- Open Space
- Ground floor flex space/active use
- Proposed roadway
- Highway crossing (multimodal)
- Bicycle/Pedestrian crossing
- Potential area for central/structured parking

0 300 600 Feet

TIGARD
 * Existing or planned in the current Tigard Triangle Plan District

Preferred Option

	Dwelling Units	General Commercial Floor Space	Office	Retail/Flex Space in mixed use	Buildable Area	
	New DUs - Spatial	Build-Out Floor Area (sq. ft.) - Spatial	Build-Out Floor Area (sq. ft.) - Spatial	Build-Out Floor Area (sq. ft.) - Spatial	Gross Area (sq. ft.)	Net Buildable Area (sq. ft.)
Existing Zoning (Baseline)						
Commercial (CG)		462,324			6,853,690	3,073,198
Mixed-Use (MUE)	961		320,864		7,145,471	3,265,760
Baseline TOTAL	961	462,324	320,864	-	13,999,161	6,338,958
Existing Zoning-Changing Site Design Standards (Option 1)						
Commercial		460,954			6,818,282	3,019,157
Office (Campus and Education)			437,420		2,949,593	865,767
Mixed Use Residential	812				2,204,212	1,808,619
Mixed Use Office	195		1,141,574	270,279	1,271,307	498,780
Baseline TOTAL	1,007	460,954	1,578,994	270,279	13,243,394	6,192,322
Recommended Option						
Campus and Education			55,311		1,435,530	824,238
General Commercial		120,510			4,231,813	1,844,465
Mixed Use	794			110,779	1,868,692	1,660,192
Open Space					2,109,891	1,207,579
Townhome/Apartments	239				1,148,684	856,739
Mixed Use-High	1,132		1,009,741	112,193	3,197,345	1,672,915
Baseline TOTAL	2,165	120,510	1,065,052	222,972	13,991,955	8,066,128

Appendix B

TVWD Interconnections

Meter Name	Location	Location/Address	Source	Type of Intertie
JWC 221st St	TV HWY & 75TH	TV HWY & 75TH; 2995 SE 75TH AVE	JWC	Main Supply
JWC Cornelius Pass	CP FLUORIDE STATION	CP FLUORIDE STATION; 4375 NW CORNELIUS PASS RD	JWC	Main Supply
Portland Meter	RALEIGH VIEW PLAZA	RALEIGH VIEW PLAZA; 6849 SW BEAVERTONHILLS HWY	PORTLAND	Main Supply
Washington Park	WASHINGTON PARK	WASHINGTON PARK; 4033 SW CANYON RD	PORTLAND	Emergency
Metzger Meter	80TH & FLORENCE LN	80TH & FLORENCE LN; 7950 SW FLORENCE LN	PORTLAND	Main Supply
Multnomah	MULTNOMAH BLVD	MULTNOMAH BLVD; 6241 SW MULTNOMAH BLVD	PORTLAND	Emergency
Garden Home	GARDEN HOME AT 65TH	GARDEN HOME AT 65TH; 6430 SW GARDEN HOME RD	PORTLAND	Back-Up Supply
Bradley Corner	OLESON & HALL	OLESON & HALL; 9120 SW HALL BLVD	PORTLAND & TIGARD	Emergency
	FLORENCE LN	6501 SW FLORENCE LN	PORTLAND	Emergency
	62ND & KRUSE RIDGE	62ND & KRUSE RIDGE; 6128 SW KRUSE RIDGE	PORTLAND	Emergency
	BURNSIDE AT SKYLINE	BURNSIDE AT SKYLINE; 333 SW SKYLINE BLVD	PORTLAND	Emergency
	MILLER RD AT ASH	MILLER RD AT ASH; 463 NW MILLER RD	PORTLAND	Emergency
	8555 NW COPELAND ST	8555 NW COPELAND ST	PORTLAND	Emergency
	6512 SW TAYLORS FERRY RD	6512 SW TAYLORS FERRY RD	PORTLAND	Emergency
	6555 SW VERMONT ST	6555 SW VERMONT ST	PORTLAND	Emergency
	6519 SW PEYTON RD	6519 SW PEYTON RD	PORTLAND	Emergency
	160TH & TV HWY	160TH & TV HWY; 4085 SW 160TH AVE	TVWD TO BEAVERTON	Emergency
	CENTER ST	3540 SW CENTER ST	BEAVERTON	Emergency
	153RD & JENKINS	153RD & JENKINS; 15570 SW JENKINS RD	BEAVERTON	Emergency
	WEIR RD	WEIR RD; 16535 SW RED ROCK CT	BEAVERTON	Emergency
	HIGH HILL LN	HIGH HILL LN; 16590 SW HIGH HILL LN	BEAVERTON	Emergency
	DIVISION & VILLAGE	DIVISION & VILLAGE; 5435 SW VILLAGE PL	BEAVERTON	Emergency
	SPRINGFIELD & 161ST	SPRINGFIELD & 161ST; 5920 SW 161ST AVE	TVWD TO BEAVERTON	Emergency
	152 S OF DIVISION	152 S OF DIVISION; 5565 SW 152ND AVE	BEAVERTON	Emergency
	HART & 155	HART & 155; 7525 SW 155TH AVE	BEAVERTON	Emergency
	DENNY RD	DENNY RD; 6995 SW ROLLINGWOOD DR	TVWD TO BEAVERTON	Emergency
	HEATHER & 103RD	HEATHER & 103RD; 7205 SW 103RD	TVWD TO BEAVERTON	Emergency
	DAVIS RD AT BPA	DAVIS RD AT BPA; DAVIS RD	TVWD TO BEAVERTON	Emergency

