Water Use Efficiency Program
2014-2019
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Appendix A - Logic Model
MUNICIPAL WATER LAW REQUIREMENTS

Background
In 2003 the Washington State Legislature passed Engrossed Substitute House Bill 1338, known as the Municipal Water Law (MWL) to address increasing demand on our state’s water resources. The Department of Health (DOH) was directed to oversee and enforce a Water Use Efficiency Program\(^1\) (WUE) to help support the collective goal of ensuring a safe and reliable drinking water supply. The WUE seeks to support this goal in the following ways:

- Contribute to long-term water supply reliability and public health protection
- Promote good stewardship of the state’s water resources
- Ensure efficient operation and management of water systems

Enacted January 22, 2007, water suppliers must fulfill certain responsibilities. Applicable requirements specific to the City of Bellingham are listed in Table 1.

Table 1.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Use Efficiency Program</td>
<td>Every 6 years</td>
</tr>
<tr>
<td>- Goal Setting &amp; Performance Measures</td>
<td></td>
</tr>
<tr>
<td>Performance Reporting</td>
<td>Annually</td>
</tr>
<tr>
<td>Metering Requirements</td>
<td>January 22, 2017</td>
</tr>
<tr>
<td>Distribution Leakage Standard</td>
<td>2020</td>
</tr>
</tbody>
</table>

Water Use Efficiency Program
As part of the Planning Requirements of the WUE, municipal water suppliers are required to collect data, forecast demand, evaluate WUE measures, calculate distribution leakage and implement a WUE program to meet their goals. As of January 1, 2007, water suppliers have been obligated to collect production and consumption data on a regular basis to include in planning documents and annual performance reporting. As part of this data collection, demand forecasting is also an essential component for determining future use and potential savings through a water use efficiency program. A description of the water supplier’s water source and supply characteristics must also be provided.

Goal Setting and Performance Measures
The WUE requires municipal water suppliers to establish a water use efficiency goal and measures for a six-year period through a public process. Goals must be measurable, address water supply and demand forecasting, and include an implementation schedule.

\(^1\) WAC 246-290-810
Performance Reporting
A progress report on annual water system production total, update on adopted WUE goals and measure performance, and distribution system leakage information, when applicable, are required in the report by July 1 of each year. Performance reports are to be made available to the public via the website or as part of the annual Consumer Confidence Report.

Metering
Production and service meters are required on all new and existing connections served water. Purveyors must have meters installed by January 22, 2017 to be in compliance with WAC 246-290.

Distribution Leakage Standard
Municipal water suppliers are required to meet a 10% or less distribution system leakage rate to comply with the state standard. Leakage must be presented both as a percentage and as leakage volume, and based on a rolling three-year average. The City is not required to meet this criterion until after all service meters have been installed. If water supplier is unable to meet this standard, the supplier must develop and implement a Water Loss Control Action Plan that outlines the steps and timelines to achieve the desired leakage rate.
CITY OF BELLINGHAM WATER SUPPLY CHARACTERISTICS

Source
The City of Bellingham's (hereafter “the City”) water supply originates as rain and snow in the Lake Whatcom and the Middle Fork Nooksack River watersheds. Water from the Middle Fork is diverted via a dam through an underground tunnel in Bowman Mountain. From there, the water travels to Mirror Lake, where fine sediment settles out, and then on to Anderson Creek and its final destination of Lake Whatcom. Lake Whatcom is the principal supply reservoir for the system. Water withdrawn from Lake Whatcom is screened then treated at the water treatment plant, located near Whatcom Falls Park.

Production and Delivery System
The current average production from the Water Treatment Plant (WTP) is about 10 million gallons per day (mgd). Treated water is pumped though nine pump stations and stored in one of 14 storage reservoirs placed throughout the City. The combined capacity of the storage reservoirs is 28.43 million gallons (MG). The system is comprised of six main pressure zones with storage and seven constant pressure neighborhood zones that do not contain water storage.

2008-2013 WUE PROGRAM SUMMARY
During the 2008-2013 WUE program period, the City experienced a 1.6% increase in population. Despite this increase, average daily water production declined by approximately 3%. Of the total water produced, 56% is metered. Figures 1 and 2 displays these trends.

Figure 1.
The largest number of service connections in the City is comprised of single-family residential water customers, which also happen to be the largest water consumer. This customer class includes both metered and flat-rate water customers, consuming approximately 35% of the total water produced.

Figure 3 summarizes consumption for the 2008-2013 WUE program period by customer class. After single-family residential, commercial and multi-unit residential are the second and third largest water consumers by customer class.

The City has over 24,000 active water customer accounts with over 60% of them being single family residential. Residential per capita water usage averages approximately 76 gallons per capita per day (gpcd). Due to the high proportion of flat rate single-family residential water customers, the water production and water consumption figures for total residential consumption are estimated based on known metered single-family residential water customer data. When the City completes its
mandatory metering project and has service meters installed on all its residential customers, reliable consumption data will be obtainable.

**Goals**

1. Maintain city-wide per capita daily consumption at an average of 105 gallons per capita per day (gpcd) for residential usage and 77 gpcd for non-residential usage for the next 6 years.

2. Keep city-wide water demand equal to or below city population growth rate for the next 6 years.

The City achieved both water use efficiency goals. Per capita daily consumption during 2008-2013 program period for residential customers averaged 76 gpcd, and 74 gpcd for non-residential use. Population growth during the 2008-2013 program period averaged approximately 1.6%, with city-wide water demand averaging an approximate 3% reduction for the program period.

**Measures**

Table 2 lists the City’s adopted water conservation measures for the 2008-2013 reporting period and the associated water customer sectors they targeted. Both quantitative and qualitative evaluations were conducted on these measures where applicable. Quantitative uses numeric data where possible to describe participation and/or results. Qualitative analysis utilizes narrative data to address questions regarding the measures. Several of these measures will be continued and expanded upon as part of the 2014-2019 WUE program period.

**Table 2.**

<table>
<thead>
<tr>
<th>2008-13 WUE Program Adopted Measures</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure</strong></td>
<td><strong>SF</strong></td>
</tr>
<tr>
<td>1. Toilet retrofit program for SFR water customers</td>
<td>X</td>
</tr>
<tr>
<td>2. Toilet retrofit program for Multi-family water customers</td>
<td></td>
</tr>
<tr>
<td>3. Toilet retrofit program for Commercial customers</td>
<td></td>
</tr>
<tr>
<td>4. Develop and implement a water conservation education program for 6th-grade students</td>
<td>X</td>
</tr>
<tr>
<td>5. Create lawn-watering door hanger for distribution during peak demand periods to educate water customers about proper outdoor watering techniques</td>
<td>X</td>
</tr>
<tr>
<td>6. Evaluate and develop High-Efficiency Fixture Program</td>
<td>X</td>
</tr>
<tr>
<td>7. Develop future water rate structures with an emphasis on water conservation</td>
<td>X</td>
</tr>
<tr>
<td>8. Upgrade City Parks to high-efficiency irrigation systems</td>
<td></td>
</tr>
<tr>
<td>9. Continue existing public outreach measures</td>
<td></td>
</tr>
<tr>
<td>a. Voluntary Metering Program</td>
<td>X</td>
</tr>
<tr>
<td>b. Residential Stormwater Retrofit Program</td>
<td>X</td>
</tr>
<tr>
<td>c. Rain Barrel Program</td>
<td>X</td>
</tr>
<tr>
<td>d. Events</td>
<td>X</td>
</tr>
<tr>
<td>e. Leak Detection</td>
<td>X</td>
</tr>
<tr>
<td>f. Print and Video outreach</td>
<td>X</td>
</tr>
<tr>
<td>g. Water Conservation Kits</td>
<td>X</td>
</tr>
</tbody>
</table>
Measures 1-3 were adopted to focus on reducing water consumption on the largest indoor water consuming fixture (based on usage) for the three largest water customer classes and use within the utility (single-family residential (SFR), multi-family, commercial). The measures provided resources and financial incentives to replace older, inefficient fixtures (toilets and clothes washers) that result in reduced potable use and potential delay of expansion to water infrastructure.

