Progress Report

Water Management and Conservation Plan

Prepared for

City of Bend

June 2016

Prepared by

GSI Water Solutions, Inc.
1600 SW Western Blvd., Suite 240 Corvallis, OR 97333
P: 541.753.0745 F: 541.754.4211
info@gsiws.com www.gsiws.com

This page intentionally left blank.

Contents

Exhibits

Appendices

Executive Summary

The City of Bend (City) operates a public drinking water system that supplies water to its customers from groundwater from the Deschutes Aquifer and surface water from Bridge Creek and Tumalo Creek. The City recognizes the value of these water sources and actively seeks opportunities to protect and conserve its water supply for the benefit of its customers and the entire Deschutes Basin.

The City first submitted a Water Management and Conservation Plan (WMCP or Plan) to the Oregon Water Resources Department (OWRD) in August 1998. The City has submitted two updated WMCPs since that time. The most recent update was submitted on January 3, 2011. OWRD issued a final order approving the City's WMCP dated June 30, 2011, and required the City to submit a WMCP progress report by June 29, 2016. This Progress Report was developed to meet that OWRD requirement.

This Progress Report consists of five sections. Section 1 is an introduction that describes the progress report requirements. Section 2 describes the status of 5-year water management and conservation benchmarks established in the City's 2011 WMCP. Section 3 summarizes average daily and average monthly diversions under the City's water rights. Section 4 compares water consumption for the past 6 years to water consumption presented in the 2011 WMCP. Section 5 presents the City's annual water audits for the past 6 years.

Water Conservation Benchmarks

The City's 2011 WMCP included numerous benchmarks for initiating or expanding water management and conservation measures related to the various programs required by OWRD. During the past 5 years, the City has worked diligently to meet the identified benchmarks. The following discussion summarizes the activities enacted by the City.

Annual Water Audit. An annual water audit compares the quantity of water put into the City's water system to the quantity of water delivered to its customers. These audits allow the City to identify system leakage, estimate non-revenue water, and better understand water system distribution efficiency. The City met its annual water audit benchmarks. It conducted annual water audits, and the City also increased the accuracy of its water use information by initiating a rate modernization process, including a plan for reorganizing its customer class information and implementing advanced metering infrastructure (AMI) technology at every customer water meter. Although not required by OWRD, the City adopted the American Water Works Association's (AWWA) M36 methodology in 2013. Water audits with this methodology provide the most up-to-date analysis of the City's water distribution system efficiency and accuracy.

Water Meters. All service connections to municipal water supply systems should be metered, and the inaccurate meters must be repaired or replaced to ensure accurate water use and billing data. The City's water system has been fully metered since 2004, and the City met its water meter benchmarks by installing water meters at all new service connections, replacing existing meters with the new AMI technology, and improving production meter accuracy by replacing five source water meters with more accurate metering technology.

Water Rates and Billing. Municipal water supplies should have rate structures and bills that promote conservation. The City updated its utility rate structure in July 2015 and meets this requirement in a number of ways. The City now bills its water customers based on the entire quantity of water metered each month and no longer provides a monthly allowance of 400 cubic

feet as part of its base charge. In addition, the City's sewer rates are based on the winter quarter average (December, January and February), which is the proxy for establishing average indoor use of water that would flow to the sewer system (i.e., not used outside on the landscape). Sewer bills that are based on the average indoor water use further incentivize the efficient use of water for indoor purposes. Finally, the City updated its bill format, and monthly bills now provide customers with additional details about their water consumption and information about their utility.

Leak Detection and Pipeline Repair/Replacement. Maintaining an efficient water system requires the detection and repair of leaks. The City's distribution system is relatively new and system leakage is calculated to be less than both OWRD's requirement of 15 percent and an optimal goal of 10 percent or less. Nonetheless, the City actively and continuously seeks to eliminate such water losses. Consistent with its water management and conservation benchmarks, the City repairs or replaces pipelines when any leaks are discovered in its distribution system. The City conducted a leak detection survey within a portion of the distribution system consisting of 19.6 miles of some of the oldest distribution mains in the City's service area. The 2015 survey identified 18 leaks that are repaired or in the process of being repaired.

The City also monitors customer water use records using the new AMI technology to detect potential leaks on its customers' side of the water meters. Monthly reports documenting *constant* water consumption are reviewed to identify potential customer leaks. Those customer accounts that are verified as likely having leaks are contacted by Finance Department or Utility Department personnel in an effort to identify where the leak is occurring and to help resolve the issue.

Public Education. Public education and outreach are key components of a public water conservation program. The City recognizes the value of partnering with its customers to conserve water and, accordingly, has conducted water conservation outreach and provided information to the public through conventional media and the City's Web site, and by attending public events.

The City filled its water conservation program manager vacancy in January 2014. Since then, the City has been able to increase the scope and quantity of its public education and outreach efforts, which have included launching a Sprinkler Inspection Pilot Program, Bend WaterWise Landscape Guide, WaterWise Speakers Series, expansion of the City's Bend WaterWise Landscaping photo Web site, co-creation of a local water education program for area middle school students, and creation of multiple informational water conservation videos.

Technical and Financial Assistance. Providing technical and financial assistance is an opportunity for water providers to encourage their customers to implement conservation measures. The City has implemented several programs to provide such assistance, consistent with its benchmarks. As part of its Large Landscape Program, the City met regularly with owners of large landscapes that were in need of, or interested in, increasing landscape irrigation efficiency, including Bend Parks and Recreation District, Bend LaPine Schools, Housing Works, and Pilot Butte State Park. The City also distributed water conservation items to its customers including toilet leak dye tabs, shower timers, irrigation water gauges, and indoor water conservation kits.

Supplier-Financed Retrofit/Replacement of Inefficient Fixtures. Replacing inefficient water fixtures is another important way for a water provider to assist its customers in conserving water. The City met its benchmarks in this area with multiple activities, including continuing to upgrade City-owned irrigation controllers, analyzing the cost effectiveness of several packages of potential water conservation incentive programs, and providing its customers with information

about the U.S. Environmental Protection Agency's (EPA) WaterSense-labeled products through its water conservation Web site.

Water Diversion and Consumption

As shown in Section 3 of this Progress Report, the City's annual diversions of surface water and groundwater varied during the 6-year reporting period. The City's average daily appropriation of groundwater ranged from 4.38 million gallons (MG) per day in 2011 to 10.39 MG per day in 2015. Its average daily diversion of surface water ranged from 2.61 MG per day in 2015 to 6.53 MG per day in 2013 (Note: The surface water system was being reconstructed from 2012 -2015 which caused a variation in surface water use).

During this Progress Report's 6-year reporting period, the City experienced significant growth as well as a full economic recovery, and the number of water service connections in the City's service area also increased by 2,236. While some annual variations exist, the City's total annual water consumption has shown a similar increasing trend from 2010 through 2015. Total annual consumption during this period ranged from a low of 3,716.2 MG in 2011 at the bottom of the economic downturn, to a maximum of 4,438.8 MG in 2015 where most experts agree we are in full recovery mode.

Progress reports typically compare water consumption by customer category during a set period of time. The comparison is useful for identifying major water customers and water use trends, which then can enhance a water provider's water conservation strategies and water system planning. An analysis of the City's water consumption over time by customer categories is difficult, however, because, consistent with one of its 2011 WMCP benchmarks, the City made changes to its customer database and introduced the multi-family customer category in late 2013. Consequently, and only for purposes of comparison in this Progress Report, the City has grouped its customers into residential and non-residential categories. Grouping its customers into these two categories allows a water use comparison with 2011 WMCP data in Section 3.

Annual Water Audit

An annual water audit is an effective tool for utilities to quantify water consumption and losses that occur in the distribution system and the management processes of the utility. As part of an annual water audit, metered water consumption for all customer categories is compared to production meter records (the quantity of water delivered to a water distribution system from all sources). The difference is equivalent to a system's non-revenue water. System leakage is one component of non-revenue water and often is attributed to water lost from deteriorating pipes, compromised pipe joints, leaking valves, and other water system components. Other components of non-revenue water include water used for firefighting, flushing of water mains, and testing new infrastructure.

OWRD's administrative rules set a goal for system leakage of 15 percent or, if feasible, to 10 percent or less. The City's annual water audits demonstrate that it has a well maintained and managed water system. The City's non-revenue water has remained below 10 percent since 2008 and averaged an impressive 3.8 percent from 2010 through 2015.

In 2013, the City's Utility Team adopted and began implementing the new national water audit standard known as the AWWA M36 annual water auditing methodology. This methodology

provides a greater level of water audit accuracy and an additional set of performance indicators for how efficiently the utility distributes water and collects revenue.