	SEXTON MNT SCHOOL	SEXTON MNT SCHOOL; 15645 SW RIGERT	TVWD TO BEAVERTON	Emergency
	SW 125TH AVE & SW CENTER ST	SW 125TH AVE & SW CENTER ST	BEAVERTON	Emergency
	SW MERCER ST & SW CENTER ST	SW MERCER ST & SW CENTER ST	BEAVERTON	Emergency
	QUATAMA & CP	QUATAMA & CP; 22210 NW BIRCH ST	HILLSBORO	Emergency
	WALBRIDGE& CP	WALBRIDGE& CP; 275 SE 24TH AVE	HILLSBORO	Emergency
	BASELINE/CP	BASELINE/CP; 615 SW Cornelius Pass RD	HILLSBORO	Emergency
	CP/SHALEEN	CP/SHALEEN; 21575 SW Cornelius Pass RD	HILLSBORO	Emergency
	CORNELIUS PASS RD & JOHNSON	CP & JOHNSON; 2425 SW CORNELIUS PASS RD	HILLSBORO	Emergency
	CHERRY AND CP	CHERRY AND CP; 21520 SW CHERRY LN	HILLSBORO	Emergency
	EVERGREEN & CP ROADHOUSE	EVERGREEN & CP ROADHOUSE; 4045 SW CP RD	HILLSBORO	Emergency
	CP AND TV HWY	CP AND TV HWY; 7575 CP RD	HILLSBORO	Emergency
	OLESON RD	OLESON RD; 4822 SW OLESON RD	RALIEGH WATER	Emergency
	72nd AND CHERRY	72nd AND CHERRY; 7400 SW CHERRY DR	TIGARD	Emergency
	BAYLOR & 68TH	BAYLOR & 68TH; 11675 SW BAYLOR	TVWD TO TIGARD	Emergency
	CASCADE NEAR GREENBURG	CASCADE NEAR GREENBURG; 10795 SW CASCADE	TVWD TO TIGARD	Emergency
	SUNSET AND CAMELOT	SUNSET AND CAMELOT; 6801 SW SUNSET HWY	WEST SLOPE	Emergency
	SW ALOMA WAY & SW FIRLOCK WAY	SW ALOMA WAY & SW FIRLOCK WAY	RALEIGH HILLS	Emergency