1. Toilet retrofit program for SFR water customers.
   
   **Status**
   Complete, and modified from original to include clothes washers and outdoor irrigation equipment.

   **Summary**
   Pilot projects for SFR, multi-family, and commercial customers was conducted to determine the most appropriate and cost-effective approach to upgrading inefficient fixtures were launched in 2009 and completed in 2010. Findings from the pilots were utilized to guide a city-wide rebate project targeted at each customer class (2010-2014). For single-family residential water customers, the City began a partnership in 2010 with the Opportunity Council’s Community Energy Challenge (CEC) program. The Community Energy Challenge is a streamlined process providing homeowners a low-cost energy assessment and access to a Home Energy Advisor. Under the partnership, the CEC also provides a water assessment to COB water customers who participate, information regarding the $150 rebate fixture retrofit opportunity, and survey questions. The partnership enables greater education and awareness regarding the water-energy nexus. Additionally, a separate outreach effort to existing metered SFR water customers was implemented in 2013, offering a $100 rebate for fixture retrofit.

   **Result**
   Pilot Project- 52 water assessments on residential homes, 3 rebates processed; SFR CEC/WC partnership- 596 water-energy assessments on homes, 135 rebates processed (29 toilets and 78 clothes washers); Existing SFR metered customer direct mailer rebate offer- 103 rebates processed (70 toilets, 33 clothes washers)

   *Estimated Cumulative Water Savings 2008-13*
   2.3 million gallons

2. Toilet retrofit program for Multi-family water customers.

   **Status**
   Complete, and modified from original to include clothes washers.

   **Summary**
   Pilot projects for multi-family water customers was conducted to determine the most appropriate and cost-effective approach to upgrading inefficient fixtures were launched in 2009 and completed in 2010.

   **Result**
   Pilot Project- 10 apartment building water assessments, 8 rebates processed (coin-op clothes washers), Multi-family customer direct mailer rebate offer-10 rebates processed (136 toilets)

   *Estimated Cumulative Water Savings 2008-13*
   7.9 million gallons
3. Toilet retrofit program for Commercial water customers.

   **Status**
   Complete, and modified from original to include additional water saving equipment pertinent to the commercial sector (e.g. not just toilet retrofit).

   **Summary**
   Pilot projects for commercial customers was conducted to determine the most appropriate and cost-effective approach to upgrading inefficient fixtures were launched in 2009 and completed in 2010. Findings from the pilots were utilized to guide a program for commercial water customers. The City partnered with Sustainable Connection’s Community Energy Challenge for the commercial sector in 2013-14 to offer water assessments and rebates in addition to the energy assessments.

   **Result**
   Pilot Project- 9 commercial buildings received assessments, 2 rebates processed (HVAC and sterilizer misters); Commercial CEC/WC Partnership- 6 assessments

   **Estimated Cumulative Water Savings 2008-13**
   10 million gallons

4. Develop and implement a water conservation education program for 6th-grade students.

   Measure was adopted to follow-up with existing City-sponsored environmental education programs that have been in progress for 4th and 5th grade elementary school students for the past decade. Research and development of a supplemental water-conservation-focused program to evaluate the appropriate age group and implementation at that grade level.

   **Status**
   Ongoing for existing COB 4-5th grade education program. Supplemental program began in 2014, with variation to original measure.

   **Summary**
   For supplemental education program, COB is partnering with RE Source's Sustainable Schools pilot project that integrates water conservation with energy efficiency and waste reduction education into program delivery to 1st-3rd grade students.

   **Result**
   Existing COB 4-5th grade education program provided water conservation education to 5,400 students and ~130 teachers and adults. 1,000 students anticipated to receive water conservation behavior change information in 2014 as part of partnership with RE Sources.

5. Create lawn-watering door hanger for distribution during peak demand periods to educate water customers about proper outdoor watering techniques.

   The door hanger aims to educate water customers about water conservation and smart watering tips during the summer months/peak demand periods when outdoor watering puts the heaviest strain on the water supply. Targeted to customers observed watering outdoors.

   **Status**
   Complete.
**Summary**

~750 door hangers distributed July 2009 to residential customers regarding mandatory restrictions on outdoor watering; estimated compliance Used for voluntary watering schedule in subsequent years.

**Result**

3 million gallons of water the first day mandatory restrictions were in place, additional 3 million gallons of water the second day restrictions were in place.

**Estimated Cumulative Water Savings 2008-13**
Continued annual decline in seasonal outdoor water use since 2009; peak day demand has not reached 2009 figures.

6. **Evaluate and develop High-Efficiency Fixture Program**

The goal of this measure was to evaluate existing codes and associated impacts of modifying it to include mandatory installation of high efficiency fixtures. The measure also extends the free water conservation kit distribution project. Kits are free to Bellingham water customers and available in two locations.

**Status**
Complete.

**Summary**

Washington State prohibits municipalities from amending codes to require anything more stringent than the state's codes in relation to single-family residential households, but all other buildings can have a more stringent requirement. Water conservation kits contain a 2.5 gallons per minute (gpm) showerhead, 2.0 gpm kitchen faucet aerator, 1.5 gpm bathroom faucet aerator, toilet tank bank (flushes with 1 gallon less of water), and water conservation information.

**Result**

COB incentivized more efficient plumbing fixtures through its rebate project- requiring WaterSense labeled 1.28gpf toilets and high efficiency clothes washers certified through Puget Sound Energy's program. ~5,300 kits distributed.

**Estimated Cumulative Water Savings 2008-13**
Savings indicated in Measures 1-3; ~190 million gallons of water conserved through water conservation kit distribution and (assumed) installation.

7. **Develop future water rate structures with an emphasis on water conservation**

In 2004 the City adopted a water rate structure based on a cost-of-service model. In 2007, the City Council adopted a schedule of rate increases through 2012. The next rate cycle, the City will evaluate a conservation block rate structure, as well as seasonal rates, for feasibility within the City's water system and customer base.

**Status**
Partially complete.

**Summary**

Adopted rate structure for 2013-2018 included a new transitional rate for newly metered water customers. COB will review new city-wide metered data for next rate structure period to determine block rate structure feasibility and need.
8. Upgrade City Parks to high-efficiency irrigation systems

Measure will assess existing systems and prioritize those that need upgrades and/or repairs.

**Status**
Incomplete.

**Summary**
One meeting by consultant with Parks Department staff for presentation on efficient irrigation practices.

9. Continue existing public outreach measures

a. Voluntary Metering Program

**Status**
Complete.

**Summary**
In January 2005, City Council adopted municipal code that established the Voluntary Metering Program (VMP). The City subsidized a portion of the cost and then made it free, to single-family residential water customers desiring to switch from a flat-rate water service to a metered water service.

**Result**
～1,000 single-family residences voluntarily switched from a flat to metered water service prior to WUE rule implementation.

b. Ordinance Adoption/Modifications

**Status**
Complete.

**Summary**
Annual review of existing municipal code and ordinances related to water use and conservation is ongoing and aims to support long-range water resource planning efforts and goals of the City’s water conservation program.