SECTION 1

Progress Report Elements

Introduction

The City of Bend (City) operates a public drinking water system (Public Water System Identification Number 4100100) that supplies water to its customers from groundwater from the Deschutes Aquifer and surface water from Bridge Creek and Tumalo Creek.

The City first submitted a Water Management and Conservation Plan (WMCP or Plan) to the Oregon Water Resources Department (OWRD) in August 1998. The City has submitted two updated WMCPs since that time. The most recent update received a final order of approval from OWRD on June 30, 2011. The City submitted the WMCP to comply with: (1) the final order approving the City's 2004 updated WMCP, (2) conditions in Permits G-16177 and G-16178, and (3) conditions in the final order approving an extension of time for Permit G-8565.

The City's 2011 WMCP included descriptions of its water sources, water rights, historical water use, curtailment plan, projected water demands, and strategy for meeting those future water needs. The WMCP also described the City's extensive portfolio of water management and conservation activities, and its plans for additional actions to be implemented during the next 5 years. The current OWRD final order approving the City's 2011 WMCP requires the City to submit a WMCP progress report by June 29, 2016. This Progress Report was developed to meet that OWRD requirement.

Oregon Administrative Rule (OAR) 690-086-0120(4) states that progress reports submitted by municipal water suppliers shall include the following:

(a) A list of the benchmarks established under OAR 690-086-0150 (i.e., benchmarks described in the most recent WMCP) and a description of the progress of the municipal water supplier in implementing the associated conservation or other measure

(b) Average monthly and daily diversions under each water right held by the water supplier for the previous 5 years

(c) A description of the results of the annual water audit required under OAR 690-086-0150(4)(a) (i.e., description of an annual water audit that includes a systematic and documented methodology for estimating any unmetered authorized and unauthorized uses)

(d) A comparison of quantities of water used in each sector as identified and described in OAR 690-086-0140(6) (i.e., water use characteristics of customers by category, such as residential, commercial, and industrial, and any other uses described in the most recent WMCP) with the quantities of water used in each sector for the previous 5 years

OWRD uses progress reports to determine whether 5-year benchmarks are being met, whether it will authorize additional diversion of water under extended permits, and/or if schedule changes proposed in updated plans are reasonable and appropriate.

Progress Report Organization

This Progress Report fulfills the requirements of the rules adopted by the Water Resources Commission in November 2002 (OAR Chapter 690, Division 86). This Progress Report is organized into the following sections, each addressing specific sections of OAR-086-0120(4):

Section	***Requirement***
Section 1 – Progress Report Elements	*OAR 690-086-0120(4)*
Section 2 – Water Conservation Benchmarks	*OAR 690-086-0120(4)(a)*
Section 3 – Water Right Diversions	*OAR 690-086-0120(4)(b)*
Section 4 – Water Consumption	*OAR 690-086-0120(4)(d)*
Section 5 – Annual Water Audit	*OAR 690-086-0120(4)(c)*

SECTION 2

Water Conservation Benchmarks

This section satisfies the requirements of OAR 690-086-0120(4)(a).

This rule requires a list of the benchmarks established in the most recent WMCP and a description of the progress of the municipal water supplier in implementing the associated conservation or other measure.

Introduction

This section details the progress that the City has made during the past 5 years in meeting water management and conservation benchmarks established in the 2011 WMCP. The City has made significant investments in staff time and resources to improve water conservation and to meet its 5-year benchmarks. The City recognizes the importance of the water resources in the Deschutes Basin and has made conservation and the efficient use of water a priority. The emphasis that the City places on conservation reflects these community values.

A summary of this section is presented **Appendix A,** which states each of the conservation benchmarks established in the City's 2011 WMCP and concisely provides the required description of the progress made toward meeting each benchmark.

Water Conservation Accomplishments

Annual Water Audit

Summary of Benchmarks: The City will develop and implement an annual water audit program within 5 years to more accurately assess revenue and non-revenue water. As part of this effort, the City will reorganize and update customer classes and work toward equipping all water meters with advanced metering infrastructure (AMI) technology.

Status:

- In addition to the water audit described in Section 4 of this Progress Report, the City began conducting annual water audits using the American Water Works Association's (AWWA) M36 methodology in 2013. Water audits with this methodology have been completed annually since that time and represent the most accurate and up-to-date analysis of the City's water distribution efficiency.
- The City has reorganized and updated its customer class information, which has increased the accuracy of its water use information.
- The City also has implemented AMI technology at every water meter. This allows staff members to better understand how and when water is used, furthering water conservation efforts such as customer leak notifications and water budgeting analysis for large users.
- Authorized unbilled water use for flushing, water quality testing, and reservoir cleaning and draining now are tracked, so their exact percent contribution to the overall non-revenue water can be determined.

Water Meters

Summary of Benchmarks: The City will continue to install water meters at all new service connections, to replace all existing meters with the new AMI technology, and to use improved technology when upgrading or replacing existing source meters.

Status:

- The City water system is fully metered and has continued to require water meters on all new service connections.
- The City completed an AMI upgrade to all meters, including hydrant meters, in 2012.
    - Upgrading water meters to include the latest AMI technology has had multiple benefits for the City and more specifically, the WaterWise Program. These benefits include:
        - Increased level of supply-side and customer-side leak detection capabilities with hourly water use data provided every 4 hours.
        - Better conservation measure targeting capabilities through comparison of detailed customer water use data and staff-calculated water budgets.
        - More thorough understanding of customer class water use patterns provides better ability to forecast future water demands.
- The City replaced four source water meters with more accurate magnetic flow meters, improving system metering and the accuracy of water audits.

Water Rates and Billing

Summary of Benchmarks: The City will continue to bill customers based, in part, on the quantity of water metered, and within the next 5 years will eliminate the monthly water allowance, which is 4 ccf (ccf = 100 cubic feet). The City also will continue to send monthly bills and to provide water efficiency and conservation information with bills.

Status:

- The City continues to bill customers based, in part, on the quantity of metered water use.
- The City approved a new rate structure beginning July 1, 2015. The new rate structure eliminated the 4 ccf monthly allowance and calculates sewer charges based on potable water metered during December, January, and February, often referred to as winter-quarter-average (WQA).

  The changes to the City's utility rate structure have had multiple positive impacts on water conservation. These benefits include:

    - Customers now are billed for every gallon of water consumed. Previously, customers consuming less than 4 ccf per month (approximately 3,000 gallons) had little financial incentive to conserve water. The elimination of this monthly allowance provides a financial incentive for the City's customers to conserve water.
    - The new sewer rates based on the potable water WQA provide an additional financial savings for indoor water efficiency for the entire year. Financial savings now can accrue on both water consumption charges and sewer charges. The result is an increased level of interest in eliminating indoor leaks, replacing outdated plumbing fixtures, and reducing indoor water use.

  - Sewer rate calculations for multi-family customers changed to a per-dwelling unit-based charge instead of the flat sewer rate that was previously in place. The result of this change is a heightened level of interest in indoor water efficiency options for these facilities.

- The City continues to send bills on a monthly basis, which provides its customers with timely information about their water consumption.
- The City includes monthly newsletters with the utility bills that contain relevant information about the utility and water conservation. Regular information includes news about current awareness campaigns, such as U.S. Environmental Protection Agency's (EPA) WaterSense' Fix a Leak Week and the Irrigation Association's Smart Irrigation Month. Other topics included the City's response to drought, the availability of indoor water conservation kits, and the WaterWise Program's Sprinkler Inspection Program.

Leak Detection and Pipeline Repair/Replacement

Summary of Benchmarks: The City will continue to conduct leak detection surveys of its infrastructure to monitor pipe integrity over time and to monitor customer consumption records for evidence of leaks. The City also will use newly installed AMI technology to monitor customer consumption and help to identify leaks.

Status:

- The City continues to repair and replace water distribution infrastructure when leaks are evident.
- The City conducted a leak detection survey within a portion of the distribution system consisting of 19.6 miles of some of the oldest distribution mains in the City's service area. The 2015 survey identified 18 leaks that are repaired or in the process of being repaired.
- The City continues to detect and communicate potential leaks to customers found on the customer side of the meter. The ability to identify these leaks increased significantly with the implementation of AMI technology at each meter. Typically, a water meter returns to "zero" at night or when buildings are empty or closed. When the AMI meter detects a meter that does not return to "zero," it typically indicates a leak within the customer service line or location, and the customer is automatically notified.
- The City continues to conduct leak repairs and meter upgrades even though system leakage is calculated to be less than the OWRD optimal goal of 10 percent or less.