Appendix C

TVWD Intergovernmental Agreements

Title	Date	Parties	Scope
Interim Water Conservation Plan Resolution No. 3230	July 16, 1993	Hillsboro, Forest Grove, Beaverton, TVWD	"Committing to an Interim Water Conservation Plan." Conserving to comply with Barney Reservoir Expansion Project
Joint Water Commission Water Service Agreement Amendment	June 30, 1994	Hillsboro, Forest Grove, Beaverton, TVWD	Adds TVWD as member of Joint Water Commission
Joint Ownership Agreement-Barney Project (Rev 6-08-94) (AKA the "Original Barney Agreement")	July 19, 1994	Hillsboro, Forest Grove, Beaverton, TVWD, United Sewerage Agency	"Establish joint ownership [and management] of a proposed expanded water reservoir commonly known as 'J.W. Barney Reservoir'." Includes Warranty Deed for land ownership in Yamhill (June 19, 1968) and Washington Counties (April 29, 1968).
Hillsboro-Beaverton-TVWD Joint Water Transmission Agreement	September 21, 1994	Hillsboro, Forest Grove, Beaverton, TVWD	Amends Joint Water Service Agreement of April 17, 1979, by adding TVWD as part owner of the joint transmission line system.
Northside Water Transmission Agreement	April 11, 1997	Hillsboro, Forest Grove, Beaverton, TVWD	Construction of Phase I of Northside Transmission Line
Northside Water Transmission Agreement- Phase II	Jan. 14,2000	TVWD, Hillsboro, JWC	Construction of Phase II of Northside Transmission Line
Transmission Line Intergovernmental Agreement	Jan. 14, 2000	JWC, Hillsboro, TVWD, Cornelius	To coordinate the design and construction of replacement 72-inch water line that runs from the slow sand filter plant to Forest Grove and Cornelius and from which Cornelius has obtained domestic water service pursuant to a contract between Hillsboro and Cornelius.
Wilsonville Master Agreement	July 6, 2000	TVWD & Wilsonville	Agreement regarding the Willamette River water treatment plant design, construction, operation and maintenance, and property ownership.
Wilsonville Accord	June 19, 2001	TVWD & Wilsonville	Adds more details to the Wilsonville Master Agreement including, but not limited to, provisions related to leasing of supply capacity, future expansion, and voting rights.
Ordinance No. 1-03	19-Feb-03	TVWD	TVWD authorizing an Intergovernmental Agreement Continuing the JWC - Hillsboro, Forest Grove, Beaverton and Tualatin Valley Water District.
Authorizing Ordinances	Mar-03	Hillsboro, Forest Grove, Beaverton, TVWD	Each city authorizing an intergovernmental agreement titled "Joint Ownership Agreement Barney Project" which continues the Barney Reservoir Joint Ownership Commission.

Water Service Agreement	27-Oct-03	JWC - Hillsboro, Forest Grove, Beaverton & TVWD	Terminates and replaces the Water Service Agreement, the Amended Water Service Agreement, the Transmission Agreement, the Amended Transmission Agreement, the Northside Water Transmission Agreement and the Northside Water Transmission Agreement Phase II.
Joint Ownership Agreement- Barney Project	27-Oct-03	Hillsboro, Forest Grove, Beaverton, TVWD, CWS	Terminates and Replaces the "Original Barney Agreement" (Rev 6-08-94).
Ordinance No. 1-04	1-Apr-04	TVWD	Authorizing a first amendment to the water service agreement and joinder agreement relating to the Joint Water Commission.
City of North Plains Water Supply Agreement	14-Jan-05	JWC, North Plains	Joint Water Commission wholesale water supply agreement with City of North Plains, expires in December 31, 2014.
Regional Water Sales Agreement	3-Apr-06	City of Portland, TVWD	Contract for TVWD to purchase water from the PWB.
Sherwood-TVWD Water Treatment Plant Agreement	Dec. 27, 2006	TVWD and Sherwood	Agreement regarding TVWD's sale to Sherwood of a portion of TVWD's ownership interest in the Supply Facilities described in the Wilsonville Master Agreement.
First Restated Intergovernmental Cooperative Agreement Creating the Willamette River Water Coalition	Oct., 2008	TVWD, Sherwood, Tigard & Tualatin	Continued the Willamette River Water Coalition
Ordinance 01-13	Sept. 20, 2013	TVWD	Ordinance establishing policies and direction to add the mid-Willamette River supply option to TVWD's water supply portfolio.

Appendix D

Final Order Incorporating Settlement Agreement

**Final Order Incorporating Settlement Agreement
Extension of Time for Permit S-49240**

Appeal Rights

This is a final order in other than 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 either 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.