**Result**
Conservation staff coordinated an interdepartmental training and review of codes regarding rainwater harvesting and produced a flow chart for public and internal use to facilitate greater ease in implementation.

c. Residential Stormwater Retrofit Program

**Status**
Complete.

**Summary**
The 75% grant funded RSRP provided free 95-gallon rain barrels, project design, installation, and inspection to residential homeowners located in the project area. The project aimed to reduce peak flows, limit erosion, & regulate water temperature. Participating homeowners were required to take part in a stormwater education workshop.
Result
A total of 166 residential homes participated in the RSRP with 330, 95-gallon rain barrels installed. Approximately 3.9 million gallons of stormwater is diverted per year from direct discharge into the infrastructure and is made available to be infiltrated or dispersed on-site. The average participating Lake Whatcom home was able to capture 42% of roof runoff into and through rain barrels. This project captures rainwater from approximately 8% of all available roof area within the City’s portion of the Lake Whatcom Watershed.

Estimated Cumulative Water Savings 2008-13
741,000 gallons
d. Rain Barrel Program

Status
Complete.

Summary
Brochures, workshops, and rain barrel sales have been ongoing and give an opportunity to educate residents about water consumption, conservation and peak demand during low rainfall periods and actions.

Result
1,100 rain barrels and 5 demonstration rainwater systems. 200+ participants in rainwater harvesting workshops.

Estimated Cumulative Water Savings 2008-13
1.6 million gallons.
e. Events
Two annual events with sponsorship through the water conservation program began during this period.

Status
Complete.

Summary
Walk for Water, a 2.3 mile walk in support of World Water Day, celebrated annually, focuses attention on freshwater and advocating for the sustainable management of freshwater resources. Whatcom Water Weeks, a two week event that celebrates the importance of our water resources, shares what we know and are learning about the “State of our Resource”, inspires and helps others learn about stewardship efforts.

Result
5th annual Walk for Water events ~400 attendees, 4 Whatcom Water Weeks events ~1,000 attendees.

f. System Leak Detection and Repair
A systematic approach to finding and repairing leaks through the distribution system was adopted in 1994 through annual valve exercising and leak detection equipment.

Status
Complete.
Summary

Leak detection zones were established to prioritize areas of the system that contain water mains that are older and more prone to leaks, in an effort to conform to state water accountability measures.

Result

Zones 1, 2, 5, 6, 7, 8, 9, 10 all received leak detection; 86 various leaks identified and repaired.

Estimated Cumulative Water Savings 2008-13

201 million gallons

g. Print and video outreach

Media was developed and targeted when appropriate for the differing water customers and projects. Various brochures, displays, and guides developed for distribution at events, workshops, and general.

Status

Complete.

Summary

Produced for indoor and outdoor conservation outreach for the program.

Result

Branding icons developed and established for the water conservation program; Rainwater Harvesting guide publication.

Evaluation

As presented previously, both qualitative and quantitative analysis were conducted on the 2008-2013 program period. A summary of estimated water savings for the applicable quantitative analysis of adopted measures is listed in Table 3 below.

Table 3.

<table>
<thead>
<tr>
<th>Quantitative Measures (gal conserved)</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Estimated Cumulative Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet retrofit program for SFR customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFR Audit/Rebate Pilot Project</td>
<td>0</td>
<td>0</td>
<td>10,604</td>
<td>0</td>
<td>0</td>
<td>825,235</td>
<td>867,651</td>
</tr>
<tr>
<td>CEC-SFR Rebates</td>
<td>0</td>
<td>0</td>
<td>59,335</td>
<td>266,540</td>
<td>99,328</td>
<td>146,708</td>
<td>1,382,324</td>
</tr>
<tr>
<td>Toilet retrofit program for MFR customers</td>
<td>0</td>
<td>0</td>
<td>435,026</td>
<td>1,450,000</td>
<td>910,000</td>
<td>0</td>
<td>7,910,104</td>
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<tr>
<td>Toilet retrofit program for COMM customers</td>
<td>0</td>
<td>1,986,600</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20,000</td>
<td>9,953,000</td>
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<tr>
<td>H2O Kits</td>
<td>7,440,160</td>
<td>14,637,828</td>
<td>7,368,154</td>
<td>9,131,856</td>
<td>5,819,320</td>
<td>4,216,769</td>
<td>190,553,694</td>
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<tr>
<td>RSRP</td>
<td>0</td>
<td>99,500</td>
<td>56,000</td>
<td>21,500</td>
<td>0</td>
<td>0</td>
<td>741,000</td>
</tr>
<tr>
<td>Leak Detection</td>
<td>3,416,400</td>
<td>22,995,000</td>
<td>5,518,800</td>
<td>2,811,690</td>
<td>13,928,400</td>
<td>7,358,400</td>
<td>201,198,870</td>
</tr>
<tr>
<td>Rain Barrels</td>
<td>41,529</td>
<td>121,965</td>
<td>120,885</td>
<td>48,637</td>
<td>45,506</td>
<td>22,843</td>
<td>1,602,305</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Estimated Annual Water Savings (gal)</td>
<td>10,898,089</td>
<td>39,831,893</td>
<td>13,568,804</td>
<td>13,730,223</td>
<td>20,802,554</td>
<td>12,589,955</td>
<td>414,208,948</td>
</tr>
<tr>
<td>Total Estimated Annual Water Savings (ccf)</td>
<td>14,570</td>
<td>53,251</td>
<td>18,140</td>
<td>18,356</td>
<td>27,811</td>
<td>16,831</td>
<td>553,755</td>
</tr>
<tr>
<td>Total Estimated Annual Cost Savings in Treatment, Energy, &amp; Delivery ($/ccf)</td>
<td>$5,391</td>
<td>$19,703</td>
<td>$6,712</td>
<td>$6,792</td>
<td>$10,290</td>
<td>$6,228</td>
<td>$204,889</td>
</tr>
</tbody>
</table>

Other assessment tools such as surveys, focus groups, and needs assessments were utilized to develop and/or execute measures. A SWOT analysis (Table 4) for the 2008-2013 program also provided assistance in developing the 2014-2019 goals and measures.
Table 4.

**SWOT Analysis**

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Effective SFR-focused outreach</td>
<td>• Minimal technical/specialized knowledge base by current staff</td>
</tr>
<tr>
<td>• Partnerships with other non-profits, edu. institutions</td>
<td>• Limited ability to assist ICI customer class</td>
</tr>
<tr>
<td>• Water-Energy nexus</td>
<td>• Data gap with SFR customer class consumption data until mid-2017</td>
</tr>
<tr>
<td>• Water conserving gardening outreach</td>
<td>• Minimal connection with local businesses</td>
</tr>
<tr>
<td>• Data collection and analysis system</td>
<td></td>
</tr>
<tr>
<td>• Variety of measures for residential customer class</td>
<td></td>
</tr>
<tr>
<td>• Established program</td>
<td></td>
</tr>
<tr>
<td>• Evaluation tools incorporated into program design</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ICI outreach and consumption reduction</td>
<td>• Water conservation a low priority/financial return on investment for customers</td>
</tr>
<tr>
<td>• Top 10 high consumption customer outreach and consumption reduction</td>
<td>• Water quality issues more important than water quantity</td>
</tr>
<tr>
<td>• More well-balanced program through possible integration of a technical/specialized .5 FTE position creation (.5 FTE programmatic and .5 FTE technical)</td>
<td>• Perceived notion that water conservation not necessary in our climate</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>
2014-2019 WUE PROGRAM

City staff evaluated 2008-2013 program measures to help guide the 2014-2019 program planning period. Measures that were effective in education and outreach and water savings will be continued with some variations.