Public Education

Summary of Benchmarks: The City will continue to conduct water conservation outreach and provide information to the public through conventional media, the City's Web site, and by attending public events. The City also will explore the potential for development of personnel cost-sharing between the City's three utilities.

Status:

- The City continues to conduct outreach and provide water conservation materials to the public, including shower timers and toilet leak detection tabs, water conservation fact sheets and success stories, utility bill inserts, and videos.
- The City filled its water conservation program manager vacancy in January 2014. Since then, the City has been able to increase the scope and quantity of its public education and outreach efforts. Additional public education and outreach efforts include:
    - Creation of a new Sprinkler Inspection Pilot Program
    - Creation of the Bend WaterWise Landscape Guide
    - Expansion of the City's Bend WaterWise Landscaping photo Web site
    - Distribution of free indoor water conservation kits
    - Public recognition for "WaterWise Stewards" at City Council meetings
    - Launch of an annual WaterWise Speakers Series
    - Co-creation of a water education program for middle school science students
    - Annual Smart Irrigation Month controller giveaway through social media
    - Annual participation in EPA's WaterSense Fix a Leak Week
    - Creation of multiple informational water conservation videos
- The City also explored and budgeted for an additional full-time employee to assist with public education and enforcement of the City's water conservation and stormwater regulations. This position was approved through adoption of the current fiscal year 2016/2017 biennial budget cycle and recruitment is anticipated in calendar year 2016.

Technical and Financial Assistance

Summary of Benchmarks: The City will continue to maintain water-conservation-focused partnerships with large water users, to distribute toilet leak dye tabs and shower timers, and to fund and use the U.S. Bureau of Reclamation's Agrimet weather station and its Web site. The City will conduct an incentive program cost analysis and create water budgets for targeted customer groups.

Status:

- The City continues to explore and expand technical and financial assistance programs for utility customers. These technical and financial programs include the following:
    - **Large Landscape Program.** The City continued to meet regularly with owners of large landscapes that were in need of, or interested in, increasing landscape irrigation efficiency. Partnerships were created or maintained with the following:
        - **Bend Metro Parks and Recreation District.** Staff members met semi-regularly to discuss water conservation efforts for several parks within the

City's water service area. The City created water budgets for several parks and discussed possible water conservation opportunities.

- **Bend-LaPine Schools.** Staff members met semi-regularly with the Bend-LaPine Schools maintenance staff to discuss water conservation through the use of smart irrigation controller technology. Bend-LaPine Schools were featured in a WaterWise Success Story and recognized by the City Council in 2015 for being awarded the WaterWise Steward designation.
- **Shevlin Center Owners Association.** Staff members met multiple times during 2014 and 2015 to help reduce water use throughout the Shevlin Center Owners Association mixed-use commercial development. The City completed thorough water budgeting and identification of water conservation opportunities. These efforts continue.
- **Oregon State Parks: Pilot Butte State Park.** Staff members met with Oregon State Parks officials to discuss water use at Pilot Butte State Park. The City created a water budget that included recommendations on how to meet Governor Brown's Executive Order No. 15-09, which seeks to reduce water consumption across all state agencies by no less than 15 percent on or before December 31, 2020.
- **Housing Works.** Staff members met several times with central Oregon affordable housing provider Housing Works to discuss water use at one of its multi-family dwelling facilities. Staff members analyzed historical water use, created landscape water budgets, and identified opportunities for indoor and outdoor water conservation.

- **Toilet Leak Dye Tabs and Shower Timer Distribution**. The City continues to distribute specific items that help customers use water more efficiently, including toilet leak dye tabs, shower timers, irrigation water gauges, and indoor water conservation kits. Each of these items was made available at the WaterWise Program's City Hall informational kiosk or by mail.
- **Conduct Incentive Program Cost Analysis**. The City completed a water conservation measure analysis as part of the 2011 WMCP. The conservation measure analysis included a series of conservation measure "packages" that grouped conservation measures together. The City evaluated costs as a conservation cost per ccf. The conservation measure analysis identified several indoor conservation measures and devices as most cost effective. Consequently, staff members continued to distribute a variety of informational resources, indoor conservation kits, toilet leak dye tabs, and shower timers.

- The City continues to fund the Bend Station (BEWO) of the U.S. Bureau of Reclamation's Agrimet weather station. The weather station provides free daily evapotranspiration (ET) data and archiving of the data via its Web site and to anyone using a smart irrigation controller. Staff members provide a link to the Agrimet Web site from the City's Web site. The ET data are used in water budget efforts for outdoor landscapes to better understand the changing water needs of the plants. Currently, the City is updating its existing Web site host and plans to include real-time ET data from either Agrimet or a different source after the upgrades are complete.

Supplier-Financed Retrofit/Replacement of Inefficient Fixtures

Summary of Benchmarks: The City will continue to increase irrigation efficiency of City-owned right-of-way and roundabout landscapes. The City will study the cost effectiveness of a toilet replacement or incentive program. The City will provide customers with a list of qualifying toilets and a toilet efficiency fact sheet. The City also will become an EPA WaterSense Partner.

Status:

- The City continues to implement smart irrigation controller upgrades and additional water efficiency measures throughout City-owned landscapes. All new City-owned landscapes must adhere to the City's Engineering Standard and Specification. This standard promotes an increased level of water efficiency in the landscape through direction to (1) use smart irrigation technology, drip irrigation where possible, and (2) limit the use of lawn to functional areas.
- The City analyzed the cost effectiveness of a toilet replacement or incentive program in the 2011 conservation measure analysis conducted by HDR. In the analysis, toilet incentive programs were determined to be $1.94 to $2.78 per ccf for EPA WaterSense-labeled toilets that flush at the 1.28 gallon per flush standard.
- A listing of all EPA WaterSense-labeled toilets is available through a link to EPA WaterSense from the City's water conservation Web site.
- The City became an EPA WaterSense Partner, member of Alliance for Water Efficiency, and member of the Irrigation Association in 2014.

Reuse, Recycling, and Non-Potable Water Opportunities

Summary of Benchmarks: The City will continue to look for opportunities to increase the use of recycled water.

Status:

- The City continues to look for and consider new opportunities to use recycled water from its water reclamation facility. However, use of recycled water in the City's potable distribution service area has not proven to be a cost-effective use of the resource. Instead, the City continues to deliver approximately one-half of its recycled water to the Pronghorn golf resort and master planned development. The other half of the City's reclaimed water is directed to seepage ponds for return to the Deschutes Basin.

Other Measures

Summary of Benchmarks: The City will evaluate adoption of modified irrigation restrictions. The City will continue to implement current landscape standards, seek appropriate partnership opportunities, look for coordination opportunities to more efficiently communicate and implement related programs, support the hydrant meter program, and develop a long-term water conservation project budget.

Status:

- The City adopted a modified set of irrigation restrictions to help promote irrigation and utility operational efficiency. The City modified irrigation hours to include all hours between 5 p.m. to 9 a.m. The even/odd day restriction continued, but irrigation is allowed by all customers on the 31st of the month. Staff members continue to evaluate the effectiveness of these irrigation restrictions and other potential restrictions as the community and utility grow.
- The City continues to implement efficient landscape irrigation standards through its Engineering Standard and Specification. This standard applies to all City-owned and public landscapes. Staff members continue to evaluate the applicability of this standard to the Bend Development Code.
- The City continues to seek appropriate partnerships that help further water conservation efforts. Long-term partnerships with Bend Parks and Recreation District, Bend-LaPine Schools, and Oregon State Parks continue while partnerships with EPA WaterSense, Alliance for Water Efficiency, Irrigation Association, and others solidify and evolve.
- The City's Utility Department continues to develop its public communications. The Department identified multiple communications-focused objectives to analyze and develop through its Strategic Plan. These communication objectives are currently being evaluated in a Department-wide strategic communications planning effort.
- The City continues to use hydrant meter boxes for customers who want to obtain water from area hydrants. Each hydrant meter box contains a water meter complete with AMI hardware for easy water use consumption reporting, billing, and analysis. This program continues to be vital in the recording of authorized water use and for water audit reporting purposes.
- The City continued to fund the WaterWise Program through Utility Department operating funds, but did not develop a capital improvement budget for water conservation because of limited staff and resources.

This page intentionally left blank.

SECTION 3

Water Right Diversions

This section addresses the requirements of OAR 690-086-0120(4)(b).

This rule requires a description of average monthly and daily diversions under each water right held by the water supplier for the previous five years.