Application History

The Department issued Permit S-49240 on April 8, 1985. The permit called for completion of construction by October 1, 1987, and complete application of water to beneficial use by October 1, 1988. On January 18, 2005, Tualatin Valley Water District (TVWD) submitted an application to the Department for an extension of time for Permit S-49240. In accordance with OAR 690-315-0050(2), on February 20, 2007, the Department issued a Proposed Final Order (PFO) proposing to extend the time to complete construction and the time to fully apply water to beneficial use to October 1, 2047, and to make the extension subject to certain conditions. The protest period closed on April 6, 2007, in accordance with OAR 690-315-0060(1). On April 6, 2007, WaterWatch of Oregon filed a protest against the PFO. On June 7, 2007, the permit was assigned from Tualatin Valley Water District to the Willamette River Water Coalition (WRWC).

In the PFO, the Department concluded that, based on the factors demonstrated by TVWD, the permit may be extended subject to certain conditions. On June 21, 2007, a Settlement Agreement was entered into between OWRD, the WRWC, and WaterWatch of Oregon. The Settlement Agreement is incorporated into this Final Order and is attached hereto. Pursuant to the Settlement Agreement, the following permit extension conditions have been agreed to:

Conditions

Development Limitations

1. The first diversion by each municipal water supplier of any water under permit S-49240 shall only be authorized after a period of 60 days from the date of issuance of a final order pursuant to OAR Chapter 690, Division 86 approving a Water Management and Conservation Plan (WMCP). For each subsequent WMCP filed by each municipal water supplier requesting diversion of water under permit S-49240, diversion of any amount of water by that municipal water supplier greater than the amount of water authorized for diversion by the previous WMCP shall only be authorized after a period of 60 days from the date of issuance of a final order pursuant to OAR Chapter 690, Division 86

approving that subsequent WMCP. For example, if in the year 2008 the initial WMCP final order authorizes use of 5.0 cfs under extended permit S-49240, and the subsequent WMCP final order in the year 2012 authorizes use of a total of 10.0 cfs under extended permit S-49240, the subject municipal water supplier shall not divert or use the additional 5.0 cfs under the year 2012 WMCP final order for 60 days after the final order is issued. Initial WMCPs shall be submitted to the Department by the municipal water suppliers that are authorized to use water under this permit as of the date of this Final Order, within 3 years from the date of this Final Order. Use of water under permit S-49240 shall be consistent with the applicable approved WMCP.

2. The deadline established in this Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. The Department may determine that a WMCP submitted to meet the requirements of this order also meets the WMCP submittal requirements of other Department orders.
3. Additional future municipal water suppliers that serve more than 1,000 individual residential or business end-user customer accounts, and that are authorized to use water under this permit pursuant to any contract or Intergovernmental Agreement (excluding short-term or emergency arrangements), shall submit a new or revised WMCP that also meets the requirements of items (4) and (5) below. Any such contract or Intergovernmental Agreement (excluding short-term or emergency arrangements) that allows municipal water suppliers that serve more than 1,000 individual residential or end-user business customer accounts to use water under Permit S-49240 shall include a provision that provides notice of the provisions of this extension Final Order, and in particular conditions #1 and #3 of this Final Order. For the purposes of this condition "short-term" means an Intergovernmental Agreement or contract that does not exceed one continuous period of two calendar years. For the purposes of this condition "emergency arrangement" means an Intergovernmental Agreement or contract to provide water to an entity in the event the entity loses its water supply due to unforeseen circumstances, for a period not to exceed one continuous period of one calendar year.
4. In addition to the requirements of OAR Chapter 690, Division 86, before using water under permit S-49240, each municipal water supplier authorized to divert or use water under this permit, and which is required to submit a WMCP pursuant to this extension Final Order, shall submit a WMCP that includes a section titled "Willamette River Fish Flows: Public Education and Voluntary Conservation" and receive a final order approving the WMCP pursuant to OAR Chapter 690, Division 86. Each subsequent WMCP submitted by these municipal water suppliers will also include such a section. WMCP section "Willamette River Fish Flows: Public Education and Voluntary Conservation" will include the following elements:
 - a. Implementation steps for initiating and disseminating a public education message (as further specified below) to its water use customers, reasonably calculated to inform the customers of the municipal water supplier. Such education message shall be disseminated by placing such message on the water supplier's website and by either (1) media, or (2) print or electronic communications delivered to the customers (e.g. bill inserts or e-mail communications), or both.

An annual April 1 public education message will be provided. The April 1 public education message covers instances where streamflows fall below the minimum fish flow needs at Salem identified in this Final Order on extension of permit S-49240 (minimum fish flow needs at Salem) during the entire April 1 to May 31 time period.

An additional public education message will be provided upon the seven-day rolling average of mean daily streamflows (measured on the Willamette River at Salem, USGS Gage number 14191000) falling below the minimum fish flow needs at Salem by 10 percent or more for 15 consecutive days, at any time of the year (except for April 1 to May 31). Such message will be placed on the water supplier's website until the minimum fish flow needs at Salem are met.

Another message will be distributed through the media, or by print or electronic communication for each period of 15 consecutive days that the seven-day rolling average of mean daily streamflows are below the minimum fish flow needs at Salem by 10 percent or more.

- b. Description of the content of the public education message:
 - i. Inform customers: about the status of river flows in relation to the minimum fish flow needs in the Willamette River, measured at Salem and the connection between their water use and Willamette River flows; that Willamette River flows are important to fish (including a description of fish resources and the presence of any listed fish); and that the Willamette River is part of the entity's source of supply.
 - ii. Provide a list of voluntary water conservation measures that are commonly accepted as effective, consistent with the municipal water supplier's WMCP, varying by season as appropriate. Such list must include, but shall not be limited to, avoidance of outdoor watering, avoidance of outdoor car washing, and avoidance of washing outdoor surfaces.
 - iii. Inform water use customers that while water conservation is important year-round, it is especially important when minimum fish flow needs in the Willamette River, measured at Salem, are not being met.
- c. A discussion of the public education message distribution and the recommended voluntary conservation measures and why they are reasonably expected to reduce water use.
- d. A reminder to OWRD staff concerning OWRD's obligation described in Term 3 of the Settlement Agreement concerning extension of time for Permit S-49240.

Conditions to Maintain the Persistence of Listed Fish

5. The maximum total amount of water that can legally be diverted shall be reduced in proportion to the amount by which the flows shown in Table 1 are not met based on a seven day rolling average of mean daily flows measured on the Willamette River at Salem (USGS Gage Number 14191000), as illustrated in the examples below. During April, May and June, the reduction in the amount that can be legally diverted will not exceed 20 percent.

Example 1:

On July 15, the last seven mean daily flows were 7000, 6500, 6000, 5500, 5250, 5000 and 4750 cfs. The seven day rolling average is 5714 cfs. The maximum total amount of water that can legally be diverted under this permit would not be reduced because the 7 day average of mean daily flows is greater than the 5,630 target flow for July 15.

Example 2:

If on July 15 the average of the last seven mean daily flows was 5,011 cfs, then the target flows would be missed by 11 percent $(100 - (5010/5630)*100)$. If the applicable WMCP indicates that the maximum total amount of water that can be legally diverted under the permit is 10 cfs, then the maximum total amount of water that could be legally diverted under this permit would be reduced by 11 percent.

July - October	5,630
November - March	6,200
April - May	15,000
June 1 - 15	12,600
June 16 - 30	8,500

Based on comments on the PFO from TVWD, OWRD's continuing evaluation reveals that certain other changes should be made to the PFO. The two following sections supersede the corresponding original sections from the PFO.

Findings of Fact

48. In accordance with OAR 690-315-0090(3), and as specified under Item 1 (Development Limitations) of the "Conditions" section of this PFO, the Department has determined that this extension shall be conditioned to provide that the diversion of any water under Permit S-49240 shall only be authorized under a final order issued pursuant to OAR Chapter 690, Division 86 approving a WMCP(s).

Conclusions of Law

7. In accordance with OAR 690-315-0090(3), and as described in Finding 48 above, the Department has established, as specified under Item 1 of the "Conditions" section of this Proposed Final Order for an Extension of Time, that the diversion of any water under Permit S-49240 shall only be authorized under a final order

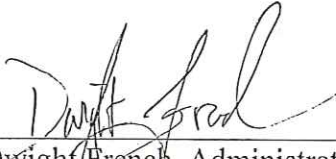
issued pursuant to OAR Chapter 690, Division 86 approving a WMCP(s), except that diversion of any amount of water authorized for the first time by any WMCP shall not occur until 60 days after issuance of the final order, as specified in Development Limitation 1.

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.230, 539.010(5) and OAR 690-315-0080(3).

Order

The extension of time for Application S-50693, Permit S-49240, therefore, is approved subject to conditions contained herein. The deadlines for complete construction and the time to fully apply water to beneficial use are extended to October 1, 2047.

DATED: June 26, 2007



Dwight French, Administrator
Water Rights and Adjudications Division

for

Phillip C. Ward, Director

If you have any questions about statements contained in this document, please contact Ann L. Reece at (503) 986-0808.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900

NOTE: Include a copy of the "Important Notice" document along with the original copy of the Final Order being sent to the permit holder.

Mailing List for Extension FO Copies

Application S-50693
Permit S-49240

FO Date: June 26, 2007

Original mailed to permit holder:

Willamette River Water Coalition
Attn: General Manager, Tualatin Valley Water Dist.
PO Box 745
Beaverton, OR 97075

Copies Mailed
By: (SUPPORT STAFF)
on: (DATE)

Copies sent to:

1. WRD - Appl. File S- 50693 / Permit S-49240
2. WRD – Dwight French, Administrator – Water Rights and Adjudications Division
3. WRD – Debbie Colbert, Senior Policy Coordinator
4. WRD – Bill Fujii
5. ODFW – North Willamette District 3, Danette Ehlers, Clackamas
6. DEQ – NW Region, Andy Schaedel, Portland
7. Golder Associates, Inc., 9 Monroe Parkway, Suite 270, Lake Oswego, OR 97035
8. Adam Sussman, GSI Water Solutions, 1600 Western Blvd., Suite 240, Corvallis, OR 97333
9. Clark Balfour, Cable Huston Benedict Haagensen & Lloyd LLP, Suite 2000, 1001 SW Fifth Ave., Portland, OR 97204-1136

Fee paid as specified under ORS 536.050 to receive copy:

10. None

Receiving via e-mail (10 AM Tuesday of signature date)

11. PFO: WRD – Watermaster District 16 – Mike McCord, Salem
Done by _____ Date _____

CASEWORKER: ALR

BEFORE THE OREGON WATER RESOURCES DEPARTMENT

In the Matter of Extension of Time for Application)	
S-50693, Permit S-49240 in the name of the)	
Willamette River Water Coalition,)	SETTLEMENT
<i>Applicant,</i>)	AGREEMENT
))	
WaterWatch of Oregon, Inc.,)	
<i>Protestant</i>)	
))	
_____)	

The Oregon Water Resources Department ("OWRD"), the Willamette River Water Coalition ("WRWC"), and WaterWatch of Oregon, Inc. ("Protestant"), referred to collectively as "the Parties" and each individually a "Party," do hereby stipulate and agree in this "Settlement Agreement" as follows:

Stipulations

- I. On January 18, 2005, Tualatin Valley Water District ("TVWD") submitted a \$250 application fee and an "Application for Extension of Time," consistent with municipal and quasi-municipal water use permit extension rules OAR 690-315-0070 through 690-315-0100, requesting the time to complete construction of the water system and to apply water to full beneficial use be extended from October 1, 1997 to October 1, 2047.
- II. On February 20, 2007, OWRD issued a Proposed Final Order ("PFO") recommending approval of the request for an extension of time with certain conditions.
- III. On April 6, 2007, the Protestant submitted a \$250 protest fee and a protest regarding the PFO on extension of time for Permit S-49240, Application S-50693.
- IV. On June 7, 2007, OWRD approved an assignment of Permit S-49240 from Tualatin Valley Water District to the WRWC. The WRWC now holds Permit S-49240.
- V. The Parties agree to resolve Protestant's pending administrative protest to the February 20, 2007 PFO on application for extension of time for Permit S-49240, Application S-50693 on the following terms.