As was stated in the previous section, the largest water customer class and consumer of the City’s water supply is single-family residences. The focus of the historical water conservation program has been to provide programs and information targeted towards this customer class and to reduce peak demand during periods of low rainfall. Review of the 2008-13 program measures and consumption data confirms this is still an important focus for the City; however, there are untapped opportunities to strengthen and balance the program so that the other customer account types are also supported. High consumption customers can be found within any customer class account type. The majority of the measures are focused on a rebate project for all customer classes. It is the intent that by providing rebates to all customer classes during this program period, the utility will see water demand savings by both customer class and individual high-use customers.

On Monday, September 22, 2014, staff presented a summary of the 2008-2013 WUE program period to the City Council's Public Works Committee. This meeting was open to the public with meeting materials and information available on the City's website in advance. At this time, staff received input and direction from Council to draft a resolution for the 2014-2019 WUE program goals and measures for a public hearing on the topic at the Monday, October 13, 2014 council meeting at 7pm. No comments were received at this hearing and City Council formally adopted by resolution the following two water use efficiency goals and ten measures.

Goals

1. Maintain annual city-wide Average Daily Demand (ADD) below 10 million gallons per day (mgd) during the 2014-2019 program period.
   The water utility has experienced a downward trend in water consumption over the 2008-2013 program period, despite a notable population increase. This goal captures those conservation advances in a quantitative manner. The City is positioned to achieve the ADD goal using the water efficiency measures described below and the metering program, which will be completed in 2017.

2. Maintain average Peak Day Demand (PDD) between June 1 and August 31 of each year to below 14 mgd during the 2014-2019 program period.
   Supplying peak water demand is one of the most challenging and costly segments of a water utility's demand curve; therefore, it is appropriate to introduce a goal aimed at reducing peak water use. The City's summertime peak day water demand has averaged just under 14 mgd during the 2008-2013 period. The new goal is to maintain that value during the next six years of population growth.

Measures

   Unmetered single-family residential utility customers represent 60% of the City's customer base and have minimal baseline knowledge of their household or individual water consumption. As the City implements its water metering project to install service meters on the remaining 15,000+ single-family residential water customers, staff observed the significant opportunity available in educating
this particular segment of our customer base on water use efficiency. Capitalizing on this ‘teaching moment’, staff began in early 2014 an outreach campaign to the 4,000 newly metered water customers. Upon retrieval of the first utility bill that contained metered water consumption, staff included a ‘Water & Money Saving Guide’ to inform customers of the largest water using fixtures in the home and extended a rebate to retrofit older inefficient water fixtures (e.g. toilets and clothes washers) with high efficiency ones. This measure and process will continue throughout the WUE program period until all service meters are installed on single-family residential water customers, or on an as needed/modified basis to reflect utility and customer needs. Existing metered single-family residences are also eligible to participate in the rebate project.

Cost-effectiveness
Based on 2008-2013 COB WUE program evaluation findings, rebate budgets are established based on available staff time to administer the program, survey data from public regarding rebate amount, research on other utilities in the state offering a similar program, and the level of participation from customers.

Projected water savings
Based on the facts published by the U.S. Environmental Protection Agency, retrofit of an older toilet can result in an estimated 10,000 gallon water savings per household for high efficiency toilets and 7,000 gallon water savings for high efficiency clothes washers. Annual savings is estimated to be 1.5 million gallons per year.

Evaluation metric
Quantitative. This measure will be evaluated based on the estimated number of households participating/rebates processed and water savings associated with fixture retrofits.

Commercial utility customers account for 17% of the total consumed water produced from the City. These customers include hotels, restaurants, business offices, fitness clubs, and churches. Findings from the City’s 2009-10 pilot water audit and rebate project for commercial water customers identified two barriers to this sector for participation in water conservation programs. One was time investment of business staff to schedule audits and two, a general lack of understanding by the owner of potential water saving opportunities within business operations. To overcome these barriers, in early 2014 the City began a partnership program with Sustainable Connection’s Community Energy Challenge (CEC) for commercial entities. The Community Energy Challenge helps businesses reduce energy use by providing with energy assessments, facility action plans, utility monitoring and technical support, enhanced rebates, and community-wide recognition for energy efficiency success. The City’s partnership includes a water assessment and helps to break down or remove the barriers identified.

Cost effectiveness
Pilot project findings identified substantial savings that could be achieved through this customer class. Approximately $100,000 of cost effective water savings were found in the 9 completed commercial water audits conducted. The table below provides an example of a commercial pilot project participant’s estimated savings for the various potential water saving measures that could be implemented on site.

Provided by consultant Watershed LLC
<table>
<thead>
<tr>
<th>Proposed Water Saving Measure</th>
<th>Estimated Cost of Implementation</th>
<th>Annual Gallons of Water Saved</th>
<th>Annual Water/Wastewater Savings $</th>
<th>Annual Energy Savings $</th>
<th>Annual Total Savings $</th>
<th>Simple Payback (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Efficiency Toilets</td>
<td>$1,050</td>
<td>13,875</td>
<td>$81</td>
<td>$0</td>
<td>$81</td>
<td>13</td>
</tr>
<tr>
<td>High Efficiency Urinals</td>
<td>$1,100</td>
<td>25,000</td>
<td>$146</td>
<td>$0</td>
<td>$146</td>
<td>7.5</td>
</tr>
<tr>
<td>Low Flow Faucet Aerator</td>
<td>$730</td>
<td>13,487</td>
<td>$79</td>
<td>$29</td>
<td>$108</td>
<td>6.8</td>
</tr>
<tr>
<td>Pre-Rinse Spray Valve</td>
<td>$45</td>
<td>21,900</td>
<td>$128</td>
<td>$105</td>
<td>$233</td>
<td>0.2</td>
</tr>
<tr>
<td>Single Pass Air Conditioning System replacement</td>
<td>$16,000</td>
<td>453,600</td>
<td>$2,656</td>
<td>$0</td>
<td>$2,656</td>
<td>6</td>
</tr>
<tr>
<td>Ice Machine replacement</td>
<td>$2,700</td>
<td>31,025</td>
<td>$182</td>
<td>$19</td>
<td>$201</td>
<td>13.4</td>
</tr>
<tr>
<td>Total</td>
<td>$21,625</td>
<td>558,587</td>
<td>$3,272</td>
<td>$153</td>
<td>$3,425</td>
<td>6.3</td>
</tr>
</tbody>
</table>

**Projected water savings**

Based on the number of participants to date in the 2014 commercial rebate project, over 600,000 gallons of water savings are estimated to be conserved through completed retrofits. Projected water savings for the 2014-19 program period are indeterminable due to the variety of water uses in this customer class.

**Evaluation metric**

Quantitative and qualitative. This measure will be evaluated based on the estimated number of commercial customers participating in energy and water assessments for a qualitative analysis, and number of rebates processed and water savings associated with fixture and equipment retrofits for a quantitative analysis.

3. **Extend rebates to multi-unit water customers (2015-2018)**

Multi-unit water customers account for approximately 18% of the total consumed water produced by the City. This customer class is comprised of apartments, condos, and tri-and four-plex residences.
Cost effectiveness

The table below provides a summary of a multi-unit pilot project participant’s estimated savings for the various potential water saving measures that could be implemented on site.