Introduction

This section presents average daily and average monthly diversions under water rights held by the City from 2010 through 2015, as shown in **Exhibit 3-1**. Six years of data are shown instead of just 5 years to provide a continuous record beyond the last year reported in the City's 2011 WMCP.

Terminology

The following terms are used to describe specific values of system demands:

- **Average day diversion** equals the total annual diversion (i.e., demand) under the given water right divided by the number of days in the year (typically 365 days).
- **Average monthly diversion** equals the total annual diversion (i.e., demand) under the given water right divided by the number of months in the year (12 months).

Generally, water right diversions (i.e., demands) are expressed in units of cubic feet per second (cfs). Demands and consumption in municipal systems also are expressed in units of million gallons per day (mgd) and gallons per minute (gpm). Annual or monthly values typically are expressed in units of million gallons (MG).

This page intentionally left blank.

Exhibit 3-1. Average Daily and Average Monthly Diversions, 2010-2015.

Application Number	Permit Number	Certificate or Transfer Number	Authorized Wells	Priority Date	Authorized Rate (cfs)	Authorized Rate (mgd)	Type of Beneficial Use	Maximum Withdrawal To Date	Average Daily Withdrawal (MG)						Average Monthly Withdrawal (MG)						Authorized Date for Completion	Mitigation Credits	Notes
								Instantaneous (cfs)	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015			
Groundwater																							
G-12226	G-11380	85414	Outback Well #1 Outback Well #2 Outback Well #3 Outback Well #4 Bear Creek Well #1 Airport Well #2	9/7/1990	10	6.5	Municipal	10													N/A - Certificated	N/A	
G-5644	G-4946	68702	River Well #1 River Well #2	10/31/1971[1]	0.9	0.6	Municipal	0.9													N/A - Certificated	N/A	-
G-5644	G-4946	85415	River Well #1 River Well #2	10/13/1971	2.7	1.7	Municipal	2.7													N/A - Certificated	N/A	
G-5644	G-4946	85412	River Well #1 River Well #2 Copperstone Pilot Butte Well #1	10/13/1971	7.57	4.9	Municipal	7.57													N/A - Certificated	N/A	-
G-5644	G-4946	85413	River Well #1 River Well #2 Pilot Butte Well #1 Bear Creek Well #1 Bear Creek Well #2	10/13/1971	4.87	3.1	Municipal	4.87													N/A - Certificated	N/A	-
G-8695	G-8565	85411	A Well (Westwood)	12/22/1978	1.51	1.0	Quasi-Municipal	1.51	4.76	4.38	6.18	5.3	6.65	10.39	144.8	133.1	188.6	161.3	202.2	316.1	N/A - Certificated (Partial perfection)	N/A	
G-8695	G-8565		A Well (Westwood) Pilot Butte Well #4 Shiloh Well #3 Hole Ten Well #1 Hole Ten Well #2	12/22/1978	0.94	0.6	Quasi-Municipal														10/1/2020	N/A	Permit Amendment T-10941
G-11942	G-11379	85559	Rock Bluff Well #1 Rock Bluff Well #2 Rock Bluff Well #3	6/30/1989	4.16	2.7	Municipal	4.16													N/A - Certificated (Partial perfection of Permit G-11379)	N/A	
G-11942	G-11379		(Rock Bluff) Well #1 (Rock Bluff) Well #2 (Rock Bluff) Well #3 Pilot Butte Well #3	6/30/1989	3.84	2.5	Municipal														10/1/1998 - extension application pending	N/A	Permit Amendment T-8342

Exhibit 3-1. Average Daily and Average Monthly Diversions, 2010-2015, Continued.

Application Number	Permit Number	Certificate or Transfer Number	Authorized Wells	Priority Date	Authorized Rate (cfs)	Authorized Rate (mgd)	Type of Beneficial Use	Maximum Withdrawal To Date	Average Daily Withdrawal (MG)						Average Monthly Withdrawal (MG)						Authorized Date for Completion	Mitigation Credits	Notes
								Instantaneous (cfs)	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015			
Groundwater continued																							
G-13097	G-16177		Bear Creek Well #3 Bear Creek Well #4 Bear Creek Well #5 Outback #7 Shiloh #3 Hole Ten 1 Hole Ten 2	8/27/1992	12	7.8	Municipal	0													4/26/2027	Obligation: 1,611.5; Assigned: 204.5	Limited by Maximum annual volume of 3,223 AF and corresponding mitigation provided. Permit Amendment T-11138.
G-13098	G-16178		Pilot Butte Well #3 Pilot Butte Well #4 Pilot Butte Well #5 Outback #7 Shiloh #3 Hole Ten 1 Hole Ten 2	8/27/1992	12	7.8	Municipal	0													5/2/2027	Obligation: 1,611.5; Assigned: 526.25	Limited by Maximum annual volume of 3,223 AF and corresponding mitigation provided. Permit Amendment T-11138.
G-4677	G-4435		7.75 cfs total; Lava Island Well #1 Lava Island Well #2 Lava Island Well #3 Lava Island Well #4 Lava Island Well #5 Lava Island Well #6 Lava Island Well #7 Lava Island Well #8 Bear Creek Well #2 Outback Well #3 Outback Well #4 Outback Well #5 Outback Well #6 Pilot Butte Well #4 Shiloh Well #3 Hole Ten Well #1 Hole Ten Well #2	11/8/1968	7.75 cfs total; 0.935 0.98 0.98 0.97 0.97 0.97 0.97 0.975 N/A N/A N/A N/A N/A N/A N/A N/A N/A	5 mgd total; 0.60 0.63 0.63 0.63 0.63 0.63 0.63 0.63 N/A N/A N/A N/A N/A N/A N/A N/A N/A	Municipal		*	*	*	*	*	*	*	*	*	*	*	*	10/1/2020	N/A	Permit Amendments T-8783, T-10351, and T-10941

*= See above

Exhibit 3-1. Average Daily and Average Monthly Diversions, 2010-2015, Continued.

Application Number	Permit Number	Certificate or Transfer Number	Facility/ Location Name	Priority Date	Authorized Rate (cfs)	Authorized Rate (mgd)	Type of Beneficial Use	Maximum Withdrawal To Date	Average Daily Withdrawal (MG)						Average Monthly Withdrawal (MG)						Authorized Date for Completion	Mitigation Credits	Notes
								Instantaneous (cfs)	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015			
Surface Water																							
S-67983	S-49823	85713	Bridge Creek and Unnamed Tributary of Middle Fork Tumalo Creek	12/12/1983	12.2	7.9	Municipal	12.2	5.69	6.35	5.09	6.53	5.54	2.61	173	193	155.3	198.6	168.7	79.4	N/A - Certificated (Partial perfection of Permit S-49823)	N/A	
S-67983	S-49823		Bridge Creek and Unnamed Tributary of Middle Fork Tumalo Creek	12/12/1983	2.8	1.8	Municipal														10/1/1999 - extension application pending	N/A	
Decree: Vol. 1, Page 153		85526	Tumalo Creek	This right is senior to all other rights on Tumalo Creek	6	3.9	Domestic, Municipal	6													N/A - Certificated	N/A	
Decree: Vol. 1, Page 135		31411	Tumalo Creek	8/5/1900	2	1.29	Municipal	2													N/A - Certificated	N/A	Period of use: 4/15-10/15; Not to exceed 6.52 cfs and 821.7 AF/year
				9/1900	4.5	2.91		4.5														N/A	
				6/1/1907	0.02	0.01		0.02														N/A	
Decree: Vol. 1, Page 135		31665	Tumalo Creek	9/1900	1.314	0.85	Municipal	1.314													N/A - Certificated	N/A	Period of use: 4/15-10/15; Not to exceed 2.603 cfs and 328.14 AF/year
				4/28/1905	0.186	0.12		0.186														N/A	
				6/1/1907	1.103	0.71		1.103														N/A	
Decree: Vol. 1, Page 135		Transfer B-112	Tumalo Creek	10/29/1913	4/1-5/1: 2.43 5/1-5/15: 3.23 5/15-9/15: 5.99 9/15-10/1: 3.23 10/1-11/1: 2.43	4/1-5/1: 1.57 5/1-5/15: 2.09 5/15-9/15: 3.87 9/15-10/1: 2.09 10/1-11/1: 1.57	Municipal	0													10/1/2019	N/A	Period of use: 4/1-11/1; Not to exceed 5.99 cfs and 1,923.5 AF/year.

Notes:
[1]Priority date day is likely a typo. Application G-5644 and Permit G-4946 has priority dates of 10/13/1971.
AF = acre-feet
mgd = million gallons per day
MG = million gallons
cfs = cubic feet per second
N/A = not applicable

This page intentionally left blank.