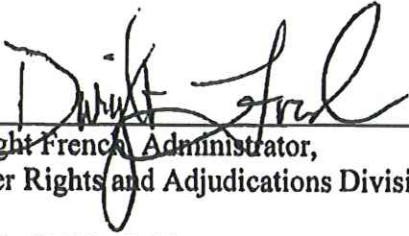
Terms of Agreement

1. Effective immediately upon signature of this Settlement Agreement by all Parties, the WRWC withdraws its application for an extension of time for Permit S-49240 pursuant to Oregon Administrative Rule (OAR) Chapter 690 Division 320. The WRWC expressly retains its application for an extension of time for Permit S-49240 pursuant to OAR Chapter 690 Division 315.
2. Regarding the application for extension of time for Permit S-49240, Application S-50693, dated January 18, 2005, WRWC and Protestant hereby expressly waive all right and opportunity to request a contested case hearing, request for reconsideration, exceptions, or to

seek judicial review of the Final Order if substantively consistent with this Settlement Agreement and the attached Draft Final Order, in addition to waiving any right and opportunity to challenge this Settlement Agreement, including the attached Draft Final Order which is part of the Settlement Agreement. The Parties expressly retain the right to take whatever lawful action is necessary to remedy a breach or ensure performance of this Settlement Agreement and Final Order by any entity or party required to perform pursuant to it. Nothing in this Settlement Agreement affects the rights of any party to challenge other orders pertaining to the use of water under this permit, including orders regarding associated Water Management and Conservation Plans.

3. In reviewing Water Management and Conservation Plans (WMCP) of municipal water suppliers authorized to use water under Permit S-49240 and which are required to submit WMCP(s) pursuant to the Final Order on extension of time for permit S-49240, OWRD will make a finding regarding whether the WMCP section "Willamette River Fish Flows: Public Education and Voluntary Conservation" includes the elements set forth in Development Limitation Condition 4 of the Final Order on extension of time for Permit S-49240. In the event that OWRD inadvertently fails to make such a finding, OWRD shall have an opportunity to correct the omission in a timely manner once the omission is discovered.
4. After WRWC and Protestant sign this Settlement Agreement, they will mail the complete signed original documents back to the Oregon Water Resources Department, ATTN: Mike Reynolds, 725 Summer St. NE, Suite A, Salem, OR 97301-1266.
5. Within 30 days after OWRD receives the original Settlement Agreement signed by WRWC and Protestant, OWRD will issue a Final Order consistent with this Settlement Agreement and substantively consistent with the Draft Final Order attached to this Settlement Agreement. The Final Order will incorporate this Settlement Agreement by reference and as an attachment.
6. Each Party to this Settlement Agreement represents, warrants, and agrees that the person who executes this Agreement on its behalf has the full right and authority to enter into this Agreement on behalf of that Party and bind that Party to the terms of this Settlement Agreement.
7. Each Party to this Settlement Agreement certifies that it has had a reasonable opportunity to review and request changes to the Settlement Agreement, and that it has signed this Settlement Agreement of its own free will and accord. Each Party to this Settlement Agreement also certifies that it has read and understands the entire Settlement Agreement and Draft Final Order.
8. This Settlement Agreement may be signed in counterparts, each of which will be deemed an original, and all of which together shall constitute one and the same Settlement Agreement. This Settlement Agreement is only effective after all Parties have signed the Settlement Agreement.

**SIGNATURE PAGE FOR SETTLEMENT AGREEMENT
ON EXTENSION OF TIME FOR APPLICATION S-50693, PERMIT S-49240**

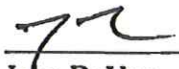


Dwight French, Administrator,
Water Rights and Adjudications Division
for
Phillip C. Ward, Director
Oregon Water Resources Department

June 15, 2007
Date

Print name: _____
for
Willamette River Water Coalition

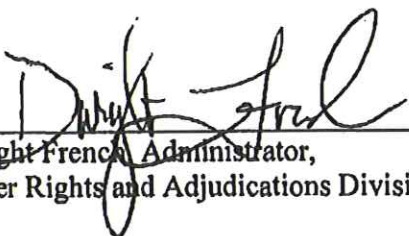
Date



John DeVoe
for
WaterWatch of Oregon, Protestant

Jun 21, 2007
Date

**SIGNATURE PAGE FOR SETTLEMENT AGREEMENT
ON EXTENSION OF TIME FOR APPLICATION S-50693, PERMIT S-49240**



Dwight French, Administrator,
Water Rights and Adjudications Division
for
Phillip C. Ward, Director
Oregon Water Resources Department

June 15, 2007
Date



Print name: Richard P. Burke
for
Willamette River Water Coalition

6-18-07
Date

John DeVoe
for
WaterWatch of Oregon, Protestant

Date

RECEIVED

JUN 21 2007

WATER RESOURCES DEPT
SALEM, OREGON