Provided by consultant Watershed LLC

<table>
<thead>
<tr>
<th>Proposed Water Saving Measure</th>
<th>Estimated Cost of Implementation</th>
<th>Annual Gallons of Water Saved</th>
<th>Annual Water/Wastewater Savings $</th>
<th>Annual Energy Savings $</th>
<th>Annual Total Savings</th>
<th>Simple Payback (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low flow faucet aerators</td>
<td>$1,560</td>
<td>105,339</td>
<td>$658</td>
<td>$384</td>
<td>$1,042</td>
<td>1.5</td>
</tr>
<tr>
<td>Low flush toilets (75)</td>
<td>$16,500</td>
<td>603,564</td>
<td>$3,768</td>
<td>$0</td>
<td>$3,768</td>
<td>4.4</td>
</tr>
<tr>
<td>Efficient clothes washers (4)</td>
<td>$7,200</td>
<td>486,720</td>
<td>$3,039</td>
<td>$891</td>
<td>$3,930</td>
<td>1.8</td>
</tr>
<tr>
<td>All Cost Effective measures</td>
<td>$25,260</td>
<td>1,195,623</td>
<td>$7,465</td>
<td>$1,275</td>
<td>$8,740</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Projected water savings

Approximately 1.5 million gallons of water per year if total rebate funding is utilized for toilet retrofits.

Evaluation metric

Quantitative. This measure will be evaluated based on the estimated number of multi-units participating/rebates processed and water savings associated with fixture retrofits.


Of the 400+ dedicated irrigation accounts, the vast majority are used the most during the summer months. Ample opportunities exist in working with this customer class to encourage efficient outdoor water use practices and identify potential and existing leaks within systems. This can be achieved through irrigation audits and training session for landscape professionals.

Cost effectiveness

Undetermined at this time.

Projected water savings

Undetermined at this time.

Evaluation metric

Quantitative and qualitative.

The Industrial customer class make up only 4% of the total consumed water produced by the City, however, several of the individual highest consumption accounts are Industrial type water customers. Working with this customer class and the WA Department of Ecology’s existing programs targeted at this group to develop Best Management Practices could afford more customized water efficiency.

Cost effectiveness
Undetermined at this time.

Projected water savings
Undetermined at this time.

Evaluation metric
Quantitative and qualitative.


A vast majority of institutional water customers are of the same account use type: churches. Developing Best Management Practices that can serve to address the similar water uses and efficiency opportunities of this group can provide customized and targeted water use efficiency opportunities.

Cost effectiveness
It is anticipated that these customers could potentially benefit from toilet retrofits, based on the use type of the facility. These technological improvements could be more appropriate than behavior changes. Typically 15 to 35% water reductions for this customer class based on national averages.

Projected water savings
Undetermined at this time.

Evaluation metric
Quantitative and qualitative.

7. Engage partners to provide water use efficiency resources to targeted customer classes (2014-2019)

Strong relationships and partnerships locally, regionally, and nationally have proven to be effective in serving the needs of the City’s water customers. The City’s water use efficiency program established partnerships in 2008-2013 with the following local non-profit agencies to assist in outreach to its water customers:

- Opportunity Council
- Sustainable Connections
- RE Sources
- WSU Whatcom County Extension

These partnerships will continue in the 2014-2019 program period to the extent feasible and as necessary, as well, staff will evaluate other potential partnership opportunities.
Cost effectiveness
Research, support and networking with other utilities, non-profit organizations, and the private sector aid in the planning and protection of our water, while maximizing staff time and budgets.

Projected water savings
Will be determined by type of partnership and scope of work.

Evaluation metric
Quantitative and qualitative where applicable.

With the City two years away from completing installation of water meters on all customers, and more reliable water consumption data becoming available, a more accurate analysis can be conducted to determine where the greatest water efficiency opportunities lie within the City’s water system. This measure will engage a consultant to look at current rate structure and current and projected water consumption data to identify more thoroughly what direction the water use efficiency program should take with a fully metered water system.

Cost effectiveness
Investment in this study will more accurately identify the best investment options for the utility’s fully metered water system and water use efficiency program.

Projected water savings
Undetermined at this time.

Evaluation metric
Quantitative and qualitative.

9. Reduce Water Treatment Plant operational water use via implementation of greater water efficient technology (2015)
A Dissolved Air Flotation (DAF) process has been identified by the City as the most effective alternative to remove algae from our source water, thus enabling the existing filters to perform as they were designed and meet the needs of the City’s customer base and reduce TTHM concentrations in the City’s distribution system. The proposed DAF system will eliminate the need for excessive filter backwashing during the summertime algae season. The algae blooms greatly reduce filter run times and result in much more frequent filter backwashes. Without algae, filter run times are typically greater than 20 hours. During the peak summertime algae season, filter run times have dropped to as low as 3 hours and commonly drop below 6 hours.

Cost effectiveness
Undetermined at this time.

Projected water savings
200-250 million gallons per year.

Evaluation metric
Quantitative.

The City sees opportunity for increased education and outreach on sustainable water management demonstration projects through community partnerships. The City views its participation in active and passive water harvesting demonstration systems as a direct benefit to the water utility, project partners, its customers, the environment, and the general public. Projects can be replicated by both commercial and residential water customers in the City for water conservation and stormwater management techniques on private property. Projects support the City’s adopted Legacies and Strategic Commitments of:

- Clean, Safe Drinking Water
  - Protect & improve drinking water sources
  - Promote water conservation
- Healthy Environment
  - Protect & improve the health of lakes, streams & bay
  - Protect & restore ecological functions & habitat
  - Conserve natural & consumable resources
- Vibrant and Sustainable Economy
  - Create conditions that encourage public & private investment
  - Foster vibrant downtown & other commercial centers
- Sense of Place
  - Support sense of place in neighborhoods
  - Support people-to-people connections
- Access to Quality of Life Amenities
  - Foster arts, culture & lifelong learning

Cost effectiveness

Previous demonstration projects have been $2,000 or less. It is anticipated projects costs will remain at this level.

Projected water savings

Existing demonstration systems total 4,500 gallons of rainwater storage. Water savings vary and are dependent on location and collection area. The primary benefit is the demonstrated application of using non-potable water for non-potable uses.

Evaluation metric

Mostly qualitative, some quantitative.

Cost-sharing opportunities with other local utilities will also be explored for some measures. Adopted measures will continue to be implemented as long as they result in water savings, water conservation education, and are cost-effective to the utility.

Program Evaluation

The WUE program as a whole is mapped through a basic program logic model (Appendix B). A program logic model is a picture of how the program works—the theory and assumptions that underlie it. The model provides a road map of how it is expected to work, what activities need to come before others, and how desired outcomes are achieved. It is also a beneficial evaluation tool that facilitates effective program planning, implementation, and evaluation. A SWOT (strengths, weaknesses, opportunities, threats) analysis
was conducted on the 2008-2013 program to assist in goal and measurement adoption for the 2014-2019 program period. Both formative (program improvement) and summative (proof the program worked as planned) evaluation will be on-going throughout the 6-year period at the macro and micro levels to determine if measures are proving to be cost-effective and meeting the short- and long-term outcomes.

City staff recognizes that targeted messaging, barrier removal, and outreach to new audiences can assist in program participation. The communications framework below illustrates the types of strategies that can be employed with targeted messages to various audiences for existing and new water use efficiency program activities.

Outreach
Targeting unique outreach messages to selected water customer classes provides specific water use efficiency solutions for each group. Additionally, staff has the ability to locate which neighborhoods have the greatest participation in water use efficiency measures to date and where outreach efforts can be maximized to raise awareness about available measures to areas where participation has been lower.

Education
Research shows that people are more likely to take action on something they understand. Messaging on water and associated money savings is more likely to be effective when people understand their water use, can identify the largest water-using appliances, and know the payback for retrofits. Staff will continue to take this approach to education in outreach messaging.

Community Engagement
There are segments of the population that are aware of and understand services available from the water use efficiency program, but still have a financial or lack-of-interest barrier to participation. Staff will continue to obtain and review needs and attitudes of these differing segments to determine how best to assist in uptake of water conservation measures.