SECTION 4

Water Consumption

This section satisfies the requirements of OAR 690-086-0120(4)(d).

This rule requires a comparison of quantities of water used in each customer category as identified in the most recent WMCP with the quantities of water used in each customer category for the previous five years.

Introduction

This section compares the consumption reported in the City's 2011 WMCP to consumption during the past 6 years (2010-2015). Although this comparison typically would be done for each customer category, the City's evaluation considers residential and non-residential customer water use for the reason described below. The comparison is useful for identifying the City's major water customers and water use trends, which then can enhance the City's water conservation strategies and water system planning. Consumption is equal to the City's metered water use.

Exhibit 4-1 presents the City's total annual water consumption and water service connections. **Exhibit 4-2** presents the City's annual consumption numerically from 2010 through 2015. **Exhibit 4-3** presents the same information graphically. **Exhibit 4-4** presents just 2015 consumption by customer category in a pie chart. **Exhibit 4-5** compares annual consumption by residential and non-residential customer categories during the past 6 years to annual consumption by these customer categories in 2008 and 2009.

During this Progress Report's 6-year reporting period, the City experienced significant growth. As shown in Exhibit 4-1, the number of water service connections in the City's service area increased by 2,236, from 22,227 in 2010 to 24,463 in 2015. The City's total consumption has shown a similar increasing trend from 2010 through 2015, with a low of 3,716.2 MG in 2011 and a maximum of 4,438.8 MG in 2015.

Analysis of consumption over time for the single-family residential, multi-family residential, and commercial customer categories is difficult because the City introduced the multi-family residential customer category in late 2013. The introduction of the multi-family residential customer category satisfies a 2011 WMCP benchmark. Consequently, for the comparisons to the 2011 WMCP within this Progress Report, the City has grouped its five customer categories into residential and non-residential customer categories to analyze water use trends in those two categories. Despite the overall increasing trend of water consumption by the two customer categories, the City's available water supplies continue to exceed demand.

In comparison with 2011 WMCP data, residential customer consumption has continuously increased from 2,266.9 MG in 2011 to 2,961.9 MG in 2015. Non-residential customer consumption had an increasing trend through 2013, peaking at 1,599.9 MG, but then decreased to 2010 levels thereafter. Consumption by these two customer categories in 2008 and 2009 was similar to 2013 levels. Going forward, the new customer classification refinements will provide a more detailed look into water use by individual categories.

Exhibit 4-1. Annual Consumption and Water Service Connections, 2010-2015 (MG).

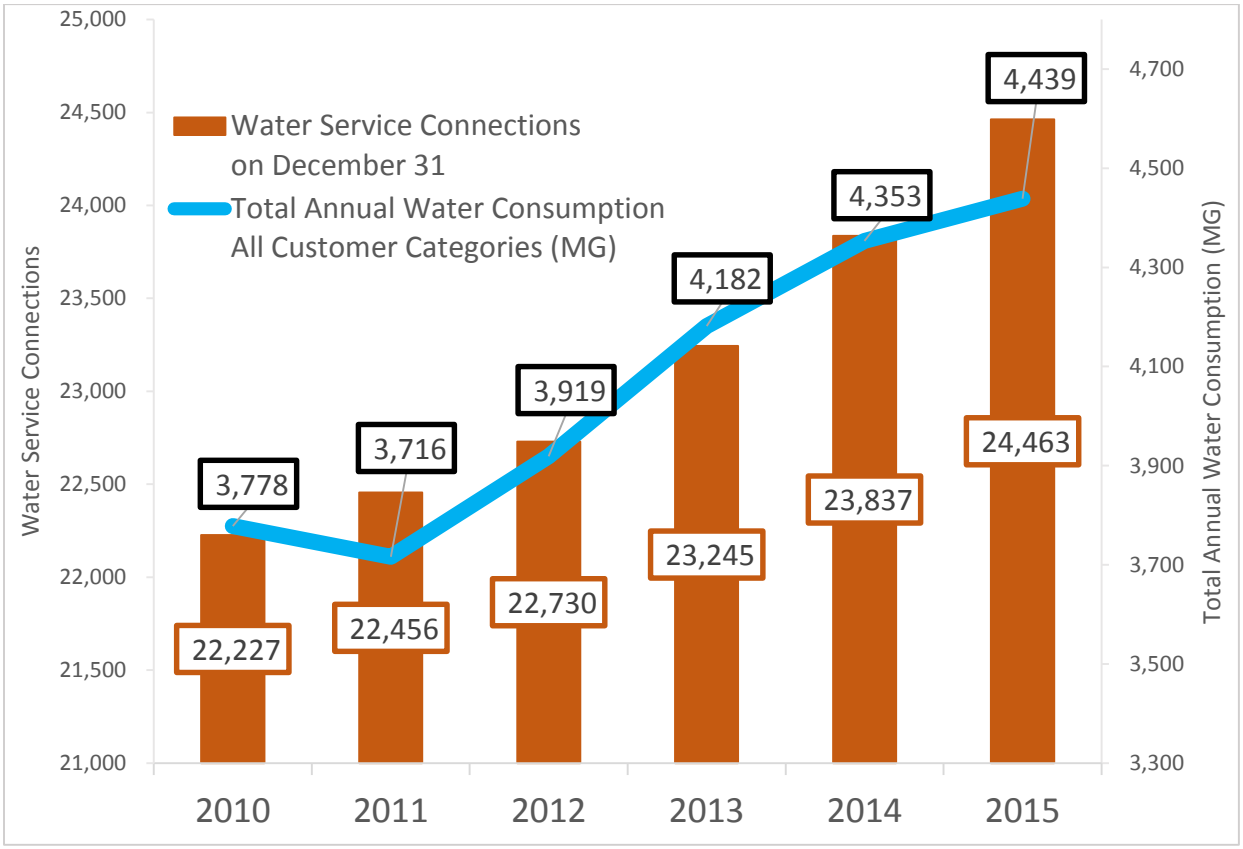
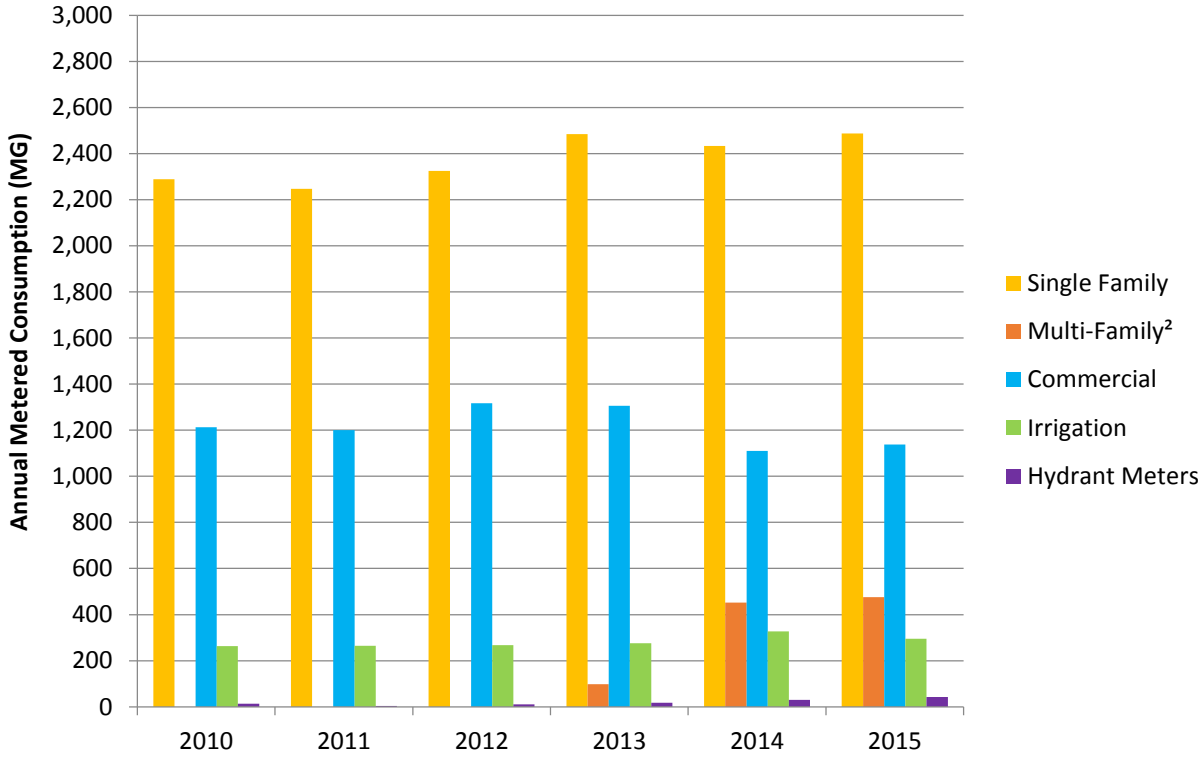


Exhibit 4-2. Annual Consumption by Customer Category, 2010-2015 (MG).

Year	Single Family	Multi-Family[1]	Commercial	Irrigation	Hydrant Meters	Residential[1]	Non-Residential[1]	Total
2010	2,288.2	N/A	1,212.5	263.7	13.5	2,304.5	1,473.3	3,777.8
2011	2,247.1	N/A	1,200.3	264.9	3.9	2,266.9	1,449.3	3,716.2
2012	2,325.0	N/A	1,316.4	267.3	10.2	2,390.5	1,528.4	3,918.9
2013	2,484.1	97.7	1,306.3	275.7	17.9	2,581.7	1,599.9	4,181.6
2014	2,433.0	451.8	1,109.9	327.8	30.8	2,884.9	1,468.4	4,353.3
2015	2,486.6	475.3	1,138.5	295.4	43.0	2,961.9	1,476.9	4,438.8

[1] The City introduced the multi-family category in September 2013. Residential and non-residential consumption is estimated for 2010 through 2012 based on the 2009 percent annual consumption for these two customer categories (61 percent residential and 31 percent non-residential) reported in the City's 2011 WMCP.
N/A = not applicable

Exhibit 4-3. Annual Consumption by Customer Category, 2010-2015.



[2] The City introduced the multi-family category in September 2013 in order to fulfill a conservation benchmark established in the 2011 WMCP.

Exhibit 4-4. Consumption by Customer Category, 2015

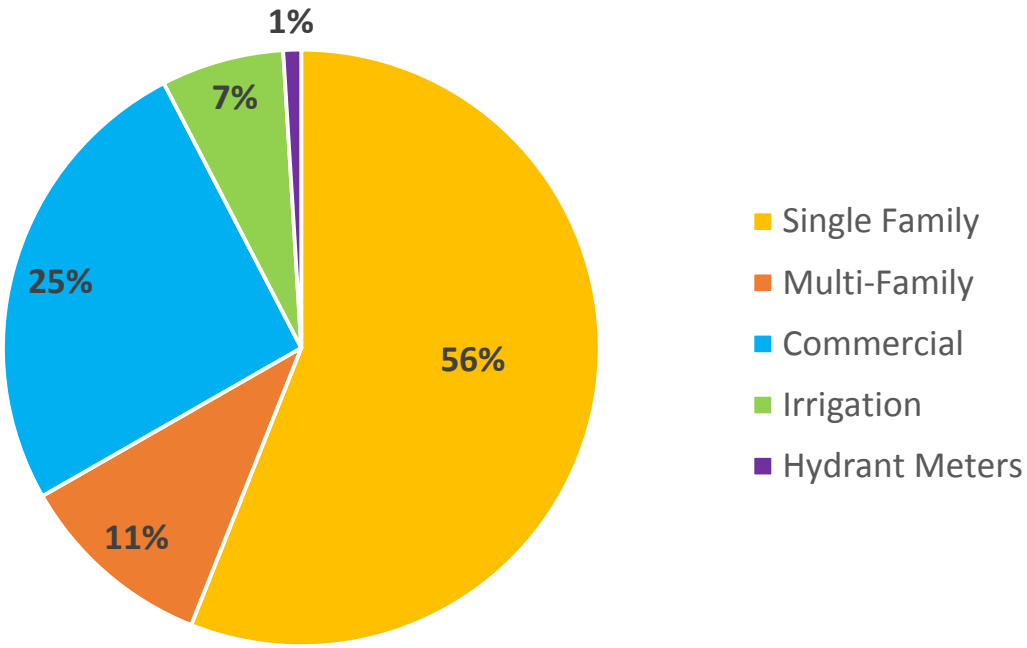
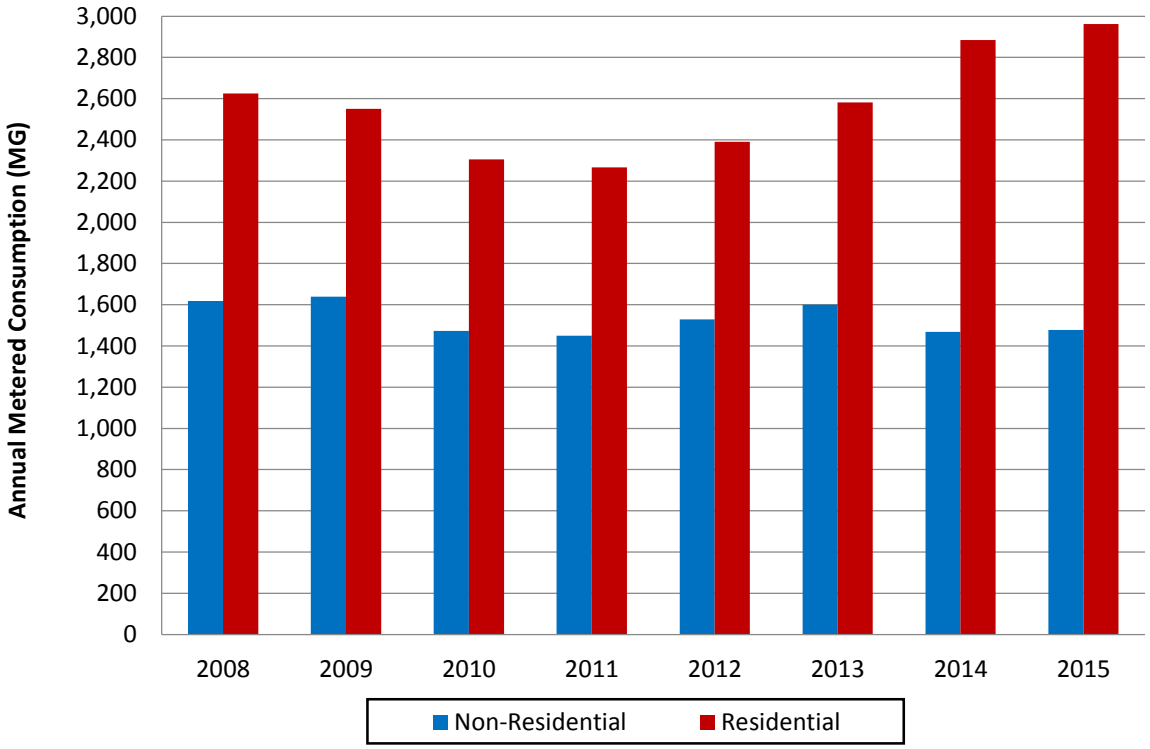


Exhibit 4-5. Comparison of 2008-2009 and 2010-2015 Annual Consumption by Residential and Non-Residential Customer Categories.



SECTION 5

Annual Water Audit

This section satisfies the requirements of OAR 690-086-0120(4)(c).

This rule requires descriptions of the results of the annual water audit (that includes a systematic and documented methodology for estimating any unmetered authorized and unauthorized uses). The non-revenue or unaccounted-for water results of the annual water audit are presented in this section.

Introduction

This section presents the results of the City's annual water audits. An annual water audit compares the quantity of water put into the City's water system to the quantity of water delivered to its customers. These audits allow the City to identify system leakage, estimate total non-revenue water, and better understand water distribution efficiency.

System leakage is one component of non-revenue water and often is attributed to water lost because of deteriorating pipes, compromised pipe joints, leaking valves, and other water system components. Other forms of non-revenue water include water used for firefighting, flushing of water mains, and pressure testing of new infrastructure. OWRD set a goal for system leakage of 15 percent or, if feasible, to 10 percent or less.

Terminology

The following terms are used to describe specific values of water system leakage:

- **Total demand** equals the quantity of water delivered to its water distribution system and includes all metered and unmetered water use in addition to system leakage.
- **Metered consumption** is equal to the metered customer water use.
- **Non-revenue water** is the difference between total demand and metered consumption.

Exhibit 5-1 presents the annual non-revenue water for 2008 through 2015. Non-revenue water has remained below 10 percent since 2008 and averaged 3.8 percent from 2010 through 2015. As described in the City's 2011 WMCP, valve maintenance and hydrant flushing that occurred in 2008 likely contributed to a higher percentage that year.