Memberships and Affiliations
The City is a member of the following organizations that promote water conservation:
• Alliance for Water Efficiency (http://www.allianceforwaterefficiency.org/)
• WaterSense (http://www.epa.gov/watersense/)
• American Rainwater Catchment Systems Association (http://www.arcsa.org)
• Whatcom Water Alliance
• Whatcom Watersheds Info Network
• Lake Whatcom Management Team (http://lakewhatcom.wsu.edu/)

Water Meter Installation Schedule
At the City’s Water Treatment Plant (WTP), one source meter measures the water entering the facility from the Lake Whatcom Reservoir. Service meters are required on all multi-family, commercial, industrial, irrigation, college and university, and city facility accounts. In August 2008, Bellingham City Council adopted Resolution 2008-26, which outlines the City’s Water Meter Installation Schedule as required by DOH (Appendix C). The schedule outlines what the City will do to meet the service meter installation mandate of 2017.

At the end of 2013, 4,000 flat-rate water customers had meters installed and began metered water billing in 2014. Preliminary consumption data from this group show averages of 12 ccf per two-month billing cycle. Approximately 11,000 flat-rate customers will have meters installed during the 2014-2019 program period.

Current Distribution System Leakage (DSL)
Until all city water customers are metered, the City does not need to meet the mandated 10% or less DSL rate. The City must, however, include information on its efforts to minimize system leakage in each Annual Performance Report. The City has had an ongoing leak detection program since early 1994 and uses the AWWA/IWA’s water balance to provide greater accountability in supply and demand side water use within the distribution system. Appendix X displays the city’s water balance.

Leaks are repaired in a timely manner whether found on a property owner’s water service line or city main.

Water Demand Forecast
Predictions about how much water will be needed for delivery to customers at some point far in the future are notoriously difficult to pin down. Accuracy of these forecasts are influenced by population, weather, climate, water prices/rates, and our conservation programs. Table 5 below shows recent figures for population, number of water services, rainfall and average daily demand for Bellingham’s water system. Using the population and employment projections and applying the per capita unit demand factors, future water demand requirements for the City’s water distribution system are estimated. To project future water demands, it was also assumed that the unit demand factors and the peaking factors would remain constant through the planning period. The projected water system demands for the required 6-year and 20-year planning periods are summarized in Table 6 and in Figure 4 below.

If recent trends continue and the City is able to meet its goal of maintaining its current per capita water use, then conservation measures will result in a 12% reduction in ADD and MDD for by 2028 when compared with projections without conservation measures (Table 7).
### Table 5.

**Trends in Population, Services, Rainfall, and Average Daily Demand consumption**

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>% Change Population</th>
<th># Services</th>
<th>% Change Services</th>
<th>Rainfall (in)</th>
<th>ADD (mgd)</th>
<th>% Change Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>76,676</td>
<td></td>
<td>24,579</td>
<td></td>
<td>29.00</td>
<td>10.14</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>77,910</td>
<td>1.61%</td>
<td>24,880</td>
<td>0.49%</td>
<td>36.49</td>
<td>10.14</td>
<td>-0.00%</td>
</tr>
<tr>
<td>2010</td>
<td>79,141</td>
<td>1.58%</td>
<td>24,978</td>
<td>0.39%</td>
<td>34.49</td>
<td>9.63</td>
<td>-5.03%</td>
</tr>
<tr>
<td>2011</td>
<td>80,367</td>
<td>1.55%</td>
<td>25,011</td>
<td>0.13%</td>
<td>32.72</td>
<td>9.52</td>
<td>-1.14%</td>
</tr>
<tr>
<td>2012</td>
<td>81,590</td>
<td>1.52%</td>
<td>23,324</td>
<td>-6.75%</td>
<td>39.88</td>
<td>9.39</td>
<td>-1.37%</td>
</tr>
<tr>
<td>2013</td>
<td>83,222</td>
<td>2.00%</td>
<td>23,467</td>
<td>0.61%</td>
<td>31.37</td>
<td>8.72</td>
<td>-7.14%</td>
</tr>
</tbody>
</table>

### Table 6.

**Total Projected Water Demands**

<table>
<thead>
<tr>
<th>Year</th>
<th>Water System ADD (mgd)</th>
<th>Water System MDD (mgd)</th>
<th>ADD Backwash and Plant Usage (mgd)</th>
<th>MDD Backwash and Plant Usage (mgd)</th>
<th>Total ADD (mgd)</th>
<th>Total MDD (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>11.5</td>
<td>22.0</td>
<td>0.6</td>
<td>1.2</td>
<td>12.1</td>
<td>23.2</td>
</tr>
<tr>
<td>2009</td>
<td>11.8</td>
<td>22.6</td>
<td>0.6</td>
<td>1.2</td>
<td>12.4</td>
<td>23.8</td>
</tr>
<tr>
<td>2010</td>
<td>12.1</td>
<td>23.2</td>
<td>0.7</td>
<td>1.3</td>
<td>12.7</td>
<td>24.5</td>
</tr>
<tr>
<td>2011</td>
<td>12.4</td>
<td>23.8</td>
<td>0.7</td>
<td>1.3</td>
<td>13.1</td>
<td>25.1</td>
</tr>
<tr>
<td>2012</td>
<td>12.7</td>
<td>24.5</td>
<td>0.7</td>
<td>1.3</td>
<td>13.4</td>
<td>25.8</td>
</tr>
<tr>
<td>2013</td>
<td>13.1</td>
<td>25.2</td>
<td>0.7</td>
<td>1.4</td>
<td>13.9</td>
<td>26.6</td>
</tr>
<tr>
<td>2014</td>
<td>13.5</td>
<td>25.9</td>
<td>0.7</td>
<td>1.4</td>
<td>14.2</td>
<td>27.3</td>
</tr>
<tr>
<td>2028</td>
<td>18.3</td>
<td>35.1</td>
<td>1.0</td>
<td>1.9</td>
<td>19.3</td>
<td>37.0</td>
</tr>
</tbody>
</table>
Table 7.

<table>
<thead>
<tr>
<th></th>
<th>Without Conservation</th>
<th>With Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADD</td>
<td>MDD</td>
</tr>
<tr>
<td>Current Year</td>
<td>10.32</td>
<td>19.81</td>
</tr>
<tr>
<td>2014</td>
<td>14.20</td>
<td>27.26</td>
</tr>
<tr>
<td>2028</td>
<td>19.27</td>
<td>37.00</td>
</tr>
</tbody>
</table>

Note: Demands in mgd.

Figure 4.
Reclaimed Water Opportunities

The City of Bellingham recognizes the benefit of using treated wastewater to reduce demands for potable water and coordinating the Water System Plan and the Sewer Comprehensive Plan. The City of Bellingham’s wastewater treatment facility could serve as a supply of reclaimed wastewater. Creating reclaimed water, however, would require significant and costly improvements to existing treatment processes to generate the requisite Class-A standard for effluent reuse.

The City has considered potential customers for water reuses and has determined that lack of suitable prospects makes the investment unviable at this time. Table 8 provides a listing of the top 20 highest water consuming customers of the City’s water supply.

Table 8.

<table>
<thead>
<tr>
<th>Last Name</th>
<th>Total Consumption (ccf)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWU</td>
<td>101,770</td>
<td>3.76%</td>
</tr>
<tr>
<td>WHATCOM CO WATER DISTRICT 2</td>
<td>62,866</td>
<td>2.32%</td>
</tr>
<tr>
<td>WHATCOM CO WATER DISTRICT 7</td>
<td>53,985</td>
<td>1.99%</td>
</tr>
<tr>
<td>BELLINGHAM COLD STORAGE</td>
<td>48,081</td>
<td>1.77%</td>
</tr>
<tr>
<td>RESIDENT</td>
<td>47,985</td>
<td>1.77%</td>
</tr>
<tr>
<td>CITY OF BELLINGHAM</td>
<td>45,748</td>
<td>1.69%</td>
</tr>
<tr>
<td>TRANS-OCEAN PRODUCTS INC</td>
<td>38,848</td>
<td>1.43%</td>
</tr>
<tr>
<td>PORT OF BELLINGHAM</td>
<td>36,231</td>
<td>1.34%</td>
</tr>
<tr>
<td>NW HEALTH CARE LINEN</td>
<td>32,073</td>
<td>1.18%</td>
</tr>
<tr>
<td>BORNESTEIN SEAFOODS INC</td>
<td>32,028</td>
<td>1.18%</td>
</tr>
<tr>
<td>PEACEHEALTH ST JOSEPH MEDICAL</td>
<td>31,177</td>
<td>1.15%</td>
</tr>
<tr>
<td>BELLIS FAIR</td>
<td>27,335</td>
<td>1.01%</td>
</tr>
<tr>
<td>BELLINGHAM SCHOOL DISTRICT</td>
<td>24,690</td>
<td>0.91%</td>
</tr>
<tr>
<td>BELLINGHAM HOUSING AUTHORITY</td>
<td>23,388</td>
<td>0.86%</td>
</tr>
<tr>
<td>TRIDENT SEAFOODS CORP</td>
<td>20,025</td>
<td>0.74%</td>
</tr>
<tr>
<td>CAREY NORTHWEST LLC</td>
<td>17,742</td>
<td>0.65%</td>
</tr>
<tr>
<td>HEATH TECNA INC</td>
<td>16,641</td>
<td>0.61%</td>
</tr>
<tr>
<td>HABITAT PROPERTIES LP</td>
<td>16,547</td>
<td>0.61%</td>
</tr>
<tr>
<td>REGENCY PARK APTS</td>
<td>15,430</td>
<td>0.57%</td>
</tr>
</tbody>
</table>
Many of the largest customers represent several smaller points of consumption (e.g. Bellingham Housing Authority, Bellingham School District, City of Bellingham, Haggens and Western Washington University- all with multiple accounts). Other large water users are food processors such as Bornstein Seafoods and Trans-Ocean Products, where reclaimed water use would not be permitted.

Two of the largest City water customers are wholesale customers of the City (Whatcom County Water Districts 2 and 7). The City could not substitute reclaimed water to these wholesale customers.

This assessment still leaves several potential reuse customers from high water users. The City examined these potential customers and assessed the feasibility of extended reclaimed water service from the wastewater treatment plant to these potential customers. An assessment of these potential reclaimed customers revealed the following facts:

- Fairhaven Park is located about 5,000 feet away from the WWTP at about elevation 170 feet.
- Lake Padden golf course is located about 20,000 feet away from the WWTP at about elevation 470 feet. It could potentially use reclaimed water for 3 to 4 months. In addition, the golf course’s proximity to Lake Padden could limit reuse potential.
- Boulevard Park and the new waterfront area is located about 15,000 feet away from the WWTP at about elevation 170 feet. It could potentially use reclaimed water for 3 to 4 months.
- Fairhaven Middle School is located about 3,000 feet away from the WWTP at about elevation 150 feet. It could potentially use reclaimed water for 3 to 4 months.
- Bellingham Golf & Country Club is located about 35,000 feet away from the WWTP at about elevation 170 feet. It could potentially use reclaimed water for 3 to 4 months.
- PSE and the Cogeneration Plant is a peaking power plant that has unpredictable water demands. When operating it uses up to about 200,000 gal/day.

The combination of the costs of adding Class Treatment to the WWTP, and of pumping and piping of reclaimed water to existing potential customers make reuse of treated wastewater economically unfeasible. The cost of the additional treatment would be great. Even greater would be the cost of constructing miles of transmission and distribution pipes to convey the treated wastewater to the points of application. The total amount of water that would be off-set from the City’s supply would be relatively small considering the large cost of additional treatment and conveyance. As a result, reuse of treated wastewater is not viable for the City at this time and is not something that will be pursued during the 2014-2019 program period.

<table>
<thead>
<tr>
<th>Top 20 Highest Water Consumption Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Name</td>
</tr>
<tr>
<td>BAKERVIEW ESTATES</td>
</tr>
</tbody>
</table>

1 Total Consumption measured from 01/01/2013 to 12/31/2013.

CCF = hundred cubic feet
Rate Structure Analysis
At present, the City uses a “cost-of-service” basis for its water rate structure that was adopted in 2012. The City of Bellingham provides water service to roughly 24,000 customers (95,000 people) inside and outside of its boundaries. Customers pay water rates under a structure the City most recently modified in 2012 through Ordinance No. 20012-12-062, establishing a multi-year rate strategy extending through 2018. Key findings and recommendations on the water portion of the utility bill in the study and what drove the 2012-2018 rate structure are presented below. The study was conducted by FCS Group and states that overall water rate revenue should be increased by 9.0% in 2013, 8.0% per year from 2014 – 2016, and by 6.0% per year from 2017 – 2018. Key factors that drive these adjustments are²:

Q&M
Operating costs are expected to increase by 2% – 5% per year, with a higher near-term impact due to costs associated with the metering program. When the metering program has been completed (by 2017), these incremental costs are expected to go away.

Debt
The proposed 2013 – 2018 water utility capital funding strategy contemplates a total of $35.5 million in revenue bond proceeds (net of issuance costs and reserve requirements) to fund the projected capital costs. An $11.6-million bond issue in 2015 is expected to increase the water utility’s annual debt burden by about $983,000 per year beginning in 2016; a 2018 bond issue of $23.9 million would increase annual debt service by an additional $2.1 million (for a total of $3.1 million per year by the end of the study period). In addition, with the planned transfer of $5 million of existing bond proceeds from the sewer utility to the water utility, the water utility is assumed to fund a proportionate share of debt service on the 2011 Revenue Bond. In the near-term, this amounts to about $270,000 per year.

Capital
Consistent with prior recommendations, the forecast incorporates a policy to fund system reinvestment through water rates. The prior water rate study completed in 2007 established an annual funding level based on annual depreciation expense, net of debt principal. However, given the projected increases in debt service discussed above, this analysis reflects a revised benchmark (50% of annual depreciation expense) to stabilize the annual funding level. By the end of the study period, the annual transfers for system reinvestment are projected to increase to about $1.4 million. This is in addition to cash funding provided through SDCs.

Reserve Funding
Consistent with the prior study, this analysis reflects a policy assumption that the water utility maintains an operating (or “working capital”) reserve with a balance sufficient to cover 60 days of projected operating expenses. Because the City has currently been maintaining an operating reserve balance of 5% (about 18 days) of budgeted expenses, this analysis phases in the higher reserve target over several years. In addition, this analysis introduces a separate “rate stabilization reserve” intended to provide additional security against revenue risk associated with volumetric revenues, preserving the City’s ability to meet its debt obligations even in low sales years. The target balance for this reserve is 50% of annual debt service for debt issued on or after January 1, 2011. Debt issued

prior to 2011 is not included in this calculation because the covenants for that debt do not allow use of a rate stabilization reserve to meet bond coverage requirements.

Expansion of Reduced-Rate Program
This study included the evaluation of the incremental impact of expanding the City’s reduced-rate program based on the low-income threshold established by Whatcom County ($35,000 per year). Based on staff recommendations, the adopted rates assume that this program is expanded.

The water rate schedule shown in Table EX-1 below is recommended for adoption as inside-City rates.