Beginning in 2013, the City began using the American Water Works Association (AWWA) M36 water audit methodology to conduct annual water audits. This methodology provides the most up-to-date analysis of the City's water distribution system efficiency and accuracy. The reporting work sheets and performance indicators for these three water audits (2013–2015) are presented in **Appendix B**.

Exhibit 5-1. Calculation of Annual Non-Revenue Water, 2008-2015.

Year	Total Demand (MG)	Metered Consumption (MG)	Non-Revenue Water (MG)	Non-Revenue Water (%)
2008	4,700	4,242	458	10
2009	4,353	4,189	164	4
2010	3,814.5	3,777.8	36.7	1.0
2011	3,913.7	3,716.2	197.5	5.0
2012	4,125.9	3,918.9	207.0	5.0
2013	4,319.0	4,181.6	137.3	3.2
2014	4,450.4	4,353.3	97.1	2.2
2015	4,745.9	4,438.8	307.1	6.5
			Average	3.8

Notes:
MG = million gallons

Appendix A

Water Conservation Benchmarks Status Updates

CITY OF BEND
Water Management and Conservation Plan Tracking - Yearly

2016 Progress Report Requirement	OAR 690-086-0120 4(a): A list of benchmarks established under OAR 690-086-150 and a description of the progress of the municipal water supplier in implementing the

Section Requirement	Sub-section Requirement	2011 Benchmarks	Benchmark Progress				Benchmark Notes
			2012	2013	2014	2015	
OAR 690-086-150 (4) A description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following conservation measures that are required of all municipal water suppliers:	(a) An annual water audit that includes a systematic and documented methodology for estimating any un-metered authorized and unauthorized uses	Develop and implement an annual water audit program within the next 5 years; as part of this effort, develop a method to calculate and track unbilled authorized consumption, which may include development of additional measurement methodology, to more accurately determine revenue and non-revenue water.	Not started	Complete	Complete	Complete	Water audits were completed for each year that compared water production to billed / metered water use to determine unaccounted for water. Beginning in 2013, the City also began conducting audits utilizing the AWWA M36 methodology.
		Reorganize and update customer classes and service codes, as well as work towards equipping all water meters with automated metering infrastructure (AMI) meters.	AMI implementation in progress.	AMI implementation complete.	Complete	Complete	AMI technology was completely implemented at every water meter in 2013. Customer classes and service codes were updated beginning in 2014.
	(b) If the system is not fully metered, a program to install meters on all un-metered water service connections.	Continue to install meters at all new service connections.	All new services are metered.	Complete	Complete	Complete	All new water services are equipped with water meters.
	(c) A meter testing and maintenance program	Continue to replace all existing meters with the new AMI standard within the next 5 years.	AMI implementation in progress.	AMI implementation complete.	Complete	Complete	AMI implementation was completed in 2013.
		Use improved technology when upgrading or replacing existing source meters during the next 5 years.	Complete / Ongoing	Complete	Complete	Complete	All new production water meters are MAG meter type with highest metering accuracy rate available.
	(d) A rate structure under which customers' bills are based, at least in part, on the quantity of water metered at the service connections	Continue to bill customers based, in part, on the quantity of water metered.	Complete	Complete	Complete	Complete	The City continues to bill customers based, in part, on the quantity of metered water used.
		Reduce the base quantity allowance from 4 ccf to zero ccf within the next 5 years.	Not started	In progress. Being discussed by city council.	Rate modernization study in progress	Complete - new rate structure as of 7/1/15. 4 CCF eliminated.	Base quantity allowance was eliminated in 2015 with utility rate modernization effort.
	(e) If the annual water audit indicates that system leakage exceeds 10 percent, a regularly scheduled and systematic program to detect leaks in the transmission and distribution system using methods and technology approriate to the size and capabilities of the municipal water supplier;	Continue to conduct leak detection surveys to monitor changes in pipe integrity over time.	Not started	Not started	Not started	Complete / Ongoing - leak detection contract signed. Delayed to January 2016 due to weather.	Conducted a leak detection survey within a portion of the distribution system consisting of 19.6 miles of some of the oldest distrubtion mains within the city's service area.
		Continue to monitor customer consumption records for evidence of leaks and to work cooperatively with customers when leaks are discovered.	Complete / Ongoing. Water use data monitored by utility and finance staff. Real and potential leaks are communicated with customer.	Complete	Complete	Complete	The City detects and communicates to customers potential leaks on the "customer side" of the meter.
		Install AMI data technology at all of its meters, which will record hourly consumption and radio transmit that information to the City. This "real-time" information will help the City find and address leaks in the system on the customer side of the meter.	AMI implementation in progress.	AMI implementation complete.	Complete	Complete	AMI implementation was completed in 2012.
	(f) A public education program to encourage efficient water use and the use of low water use landscaping that includes regular communication of the supplier's water conservation activities and schedule to customers	Continue to provide water efficiency and conservation outreach information to the public using print materials, radio, and video.	Not started. Limited public outreach due to limited staff and resources.	Complete. Water conservation staff and resources budgeted.	Complete	Complete	Restarted in 2014 when staff and resources were re-allocated to the utility.
		Continue to update the Web site and outreach materials as needed.	Complete. City water conservation site is www.waterwisetips.org	Complete	Complete	Complete	Regular updates to www.waterwisetips.org are made by water conservation staff.
		Explore the potential for development of cost-share partnerships between the City's three water utilities: water, stormwater, and wastewater. The water and stormwater utilities have the potential to jointly hire an employee that can serve both programs.	Not started	Not started	In progress	0.2 FTE approved in 2015 for combined stormwater & water conservation enforcement	Exploration and ultimate approval for this new position is complete. Start date delayed to 2016.

Section Requirement	Sub-section Requirement	2011 Benchmarks	Benchmark Progress				Benchmark Notes
			2012	2013	2014	2015	
OAR 690-086-150 (5) If the supplier proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-140(5)(i), a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of:	(a) A system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent or sufficient information to demonstrate that system leakage currently is no more than 15 percent	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A
OAR 690-086-150 (6) If the supplier serves a population greater than 1,000 and proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), or if the supplier serves a population greater than 7,500, description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following measures; or documentation showing implementation of the measures is neither feasible nor appropriate for ensuring the efficient use of water and the prevention of waste	(a) A system-wide leak repair or line replacement program to reduce system leakage to 15 percent and if the reduction of system leakage to 15 percent is found to be feasible and appropriate, to reduce system leakage to 10 percent	As stated in Leak Detection and Repair under OAR 690-086-0150(4), continue to conduct leak detection surveys to monitor changes in pipe integrity over time.	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A
		Continue to monitor customer consumption records for evidence of leaks.	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A - system leakage is below 15%	N/A
	(b) Technical and financial assistance programs to encourage and aid residential, commercial, and industrial customers in implementation of conservation measures;	Continue efforts to develop and maintain WaterWise partnerships with large use customers during the next 5 years.	Complete	Complete	Complete	Complete	Partnering regularly with Bend LaPine Schools, Bend Parks and Rec, Oregon State Parks, and more.
		Continue to distribute toilet tank leak detection dye tablets, shower timers, and related information to customers during the next 5 years.	Complete	Complete	Complete	Complete	These are available year round at various City events, the WaterWise display in City Hall, and at our Utility Department's Boyd Acres facility. Also available in our free indoor water conservation kits.
		Conduct cost analysis aimed at the creation of cost-effective rebate programs within the next 5 years.	Complete - HDR conservation analysis conducted in 2010.	Complete	Complete	Complete	The HDR conservation measure analysis is used as a reference to determine the cost effectiveness of potential conservation measures.
		Develop a pilot program for creation of water budgets for targeted customer groups, based on evapotranspiration data.	Not started	Not started	In progress. Developing water budgets for large landscape customers.	Complete	Water budgets are created for Large Landscape Program participants. These include Bend LaPine Schools, Bend Parks and Rec, Oregon State Parks, and more. Budgets are provided to customers to help analyze current water use patterns and where water efficiency opportunity exists.
		Continue to fund and promote the use by all customers of the Agrimet weather station and its Web site, including a pilot project to place real time evapotranspiration data on the City Web site for use in creation of outdoor water use budgets.	The Agrimet weather station continues to be funded. Real time ET data not yet posted to the city web site.	Complete. Web link to Agrimet located on City's water conservation site.	Complete	Complete	The City continues to fund the Bend Station of the Agrimet weather station. Staff provide a link to the Agrimet website from the city's website. The City is currently updating its existing website host and hopes to include real-time ET data from either Agrimet or a different source once the upgrades are complete.
	(c) Supplier financed retrofitting or replacement of existing inefficient water using fixtures, including distribution of residential conservation kits and rebates for customer investments in water conservation;	Continue to pursue greater irrigation efficiency of its existing City-owned landscapes and all new landscapes so they will meet the latest specification and standards, which includes the use of smart irrigation controller technology, xeriscaping principles, and other sustainable landscape practices.	Not started	In progress	In progress	All new City-owned landscapes meet the Engineering Standard & Spec.	All City-owned new landscapes meet the low water specifications detailed in the Engineering Standard and Specification.
		Study the cost effectiveness of implementing a toilet rebate replacement or incentive program based on the new voluntary federal HET standard.	Complete - HDR conservation analysis conducted in 2010.	Complete	Complete	Complete	The HDR conservation measure analysis identified the potential cost effectiveness of implementing a toilet rebate program at $1.94 to $2.78 per CCF over the life of the measure.
		Become an EPA Water Sense Program partner and make related information available through its Web links, bill stuffers, and other methods.	Not started	Not started	Complete	Complete	The City is now an EPA WaterSense Partner and active member of Alliance for Water Efficiency, Irrigation Association, and Oregon Landscape Contractors Association.
		Provide a list of qualifying toilets that meet the various flush standards along with the creation of a toilet efficiency fact sheet.	Not started	Not started	Complete - Directing public to EPA WaterSense product search website	Complete	A link to EPA WaterSense approved devices is located on the City's water conservation website.
	(d) Adoption of rate structures, billing schedules, and other associated programs that support and encourage water conservation;	As stated in Unit-based Billing Program under OAR 690-086-0150(4), continue to bill customers based, in part, on the quantity of water metered.	Not started	In progress. Being discussed by city council.	Rate modernization study in progress.	Complete - new rate structure as of 7/1/15. 4 CCF allowance eliminated.	New rate structure went into effect on July 1, 2015. The City continued to bill its customers based, in part, on the quantity of water metered.
		Reduce the base quantity allowance from 4 ccf to zero ccf within the next 5 years.	Not started	In progress. Being discussed by city council.	Rate modernization study in progress.	Complete - new rate structure as of 7/1/15. 4 CCF allowance eliminated.	New rate structure went into effect on July 1, 2015. This eliminated the remaining 4 CCF monthly allowance and based sewer charges on winter quarter average water use.