<table>
<thead>
<tr>
<th>Table EX-1: Summary of Proposed 2013 – 2018 Inside-City Water Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Rates for Single-Family Districts</td>
</tr>
<tr>
<td>Monthly Flat Rate:</td>
</tr>
<tr>
<td>Single-Family Residence</td>
</tr>
<tr>
<td>Discounted Single-Family</td>
</tr>
<tr>
<td>Monthly Fixed Rate:</td>
</tr>
<tr>
<td>5/8&quot; Meter</td>
</tr>
<tr>
<td>3/4&quot; Meter</td>
</tr>
<tr>
<td>Volume Rate per ccf:</td>
</tr>
<tr>
<td>Combined with Mtered Single-Family Residential Rate:</td>
</tr>
<tr>
<td>Monthly Flat Rate:</td>
</tr>
<tr>
<td>Multi-Family, Non-Residential, &amp; Institution</td>
</tr>
<tr>
<td>Monthly Flat Rate:</td>
</tr>
<tr>
<td>5/8&quot; Meter</td>
</tr>
<tr>
<td>3/4&quot; Meter</td>
</tr>
<tr>
<td>1&quot; Meter</td>
</tr>
<tr>
<td>1-1/2&quot; Meter</td>
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<tr>
<td>2&quot; Meter</td>
</tr>
<tr>
<td>3&quot; Meter</td>
</tr>
<tr>
<td>4&quot; Meter</td>
</tr>
<tr>
<td>6&quot; Meter</td>
</tr>
<tr>
<td>Volume Rate per ccf:</td>
</tr>
<tr>
<td>Outside-City Rates are 1.5 times the rates shown above</td>
</tr>
</tbody>
</table>

Outside-City rates are 1.5 times the rates shown above. All customers are metered combined with metered single-family residential rates.

The rate forecast shown in Table EX-1 reflects:
• Across-the-board increases to the unmetered rate structure, based on the aggregate rate revenue increases of 9.0% in 2013, and 8.0% per year from 2014 – 2016. Based on the planned metering schedule, no customers will be in this class beyond 2016.

• Separation of water districts from other single-family customers. A review of recent water consumption patterns suggests that the water districts served by the City use water in a materially different way than the City’s other metered single-family customers. These districts equate to roughly 300 homes based on the master meters that are tracked in the City’s billing system, but appear to be using as much water as 2,100 homes. Consequently, the proposed rate structure improves equity by establishing a separate rate structure for these districts. Note that this study also included the development of a potential resale rate structure for future wholesale customers, which could also serve as a basis for recovering costs from these customers.

• Introduction of a customer class for newly metered customers, designed to recover approximately 65% of costs from fixed charges and 35% from volume rates. Excluding water districts from other single-family residences as discussed above, the existing metered single-family rate structure currently generates about 56% of its revenue from fixed charges – under the proposed strategy, it would gradually increase its reliance on the fixed charge until it reaches the 65% target after three years. After three years the two customer classes would be merged. This three-year transition period in which there would be two single-family metered classes moderates the increases to both groups – those who are moving from unmetered to metered, and the existing metered customers whose rates will be shifting to a greater reliance on fixed charges.

• Linking of the untreated water rate structure to the non-residential rate structure. Because roughly 20% of the revenue requirement is attributable to water treatment, the untreated water rate structure is set at 80% of the non-residential rate structure. The City’s current untreated water customer will pay significantly less under this structure, which is an equitable outcome given that the existing structure is primarily a fixed rate and was based on the historical demand patterns of a different (and significantly larger) industrial customer. In addition to improving equity, this change also makes it easier to attract future customers for untreated water.

By 2018, the City will be a fully metered water system and can review consumption data from this standpoint to determine the necessity and/or scale of a water conservation rate structure for the new rate adoption beginning 2019.

**Mission:** Provide water customers education and information that results in more efficient and source-appropriate use of our water resources.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Offer rebates for single-family residential water customers</td>
<td>Bill inserts; water &amp; money saving guide; water &amp; energy assessments</td>
<td># of bill inserts distributed; # of water assessments completed</td>
<td>SFR water customers become aware of rebates and understand high water use fixtures in the home, receive water &amp; energy assessment</td>
<td>SFR water customers replace a high water use fixture</td>
<td># of fixture retrofit rebates processed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer rebates for commercial water customers</td>
<td>Bill inserts; water &amp; energy assessments</td>
<td># of bill inserts distributed; # of water assessments completed</td>
<td>Comm water customers become aware rebates and understand high water use fixtures in commercial facilities</td>
<td>Comm water customers replace high water use fixtures</td>
<td># of fixture retrofit rebates processed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer rebates for multi-family water customers</td>
<td>Focus group on property management companies, needs assessment, survey and survey findings report; bill inserts; water &amp; energy assessments</td>
<td># of bill inserts distributed; # of water assessments completed</td>
<td>MFR water customers become aware of rebates and understand high water use fixtures in commercial facilities</td>
<td>MFR water customers replace high water use fixtures</td>
<td># of fixture retrofit rebates processed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create BMP’s for irrigation water customers</td>
<td>Focus group, needs assessment, survey and survey findings report on irrigation water customers; training for Irrigation customers</td>
<td># of irrigation customers receiving BMP’s, # of customers completing training</td>
<td>Irrigation water customers become aware of BMP’s and understand BMP’s available</td>
<td>Irrigation water customers implement BMP’s</td>
<td># of irrigation customers implementing BMP’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create BMP’s for industrial water customers</td>
<td>Focus group, needs assessment, survey and survey findings report on industrial water customers</td>
<td># of industrial customers receiving BMP’s</td>
<td>Induct water customers become aware of BMP’s and understand BMP’s available</td>
<td>Induct water customers implement BMP’s</td>
<td># of industrial customers implementing BMP’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create BMP’s for institutional water customers</td>
<td>Focus group, needs assessment, survey and survey findings report on institutional water customers</td>
<td># of institutional customers receiving BMP’s</td>
<td>Instit water customers become aware of BMP’s and understand BMP’s available</td>
<td>Instit water customers implement BMP’s</td>
<td># of institut customers implementing BMP’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partnerships to provide water use efficiency resources</td>
<td>Contracts with private and non-profit agencies to provide water use efficiency outreach through coordinated efforts</td>
<td># of partnerships, # of water customers receiving wuse info through partnerships</td>
<td>Increased awareness of WUE program by project participants of partnership programs</td>
<td>Increased participation in WUE activities</td>
<td># of participants from partnership programs participating in WUE activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct water use efficiency cost benefit analysis</td>
<td>Report outlining activities that produce the most cost-effective savings for water efficiency</td>
<td>Implementation plan for top rated activities that provide the most cost-effective savings</td>
<td>Knowledge of where the best WUE savings can be achieved</td>
<td>Implementation of cost-effective WUE activities</td>
<td>Water savings as a result of cost-effective WUE activities implemented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install greater water efficient technology at Water Treatment Plant</td>
<td>Dissolved Air Floation (DAF) system at WTP</td>
<td>Reduced water use in water treatment process</td>
<td>Reduced water use in water treatment process</td>
<td>Reduced water use in water treatment process</td>
<td># of gallons conserved in water treatment process with DAF system installed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create sustainable water management demonstration projects with community partners</td>
<td>Sustainable water management demonstration projects for the public to visit and community partners to use</td>
<td># of demonstration projects completed; # of customers touring demonstration projects</td>
<td>Water customers and community partners become aware of sustainable water management strategies and understand options they can implement on their own properties</td>
<td>Water customers implement sustainable water management strategy on their property</td>
<td># of water customers adopting a sustainable water management strategy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ANTICIPATED OUTCOMES**

- Maintain annual city-wide Average Daily Demand at below 10 mgd during the 2014-19 program period;
- Maintain average Peak Day Demand between June 1 and August 31 of each year to below 14 mgd during the 2014-19 program period.
- Calculate ADO during program period; average PDD during summer months over program period.