Section Requirement	Sub-section Requirement	2011 Benchmarks	Benchmark Progress				Benchmark Notes
			2012	2013	2014	2015	
		Continue to send monthly bills and to provide water efficiency and conservation information to the public with periodic bill stuffers and electronic messaging with related conservation information and links to the City's conservation Web site.	Complete	Complete	Complete	Complete	The City continued to send monthly water bills. A variety of communication tools are utilized by water conservation staff including monthly utility bill newsletters, social media, City website, press releases, attending public events, and more.
	(e) Water reuse, recycling, and non-potable water opportunities; and	During the next 5 years, continue to look for opportunities to increase the use of recycled water.	Not started	Not started	Not started	Not started. Will identify internal processes associated with water reuse for more effective outreach.	The City continues to seek opportunities to use recycled water, but use within the potable supply system is not cost effective. The City currently sends approximately one-half of its recycled water to an area golf course. The other one-half is placed in recharge ponds that help recharge the Deschutes Basin Aquifer.
	(f) Any other conservation measures identified by the water supplier that would improve water use efficiency.	Within the next 5 years, evaluate adoption of modified irrigation restrictions based on time of day (hours that promote efficient water use).	Completed - New irrigation hours approved.	Complete	Complete	Complete	Approved irrigation hours and days have been incorporated into Bend Code.
		Continue to implement current landscape standards through related approval processes during the next 5 years.	In progress	Engineering standard and spec complete. Bend Development Code review discussions in progress.	Bend Development Code review discussions in progress.	Bend Development Code review discussions in progress.	Public projects continue to follow the Engineering Standard and Specification. Bend Development Code continues to be discussed and reviewed for water conservation.
		Continue to seek appropriate partnership opportunities based on current project priorities, budget, and staff time.	Not started	Not started	In progress	In progress	Currently seeking to establish and maintain partnerships with irrigation related water users as this use drives maximum day demand. Current partnerships include OSU Extension, Bend LaPine Schools, Bend Metro Parks & Rec and more.
		Continue to look for coordination opportunities to more efficiently communicate and implement related programs.	Not started	Not started	Complete. Water Conservation Program Manager hired.	Complete	Coordination of water conservation programming is conducted with stakeholder input.
		Continue to implement the hydrant meter program and related fill station.	Complete	Complete	Complete	Complete	The City continued to implement this program, which continues to be instrumental in reducing non-revenue water.
		During the next 5 years, work with the City Council and the City's Engineering Department to develop capital improvement and conservation budgets to identify which conservation measures to fund and implement.	Not started	Not started	Not started	Not started - scheduled w/ next water master plan	Determining conservation program budget and cost effective programming will be covered by the 2016/2017 water master plan update.

Appendix B

Results of City's AWWA Water Audit 2013 through 2015

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Bend, OR
Reporting Year: 2013 (1/2013 - 12/2013)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter Error Adjustments

WATER SUPPLIED					Pcnt:	Value:	
Volume from own sources:	7	4,316.780	MG/Yr	7	-2.00%		MG/Yr
Water imported:	3	0.503	MG/Yr	2	-2.00%		MG/Yr
Water exported:	n/a	0.000	MG/Yr				MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 4,405.391 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	4,198.312	MG/Yr			
Billed unmetered:	8	39.250	MG/Yr			
Unbilled metered:	n/a	0.000	MG/Yr			
Unbilled unmetered:	9	10.970	MG/Yr		10.970	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 4,248.532 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 156.859 MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		11.013	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	-20.887	MG/Yr	-0.50%		MG/Yr
Systematic data handling errors:		10.496	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 0.622 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 156.237 MG/Yr

WATER LOSSES: 156.859 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 167.829 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	480.3	miles
Number of active AND inactive service connections:	9	25,847	
Service connection density:		54	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 8 — 67.3 psi

COST DATA

Total annual cost of operating water system:	7	$11,961,532	$/Year	
Customer retail unit cost (applied to Apparent Losses):	6	$2.82	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	6	$994.68	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Bend, OR
Reporting Year: 2014 1/2014 - 12/2014

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

					Pcnt:	Value:	
Volume from own sources:	7	4,460.645	MG/Yr	7	-2.00%		MG/Yr
Water imported:	3	0.005	MG/Yr	2	-2.00%		MG/Yr
Water exported:	n/a	0.000	MG/Yr				MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 4,551.684 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	4,353.566	MG/Yr			
Billed unmetered:	8	4.680	MG/Yr			
Unbilled metered:	n/a	0.000	MG/Yr			
Unbilled unmetered:	9	12.310	MG/Yr		12.310	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? 4,370.556 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 181.128 MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		11.379	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	-21.660	MG/Yr	-0.50%		MG/Yr
Systematic data handling errors:		10.884	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 0.604 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 180.524 MG/Yr

WATER LOSSES: 181.128 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 193.438 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	489.0	miles
Number of active AND inactive service connections:	9	26,864	
Service connection density:		55	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 8 67.3 psi

COST DATA

Total annual cost of operating water system:	7	$10,766,907	$/Year	
Customer retail unit cost (applied to Apparent Losses):	6	$2.46	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	6	$1,043.06	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Bend, OR
Reporting Year: 2015 (1/2015 - 12/2015)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

					Pcnt:	Value:	
Volume from own sources:	7	4,745.630	MG/Yr	7	-2.00%		MG/Yr
Water imported:	n/a	0.000	MG/Yr				MG/Yr
Water exported:	n/a	0.000	MG/Yr				MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 4,842.480 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	4,438.846	MG/Yr			
Billed unmetered:	8	5.470	MG/Yr			
Unbilled metered:	n/a	0.000	MG/Yr			
Unbilled unmetered:	9	10.420	MG/Yr		10.420	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 4,454.736 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 387.744 MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		12.106	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	-22.084	MG/Yr	-0.50%		MG/Yr
Systematic data handling errors:		11.097	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1.120 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 386.624 MG/Yr

WATER LOSSES: 387.744 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 398.164 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	487.3	miles
Number of active AND inactive service connections:	9	27,191	
Service connection density:		56	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 8 | 68.3 psi

COST DATA

Total annual cost of operating water system:	7	$11,108,836	$/Year	
Customer retail unit cost (applied to Apparent Losses):	6	$2.49	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	6	$1,049.35	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered