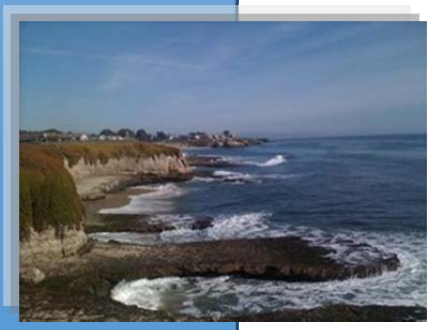
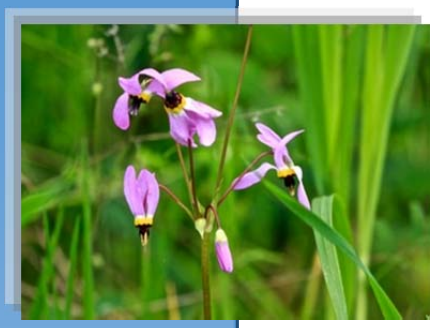
City of Santa Cruz





# Water Conservation Master Plan

January 2017

Prepared by:

MADDAUS WATER MANAGEMENT INC.

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## LIST OF ACRONYMS

| | |
|---|---|
| AB | Assembly Bill |
| AF | acre-feet |
| AFY | acre-feet per year |
| AMI | Advanced Metering Infrastructure |
| AMR | Automatic Meter Reading |
| AWE | Alliance for Water Efficiency |
| AWWA | American Water Works Association |
| BG | billion gallons |
| BGY | billion gallons per year |
| BMP | Best Management Practice |
| CEC | California Energy Commission |
| CII | Commercial, Industrial and Institutional |
| CIS | Customer Information System |
| COM | commercial |
| CP | Cathodic protection |
| CUWCC | California Urban Water Conservation Council |
| CWC | California Water Code |
| DMM | Demand Management Measures |
| DOF | California Department of Finance |
| DSS | Least Cost Planning Decision Support System Model |
| DWR | California Department of Water Resources |
| EPA | Environmental Protection Agency (United States) |
| GHG | Greenhouse Gases |
| GIS | Geographic Information System |
| GPCD | gallons per capita per day |
| gpf | gallons per flush |
| gpm | gallons per minute |
| HECW | High-Efficiency Clothes Washer |
| HET | High-Efficiency Toilet |
| IND | industrial |
| IRR | irrigation |
| IWA | International Water Association |
| MFR | Multifamily Residential |
| MG | million gallons |
| mgd | million gallons per day |
| MGY | million gallons per year |
| MOU | Memorandum of Understanding Regarding Water Conservation in California |
| MUN | municipal |
| MWELO | Model Water Efficient Landscape Ordinance |
| MWM | Maddaus Water Management, Inc. |
| NRW | non-revenue water |
| PG&E | Pacific Gas & Electric |
| psi | pounds per square inch |
| PWSS | Public Water System Statistics |
| SB | Senate Bill |

| | |
|---|---|
| SB X7-7 | Water Conservation Bill of 2009 |
| SCWD | Santa Cruz Water Department |
| SF | Single Family |
| UCSC | University of California Santa Cruz |
| UHET | Ultra-High Efficiency Toilet |
| ULFT | Ultra-Low Flow Toilet |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WCMP | Water Conservation Master Plan |
| WF | water factor |
| WS | WaterSense (EPA Program) |
| WSAC | Water Supply Advisory Committee |

# 1. EXECUTIVE SUMMARY

The purpose of the Executive Summary is to briefly describe the City of Santa Cruz Water Department (City) Water Conservation Master Plan (WCMP or Plan). The evaluation process and assumptions used to develop this Plan and recommendations for future implementation are included in the full report.

The City of Santa Cruz has had a long-standing commitment to water conservation since the 1980s and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient. In 2000, the City adopted a Water Conservation Plan, the goal of which was to reduce water demand system-wide by 282 million gallons per year in 2010. Through plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies, residential and commercial customers have saved over 330 million gallons of water per year so far. The City is also a member of the California Urban Water Conservation Council (CUWCC) and is active in promoting water conservation statewide.

In 2011, the City sponsored a survey of its residential and commercial customers called the Residential and Commercial Baseline Water Use Survey Program (Baseline Survey) to develop a picture of the current state of water-using equipment within the service area. This study revealed that indoor water use efficiency opportunities were mostly saturated. The survey findings provided a basis for estimating additional conservation potential and yielded information to help select, target, and design future water conservation initiatives.

In 2013, the City of Santa Cruz contracted with Maddaus Water Management (MWM) to develop an updated Water Conservation Master Plan. Strengthening water conservation efforts had been identified as top priority by the Santa Cruz City Council (City Council), the City's Water Commission, and more recently by the City's Water Supply Alternatives Committee in its effort aimed at delivering a safe, adequate, affordable, and environmentally sustainable water supply. The overall goal of the updated plan was to define the next generation of water conservation activities and serve as a roadmap to help the community achieve maximum, practical water use efficiency. Additional goals established during the planning process included the following:

- Capitalize on opportunities to assist with meeting the future water needs of the Santa Cruz Water Department customers through cost-effective and sustained water conservation and water use efficiency efforts
- Demonstrate environmental stewardship and foster innovative, responsible, and efficient practices
- Commit to and implement a water conservation program that supports the health of rivers, streams, and groundwater integral to the region's quality of life and economy
- Monitor and measure performance to ensure conservation potential is being met as forecasted
- Maintain and exceed the water savings already achieved by the City of Santa Cruz as well as identify the best path to achieve those savings and to monitor commitments to the CUWCC Memorandum of Understanding (MOU) Regarding Urban Water Conservation
- Maintain a long-term plan for compliance with SB X7-7 to meet the gallons per capita per day (GPCD) target by 2020
- Meet the City's integrated water resource management goals to reduce peak season demands

The process used to develop the plan included analyzing individual conservation measures and different sets of measures or "programs" using the Least Cost Planning Water Demand Management Decision Support System Model (DSS Model). The evaluation includes measures directed at existing accounts as well as new development measures to help ensure new residential and business customers are more water efficient. After a significant screening and evaluation process, a Recommended Program consisting of 35 individual measures was selected to evaluate the net

effect of running selective multiple measures together over time. The elements of the Recommended Program are highlighted in Table 1-1, organized by major customer sector. Note that some measures appear twice since they apply to more than one sector.

## 1.1 Long-Term Demand and Conservation Program Analysis Results

The development of this Plan consisted of two main parts: 1) create a demand and conservation analysis for 2015 to 2035 and 2) evaluate conservation savings potential for the years 2015 to 2035 with a variety of different measures and conservation programs.

The first step in the analysis was to review and analyze historical water use production and billing data. The analysis built on previous efforts and was updated using M.Cubed's September 2015 City of Santa Cruz Water Demand Forecast, in which M.Cubed conducted an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. The historical water use, selected population projections, most recent plumbing code information, and discussions with the City were used to create a demand forecast for the years 2015 to 2035, as further described in Sections 3 and 5.

Once the demand forecast was completed, the conservation measures listed in Table 1-1 were analyzed for costs and benefits. A total of 33 out of 35 unique measures were analyzed using the DSS model. Two measures (conservation pricing and additional building code requirements for new development) were not sufficiently developed to be modeled individually at the time. The conservation analysis included all the quantifiable measures selected by the City. The following important factors about the conservation measures were included in this analysis:

1. The measures recommended are listed in Table 1-1 and described in Section 7 in Table 7-1.
2. New California state-wide plumbing standards that were adopted in 2015, the Model Water Efficient Landscape Ordinance (MWELO) and the CALGreen building code (as of December 1, 2015). These can be found in Appendix A.

**Table 1-1. Elements of Recommended Program**

| Utility Measures | Residential Measures | CII Measures | Landscape Measures |
|---|---|---|---|
| System Water Loss Reduction | Residential Leak Assistance | CII Incentives | Large Landscape Budget-Based Water Rates |
| Advanced Metering Infrastructure | Single Family Residential Surveys | Pre-Rinse Spray Nozzle Installation | Water Efficient Landscape Ordinance |
| SF, MF, COM Conservation Pricing - Water and Sewer[1] | Plumbing Fixture Giveaway/Opt | CII Surveys | Single Family Residential Turf Removal |
| General Public Information | Residential Ultra High Efficiency Toilet Rebates | High Efficiency Urinal Program | Multifamily Residential/CII Turf Removal |
| Public Information (Home Water Use Report) | High Efficiency Clothes Washer Rebates | Public Restroom Faucet Retrofit - MUN | Expand Large Landscape Survey/Water Budgets |
| | Gray Water Retrofit | Public Restroom Faucet Retrofit - COM | Sprinkler Nozzle Rebates |
| | | School Retrofit | Residential Rain Barrels |
| | Hot Water On Demand - New Development | Hot Water On Demand - New Development | Climate Appropriate Landscaping and Rainwater Infiltration |
| | Toilet Retrofit at Time of Sale | Toilet Retrofit at Time of Sale | |
| | CII MF Common Laundry Room High Efficiency Clothes Washer[2] | CII MF Common Laundry Room High Efficiency Clothes Washer[2] | |
| | Single Family/Multifamily Dishwasher Rebates[2] | Rewarding Businesses for Adopting Best Practices[2] | |
| | Hot Water Recirculation Systems[2] | Hot Water Recirculation Systems[2] | |
| | Additional Building Code Requirements for New Development[2] | Additional Building Code Requirements for New Development[2] | |
| | Innovation Incubator Program[2] | Innovation Incubator Program[2] | |

[1] This measure was still under development when the technical memorandum was approved in April 2016. A comprehensive cost of service water rate study conducted by Raftelis Financial Consultants, Inc. was completed in August 2016.
[2] These measures target both CII and residential customers.

The Plan presents the water demands and conservation savings determined by this analysis. The Plumbing Code includes the new California State Law (Assembly Bill 715), which requires installation of High Efficiency Toilets and High Efficiency Urinals as of 2014. The Plumbing Code also includes SB 407, which applies to all new construction and replacements as of 2017 for single family and 2019 for multifamily and commercial properties. The increase of projected growth in population will cause baseline water demand to increase slightly. However, overall water use projections with plumbing code and water savings from the recommended program are expected to decline and then level off by 2035, based on current technologies.

Table 1-2 presents the City's water use projections 1) without plumbing code savings; 2) with only plumbing code savings and no active conservation activity; and 3) with plumbing code savings and the Recommended Program active conservation program implementation savings. It is important to note that demand projections are normalized,

without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

**Table 1-2. Normalized Water Use Projections**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand (MGY) | 3,560 | 3,636 | 3,743 | 3,838 |
| Demand with Plumbing Code (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |
| Demand with Plumbing Code and Recommended Program (MGY) | 3,327 | 3,225 | 3,205 | 3,220 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table shows the savings in 5-year increments for the plumbing codes, Recommended Program, and the Recommended Program with plumbing code savings from a baseline of 2015 normalized water demands without drought or recession conditions.

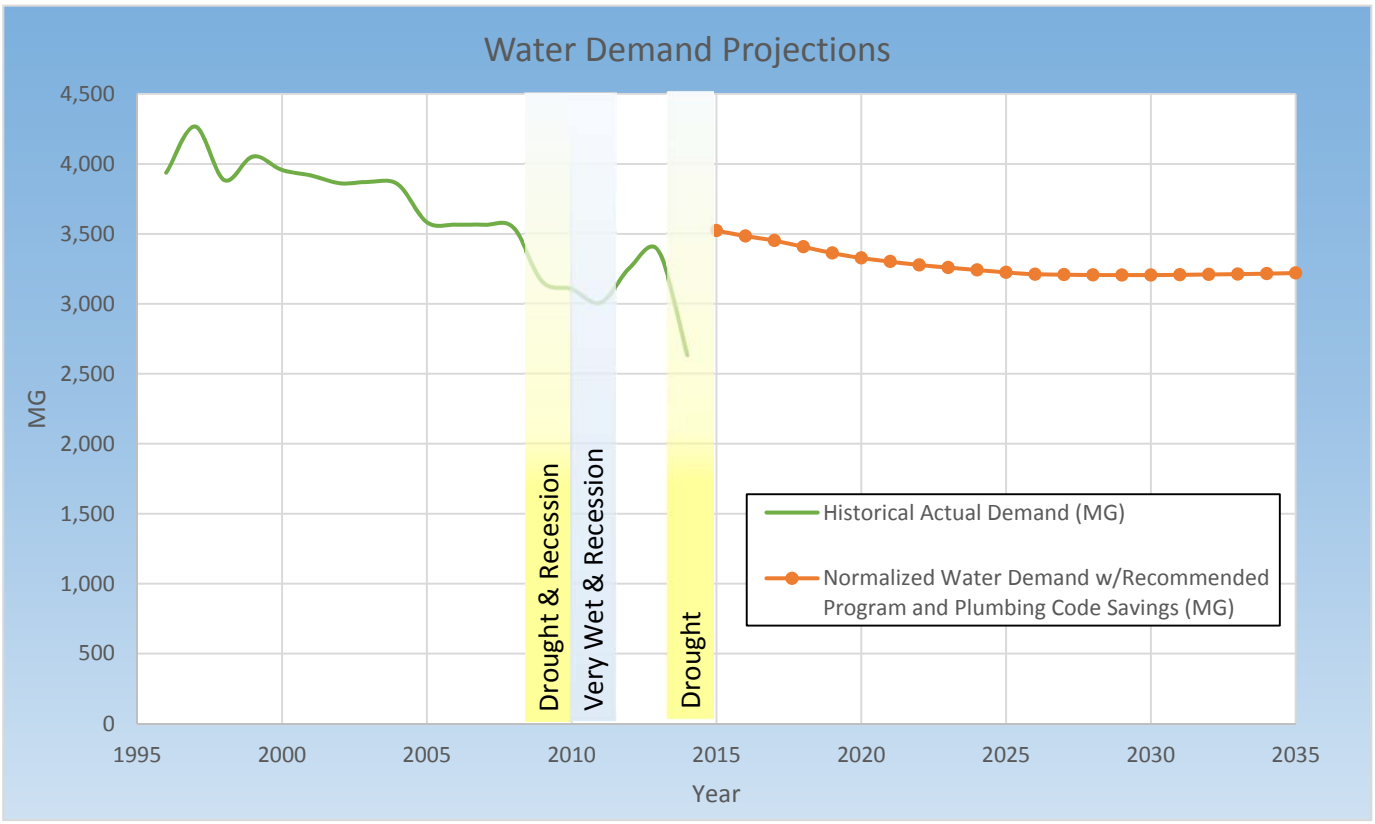
**Table 1-3. Long Term Conservation Program Savings over "Baseline" Demand**

| Conservation Program | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Plumbing Code (MGY) | 96 | 179 | 269 | 329 |
| Recommended Program (MGY) | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings (MGY) | 233 | 411 | 538 | 619 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Figure 1-1 exhibits the same information as Table 1-2, in graphical form for the Recommended Program only. Demand projections are normalized, beginning in 2015, whereas historical demands are based on actual data, which illustrates how much demands have been affected recently by drought and economic influences. Future water demand is presented without lingering effects of drought, hence the large discontinuity between actual and forecast demand. This rebound to historical demand levels is considered a conservative assumption and repressed demands may persist for several years and beyond 2020. The projections do not reflect this delayed reaction.

**Figure 1-1. Recommended Program Projected Normalized Water Demands**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table shows the projected per capita water use in gallons per day per person (GPCD) in 5-year increments for the projected demand with no plumbing code savings, projected demand with plumbing code savings, and projected demand with Recommended Program implementation and plumbing code savings.

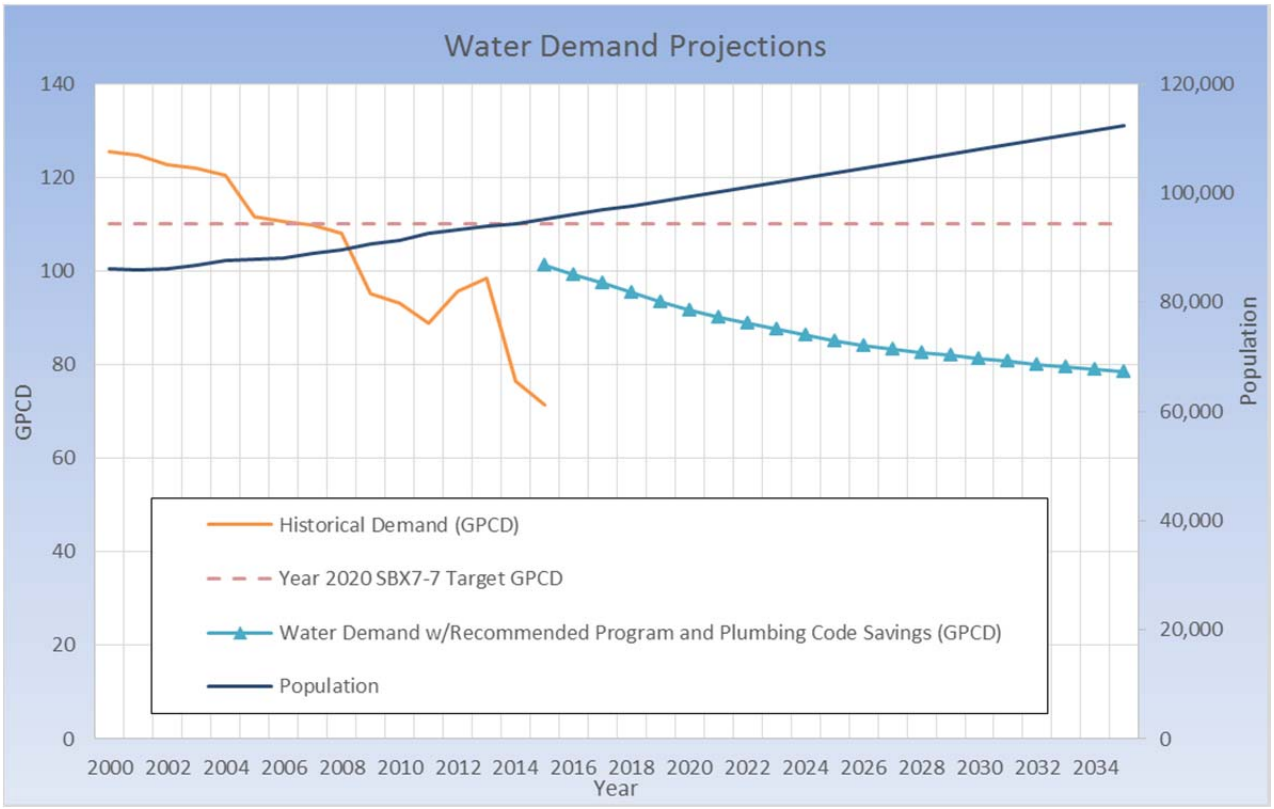
**Table 1-4. Projected Population and Per Capita Water Use[1]**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Population [2] | 99,403 | 103,620 | 107,989 | 112,390 |
| "Baseline" Demand without Plumbing Code (GPCD) | 98 | 96 | 95 | 94 |
| Demand with Plumbing Code (GPCD) | 95 | 91 | 88 | 86 |
| Demand with Plumbing Code and Recommended Program (GPCD) | 92 | 85 | 81 | 78 |

[1] City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.
[2] WSAC Final Report, October 2015.

The following figure presents the SB X7-7 year 2020 GPCD target and historical and projected GPCD estimates with plumbing codes and Recommended Program savings. As seen below, the City has already met its state-mandated 2020 target and surpassed its voluntary CUWCC 2018 goal of 101 GPCD. The goal of the City's plan is to press beyond these state targets and instead maximize conservation savings to help meet local resource needs for current and future water demands.

**Figure 1-2. Water Conservation Program Savings Normalized Projections – SB X7-7 Target**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table presents the benefit-cost analysis summary for the Recommended Program, which includes all the measures listed previously.

**Table 1-5. Recommended Program Costs and Savings**

| Conservation Program | Average Cost of Water Saved ($/MG) | Water Savings over "Baseline" Demand in 2035 (MGY) |
|---|---|---|
| **Recommended Program with Plumbing Code Savings** | 4,572 | 619 |

Notes:

1. Across the modeling time period of 2015-2035, administrative costs average approximately 22% of total utility costs annually.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 1.2 Key Findings from the Water Conservation Program Analysis

As a result of this comprehensive analysis, here are some summary observations and conclusions:

1. The additional, incremental water savings from the Recommended Program, compared to the City's recent demand forecast developed by M.Cubed and used by the Water Supply Advisory Committee (WSAC), amount to about 220 million gallons in 2035.
2. The estimated annual demand will decline over time to about 3.2 billion gallons per year (BGY) in 2035, versus about 3.4 BGY estimated in the M.Cubed demand study. That estimate is comparable to the actual

level of water production experienced in the late 1960s, when the service area population was around 50,000. This decrease represents an almost 16% reduction is water use over 20 years.

3. The impact on water savings from 2015 changes in the fixture plumbing codes prompted by the emergency conservation regulations (which would not have been factored in but for the delay associated with the Water Supply Advisory Committee's process) is over 100 million gallons more than previously estimated.
4. The overall cost of water saved by the Recommended Program is about half of what the WSAC set as a recommended threshold.
5. Gross per capita water use is expected to gradually decline to a level of less than 80 GPCD in 2035.

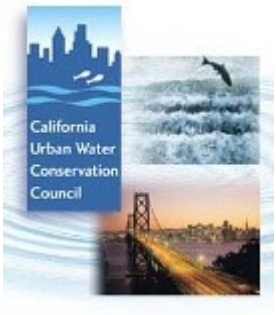
Successful implementation of the Recommended Program will require a significant increase in level of effort on the part of the City. Many new conservation measures will be employed and high participation rates are needed to achieve selected Program goals. Recommendations to assist with implementation include the following next steps:

- Budget an average of $1.1 million per year to cover the estimated cost of implementing this Program.
- Prioritize measures for implementation giving highest priority for implementation to those that contribute the most to meeting peak water saving targets in order to best optimize supply sources.
- Consider working with the largest water using customers in an attempt to reduce water use as described in Section 3.
- Develop a Measure Implementation Plan that describes exactly how each program measure will be implemented.
- Prepare an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process).
- Update codes and ordinances, as necessary.
- Form partnerships and apply for grants, where appropriate.
- Contract services, if needed, to gain enough staff support to administer or accelerate implementation of the new program.
- Maintain the City Water Commission and Staff Conservation Working Group to guide the implementation.
- Review and use tools to track water use by customer class and overall water use reductions adjusted for the weather and other external factors.
- Set up a database to store and manage measure participation, cost, and other data to gauge successes and failures and adjust measures as needed.
- Use the tools annually to help decide on priorities for the next plan year.
- Use the DSS Model to annually update the Program, including actual measure participation, projected water savings, and expected per capita water use reductions. This will help to ensure the Program is on track to meet savings goals, including per capita water use targets.

Use the input from the City Water Commission as the forum for ongoing feedback and public input. In addition, utilize the Staff Working Group to update the annual work planning process to amend the plan, budgets, staffing, contracting, schedule, and so forth so as to stay on track.

# 2. INTRODUCTION

Water is a precious natural resource that is vital to the health and welfare and to the economy of the Central Coast region. The City of Santa Cruz relies entirely on local sources for the community's drinking water supply. Because water supplies are limited, it is important that everyone uses water efficiently. The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient.




In 2000, the City adopted a Water Conservation Plan in order to reduce water demand system-wide by 282 million gallons per year by the year 2010. Residential and commercial customers have saved over 330 million gallons of water per year so far with the help of plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies. The City is active in promoting water conservation statewide.

The City of Santa Cruz contracted with MWM in 2013 to develop an updated Water Conservation Master Plan in order to define the next generation of water conservation activities and serve as a roadmap to help the community achieve maximum, practical water use efficiency. The City Council, the City's Water Commission, and the City's Water Supply Alternatives Committee, in its effort aimed at delivering safe, adequate, affordable, and environmentally sustainable water, has identified strengthening water conservation efforts as a top priority.

## 2.1 Overview of City of Santa Cruz Water System and Need for Conservation

The City faces a projected worst year gap between peak season available supply and demand during an extended drought of about 1.2 billion gallons (WSAC, October 2015). This shortfall is due to the following factors:

- 95% of the City's water supplies are collected from surface water sources.
- The City is physically and geographically isolated from other public water systems.
- The City is currently vulnerable to water shortage in extended dry and critically dry years.
- Expected requirements for fish flow releases to protect threatened and endangered species and anticipated impacts of climate change will further reduce available water supply.
- There is a decline in available groundwater supply.

This WCMP is part of the City's integrated water management approach where the City recognizes water conservation as a responsible management strategy for meeting existing and future water needs. Some of the numerous key potential benefits include:

- Protecting natural resources;
- Stretching existing supply
- Maximizing peak season water savings; and
- Helping downsize or delay costly supply, treatment, and distribution system upgrades.

## 2.2 Purpose and Scope of Plan

The City of Santa Cruz's Water Conservation Master Plan strives to maximize the community's efficient use of water in the most equitable and cost-effective manner to the extent practical for implementation by City staff.

Key priorities of the WCMP include the following:

- Capitalize on opportunities to meet the future water needs of the Santa Cruz Water Department customers through cost-effective and sustained water conservation and water use efficiency efforts
- Demonstrate environmental stewardship and foster innovative, responsible and efficient practices
- Commit to and implement a water conservation program that supports the health of rivers, streams, and groundwater integral to the region's quality of life and economy
- Monitor and measure performance to ensure conservation potential is being met as forecasted

Achieving these goals will allow the Water Department to:

- Maintain and exceed the water savings already achieved by the City of Santa Cruz as well as identify the best path to achieve those savings and to monitor commitments to the CUWCC Memorandum of Understanding (MOU) Regarding Urban Water Conservation;
- Maintain a long-term plan for compliance with SB X7-7 to meet the gallons per capita per day (GPCD) target by 2020; and
- Meet the City's integrated water resource management goals to reduce peak season demands.

## 2.3 Plan Development

In preparation for this project, the City completed a Residential and Commercial Baseline Water Use Survey in May 2013 to assess the current status of plumbing fixtures, appliances, and landscape characteristics present in the City's water service area. The results of this baseline study are summarized in Section 3.4. The full baseline study can be found at the following links:

http://www.cityofsantacruz.com/departments/water/conservation/more-information/water-use-baseline-survey

http://www.cityofsantacruz.com/home/showdocument?id=32326

Work on the Water Conservation Master Plan began with a kick-off meeting in January 2013 and was overseen by the City's Water Commission. Since that time, the Water Commission has developed the goals of the planning effort; identified and selected a suite of potential quantifiable conservation measures for technical analysis; and evaluated system-wide conservation potential through selection of a Recommended Program scenario.

There have been two (2) main phases in the City's planning process, separated by an intervening year that included an in-depth review of the work by the Water Supply Advisory Committee (WSAC). The process followed in preparing the Plan is summarized as follows:

**Phase 1: January 2013-October 2014**

- Analyzed water use and review City's Baseline Survey for remaining conservation potential
- Identified, screened, and prioritized measures, with significant public input via Water Commission Meetings and workshops

- Least Cost Decision Support System Model (DSS Model) was used to analyze the water savings, benefits, costs for each modeled measure that was selected during the screening process
- Formulated programs, leading to a recommended Program "C" to maximize total annual water savings based on conservation potential
- Presented outcomes to Water Commission on October 6, 2014

**WSAC Review: October 2014-September 2015**

- At City Council direction, staff and MWM worked with WSAC on integrated planning review. This included the WSAC review of prior Phase 1 analytical results from the DSS Model and seeking to answer additional questions with City and MWM technical assistance.
- Shifted conservation program emphasis to peak season (April-October) water savings rather than maximizing overall higher annual volume and/or more cost-effective water efficiency savings to better address the City's supply-demand gap.
- Prepared and adopted a new econometric-based demand forecast
- Produced recommendations for additional conservation measures to be included in the Final Water Conservation Master Plan

**Phase 2: October 2015-December 2016**

- Recalibrated model to updated econometric demand forecast and reset planning horizon to 2015-2035
- Incorporated new plumbing code changes based on the State's Emergency Drought Regulations, effective December 1, 2015
- Incorporated input (reviewed existing modeled measures for any adjustments and for additions of new measures) from WSAC process, with focus on peak season demand reduction, completed in workshop format on January 14, 2016 with City Staff
- Formulated the "Recommended Program" into the DSS Model and evaluated results.
- Prepared Technical Memorandum for Water Commission review and approval on April 4, 2016.
- City Council approved the TM on April 12, 2016.
- Final report prepared and posted online January 2017.

## 2.4 Plan Adoption

The Water Conservation Master Plan, in the Technical Memorandum form approved by City Council in April 2016, was formally adopted as a part of the City's 2015 Urban Water Management Plan on August 23, 2016.

# 3. ANALYSIS OF HISTORICAL WATER DEMAND

The WCMP process was comprised of four distinct steps: 1) input/analysis of system-wide demand projections to establish demand planning baseline with and without plumbing and building codes; 2) evaluation of system-wide conservation potential; 3) identification and study of potential conservation measures; and 4) deliberation and adoption of preferred long-term conservation program. Each of these steps is described in more detail in the following sections. This section presents a summary of the City's historical demand trends as well as the basis for the demand forecast.

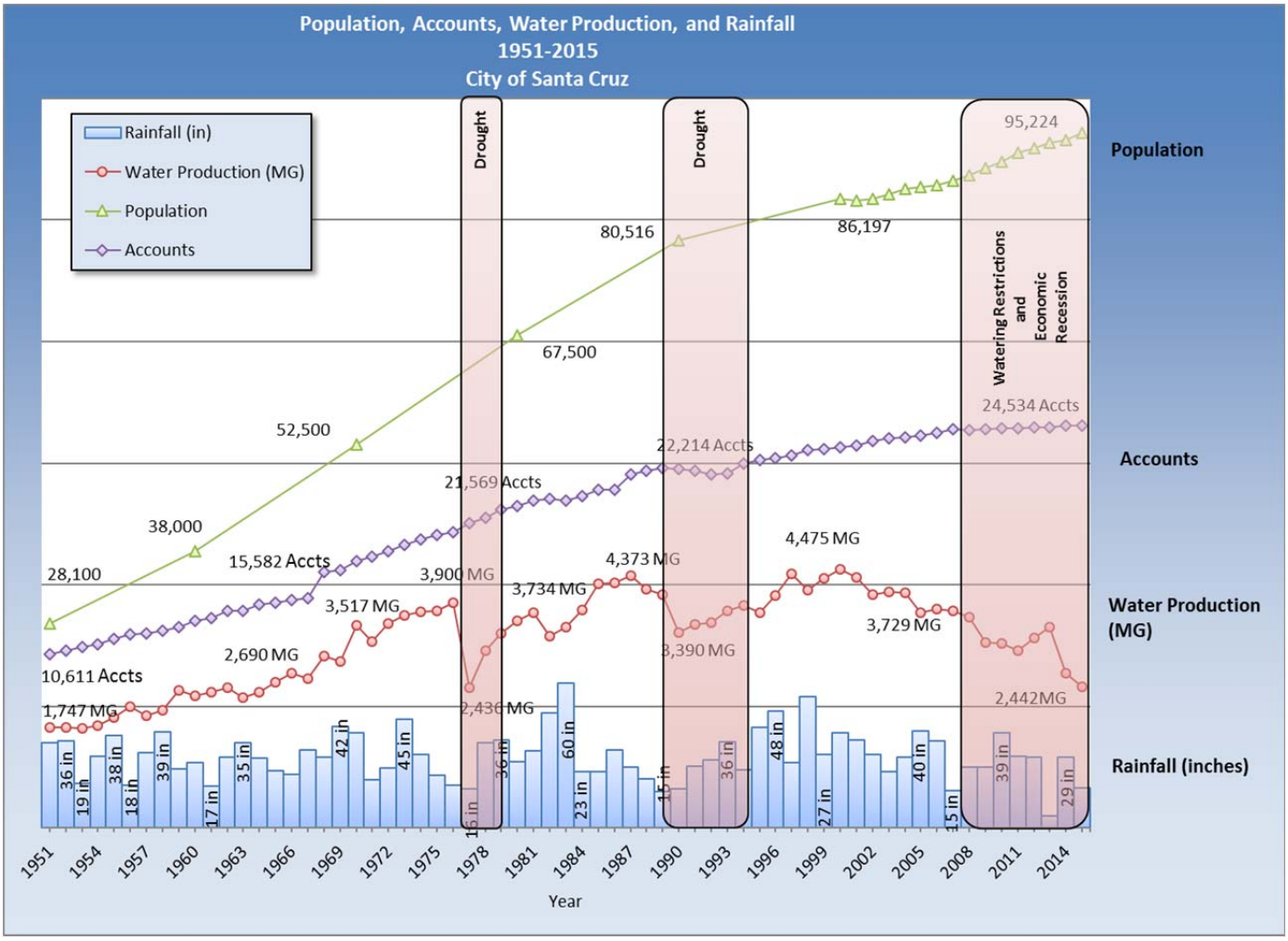
The City's water use patterns were analyzed based on water production and consumption data from City staff; water loss was examined as well. Historical monthly water use data was analyzed. Based on the City's water billing system, residential water use was broken down into single family and multifamily categories. Historical data was segregated into indoor and outdoor water use by customer type using the monthly billing data.

From the billing data, residential per capita water use values were calculated for water use inside the home and outside the home. These values were compared with other sources of municipal water use data applicable to the area. Other nonresidential categories of use were analyzed separately. Average daily commercial/industrial and public water use was expressed on a gallons-per-account or gallons-per-employee basis.

## 3.1 Historical Trends

As seen in Figure 3-1, the historic trend in system water use from 1950 to 2000 increased over time, consistent with account growth and population growth, except during two major drought periods. Around 2000, the pattern changed and system demand began a long period of decline, accelerated in 2009 by drought, economic downturn, and other influencing factors. The City has not seen a full demand recovery since the recent economic recession due to the ongoing drought. In 2013, system-wide demand was 3,364 million gallons per year, about one billion gallons per year less than the decade before with Stage 1 water shortage regulations and restrictions in effect. In 2014, the City instituted water rationing due to severe drought conditions. In 2015, with the same rationing scheme in place, production declined to 2,442 million gallons, a level not seen since the drought in the 1970s. Water demands are projected to remain depressed after the year 2015 long-term behavioral changes related to water use. While it is prudent to assume that future demands will eventually recover when rainfall patterns/drought conditions and the economy normalize, it might not be to the same level as before due to widespread, long-term conservation measures taken in response to drought and ongoing adjustments in water rates. Nonetheless, system-wide demand has recovered to near pre-drought levels after each of the three droughts of record since 1951. Given the pattern of consistent recovery, it is prudent to assume that future demands will follow suit when rainfall patterns, drought conditions, and the economy normalize.

**Figure 3-1. Historical Trends for City of Santa Cruz**




Source: City of Santa Cruz, 1951-2015.

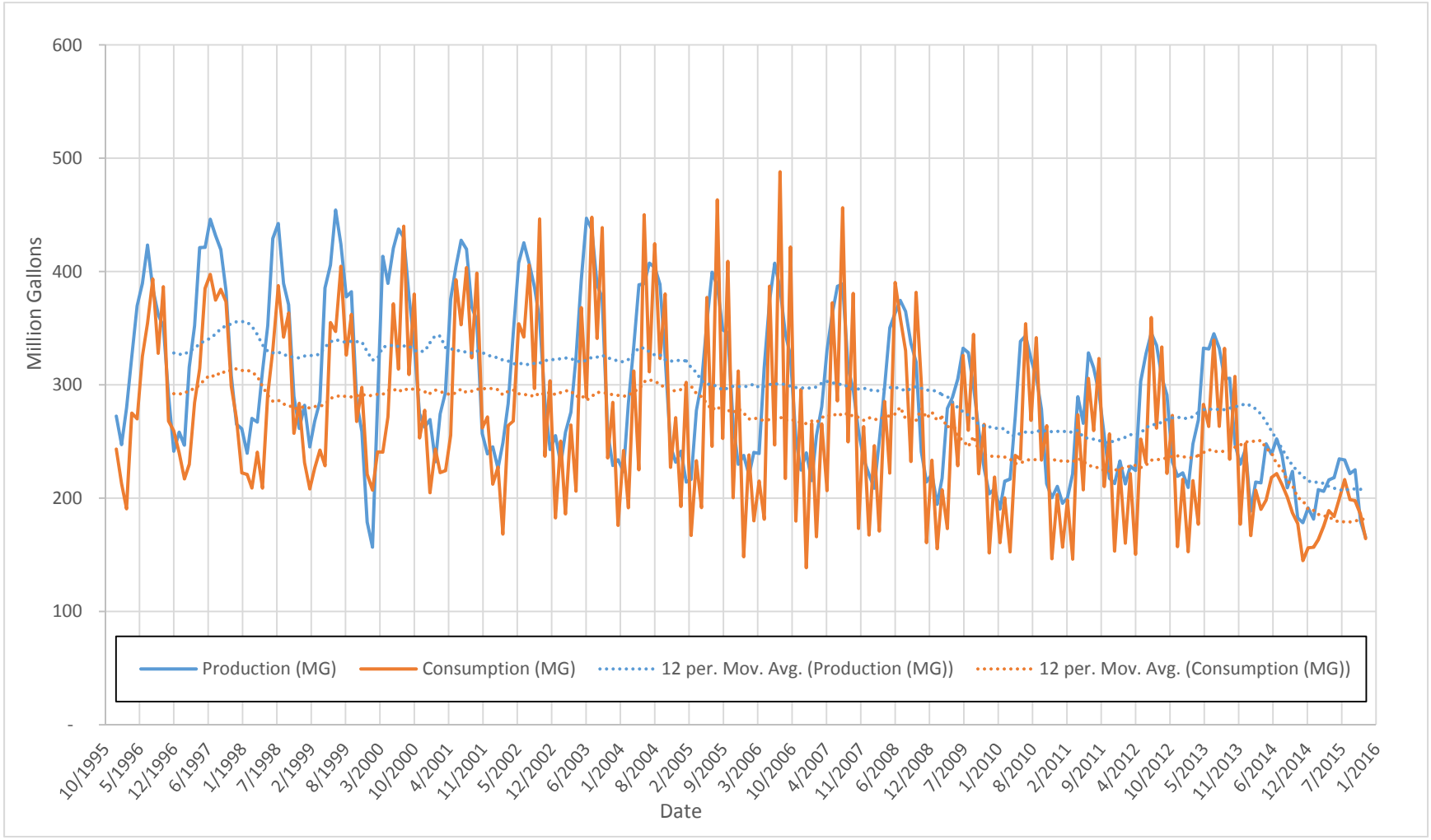
## 3.2 Production versus Consumption

Historical water production data for the City was analyzed on a monthly basis and shown in Figure 3-2, which illustrates the total production versus total consumption for the City. Water production data was measured at the City's water treatment plants. Water consumption data was measured at the customer meters. As can be seen from the figure, the City does not experience significant losses of water in its system between the sources and the customer.

The difference between the amount of water produced and the amount of water billed is termed the non-revenue water (NRW). The City has elected to use an estimated NRW value of 7.5% in their NRW projection estimates based on past AWWA Water System Audit Reports as presented in Section 4.4.2.

The City is currently preparing a Water Loss Control Program Report completed in 2016. The recommendations produced from this year-long project will be used to guide development of a robust water loss control strategy and will serve as a foundation for completing and reporting future annual water audits to the state beginning in 2017 under the requirements of SB 555 of 2015.

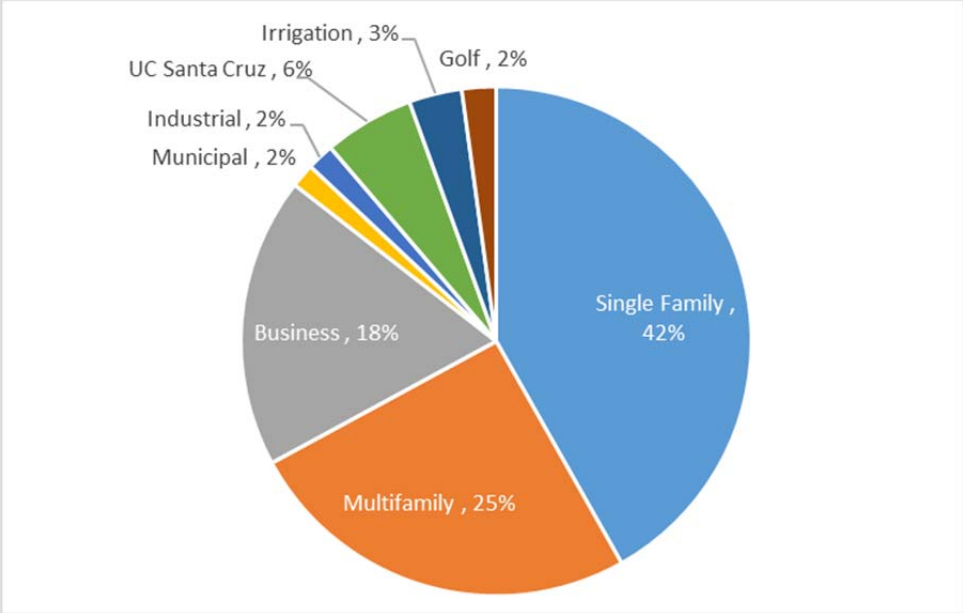
**Figure 3-2. Historical Water Production and Consumption**



## 3.3 Consumption by User Category

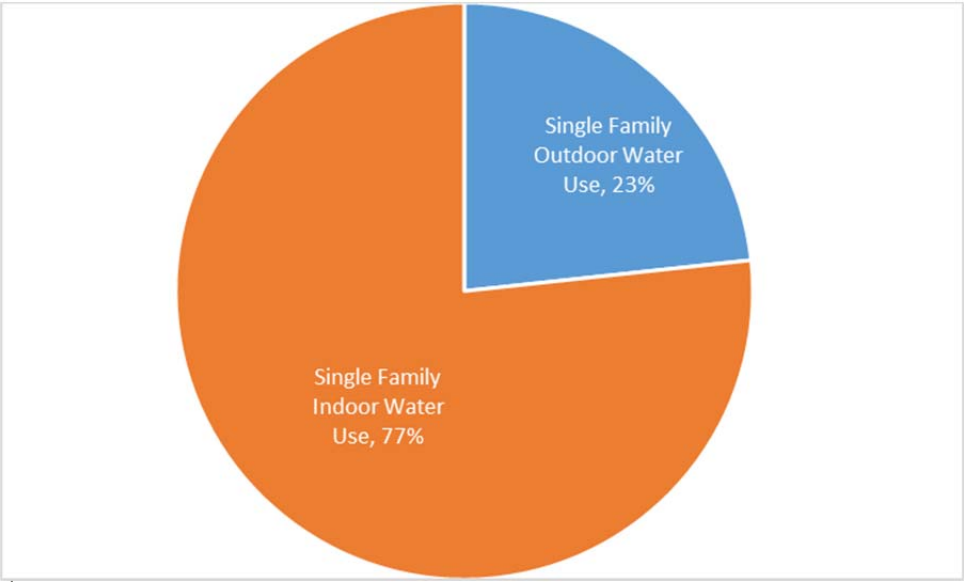
The City has several different types of water users. The current and projected user categories in the City are classified as Single Family, Multifamily, Business, Municipal, Industrial, UC Santa Cruz, Irrigation (including north coast agricultural irrigation), and Golf. The City is a mostly residential community, with some light commercial and industrial. The City is predominately a local services-based economy focused on tourism. The largest category of users of water in the City is the single family residential users who consume about 42% of the water sold. Shown in the following Figure 3-3 is the average annual consumption of the various user categories, based on year 2015 water use and account data for all customer categories.

**Figure 3-3. Annual Consumption by User Category**




Residential use is approximately 67% of the total annual consumption, typical of a city without significant commercial industrial uses. Since the single family residential use category formed the major portion of the City's water use (42%), it was analyzed further. Figure 3-4 shows the breakdown of single family residential use as indoor and outdoor based on the assumption that indoor use is approximately equal to the minimum use in the winter. Recent rainfall has been below normal, so an average of pre-recession and pre-drought years 2007-2008 as a baseline was selected for this profile as it was evident that there was little, if any, winter watering of landscape in these years. The goal of the analysis by customer sector, shown in the previous Figure 3-3, and the breakdown of indoor and outdoor water use, shown in the following Figure 3-4 were provided to help the water conservation planning staff to design conservation programs and marketing messages to obtain the highest water savings. As seen in Figure 3-4 below, 77% of the average single family water use is indoors.

**Figure 3-4. Single Family Residential Water Use: Indoor vs. Outdoor***



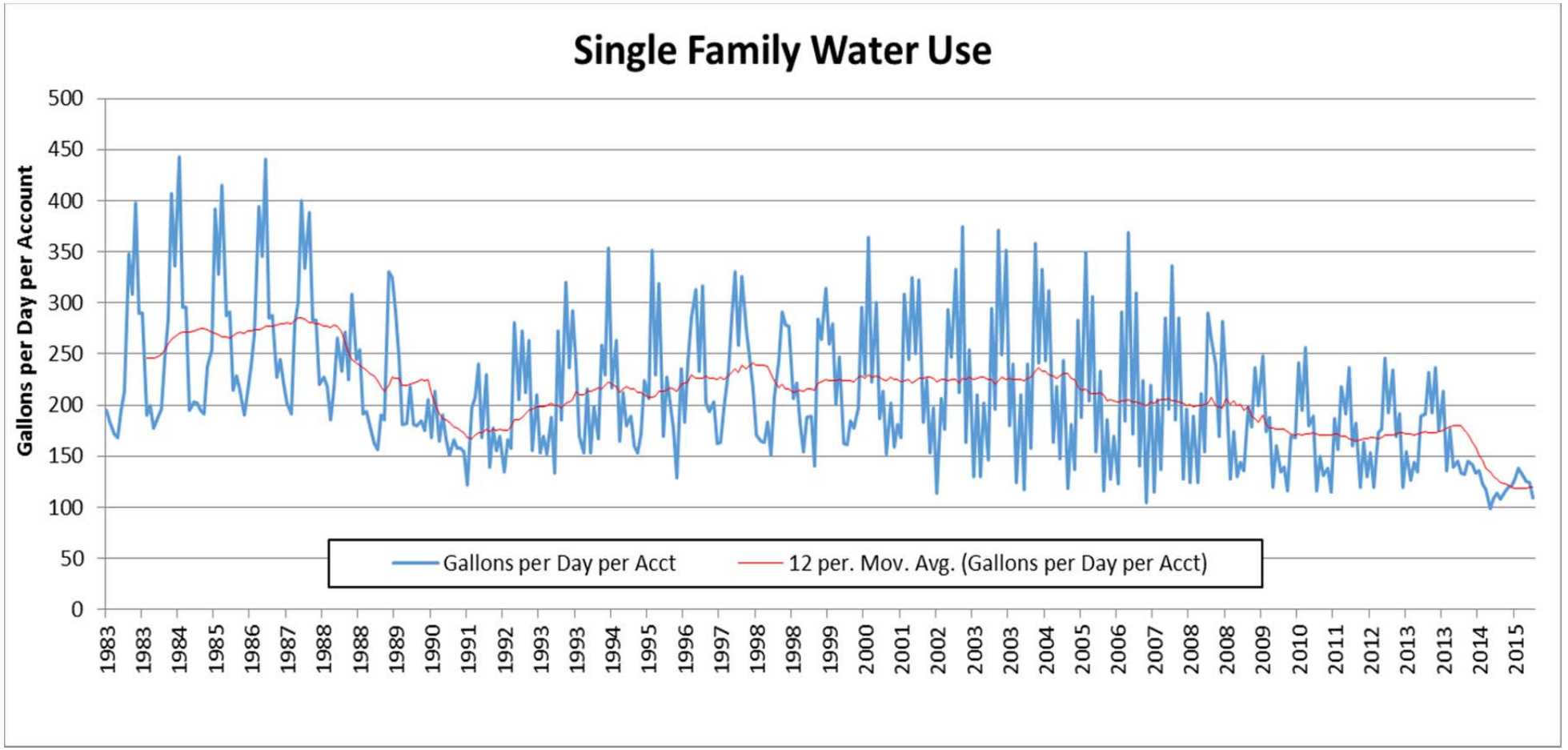

* Average 2007-2008 single family indoor and outdoor water use.

The average monthly usage per account per day for the primary water-user types of customers in the City, including Single Family, Multifamily, Business, and UC Santa Cruz are presented in the following Table 3-1 and Figures 3-5, 3-6, 3-7, and 3-8 along with more information in Appendix B.

**Table 3-1. Average Monthly Usage Per Account Per Day**

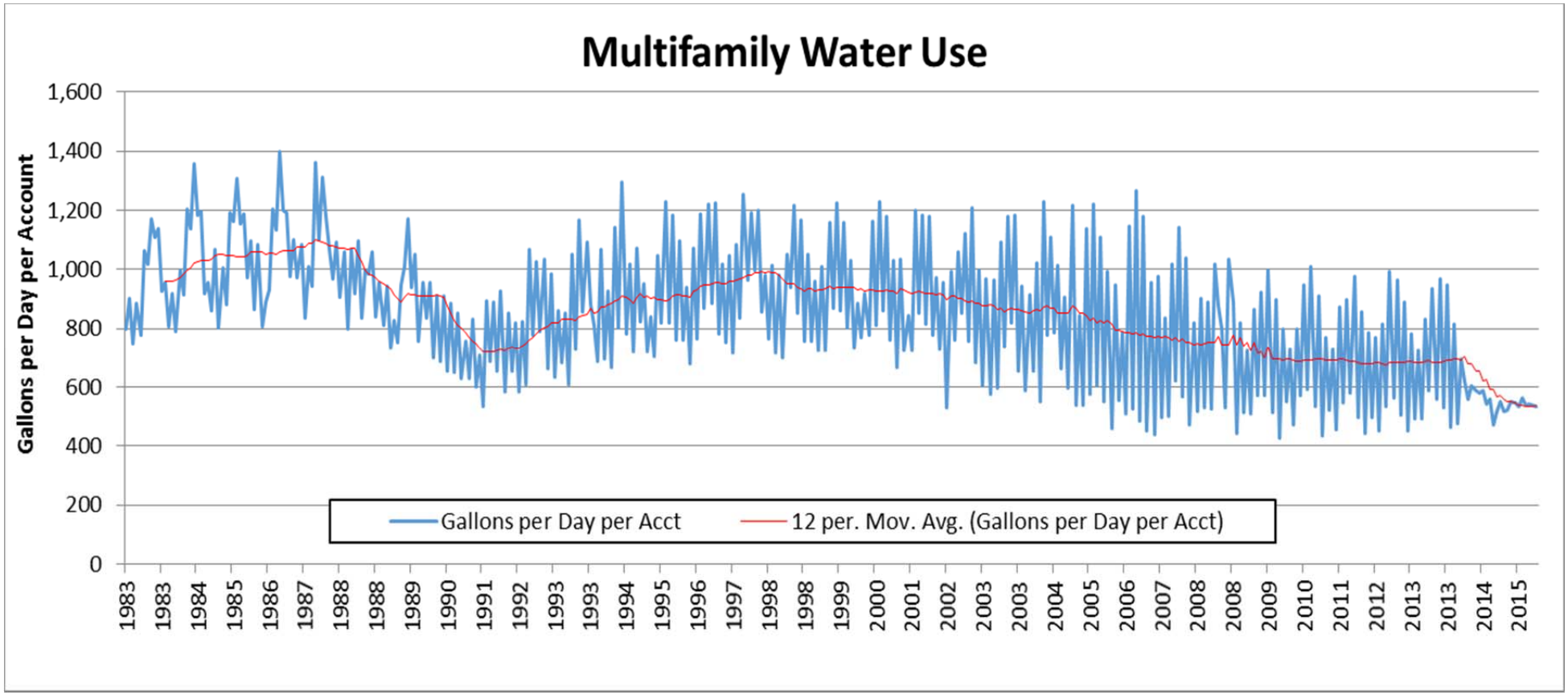
| Customer Categories | Indoor Use Percentage | Outdoor Use Percentage |
|---|---|---|
| **Single Family** | 77% | 23% |
| **Multifamily** | 88% | 22% |
| **Business** | 83% | 17% |
| **Municipal** | 32% | 68% |
| **Industrial** | 81% | 19% |
| **UC Santa Cruz** | 73% | 27% |
| **Irrigation** | 0% | 100% |
| **Golf** | 0% | 100% |

**Figure 3-5. Single Family Consumption per Account per Day***



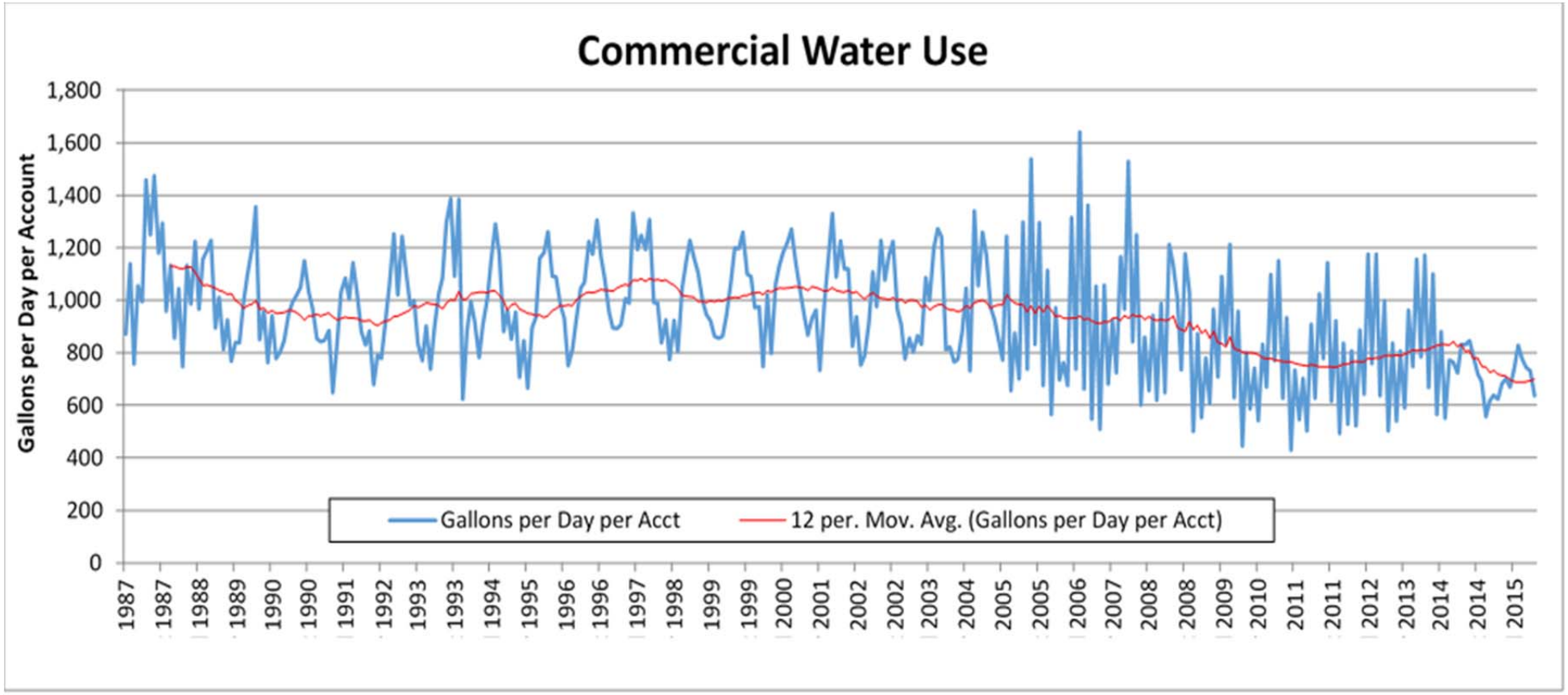

* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-6. Multifamily Consumption per Account per Day***



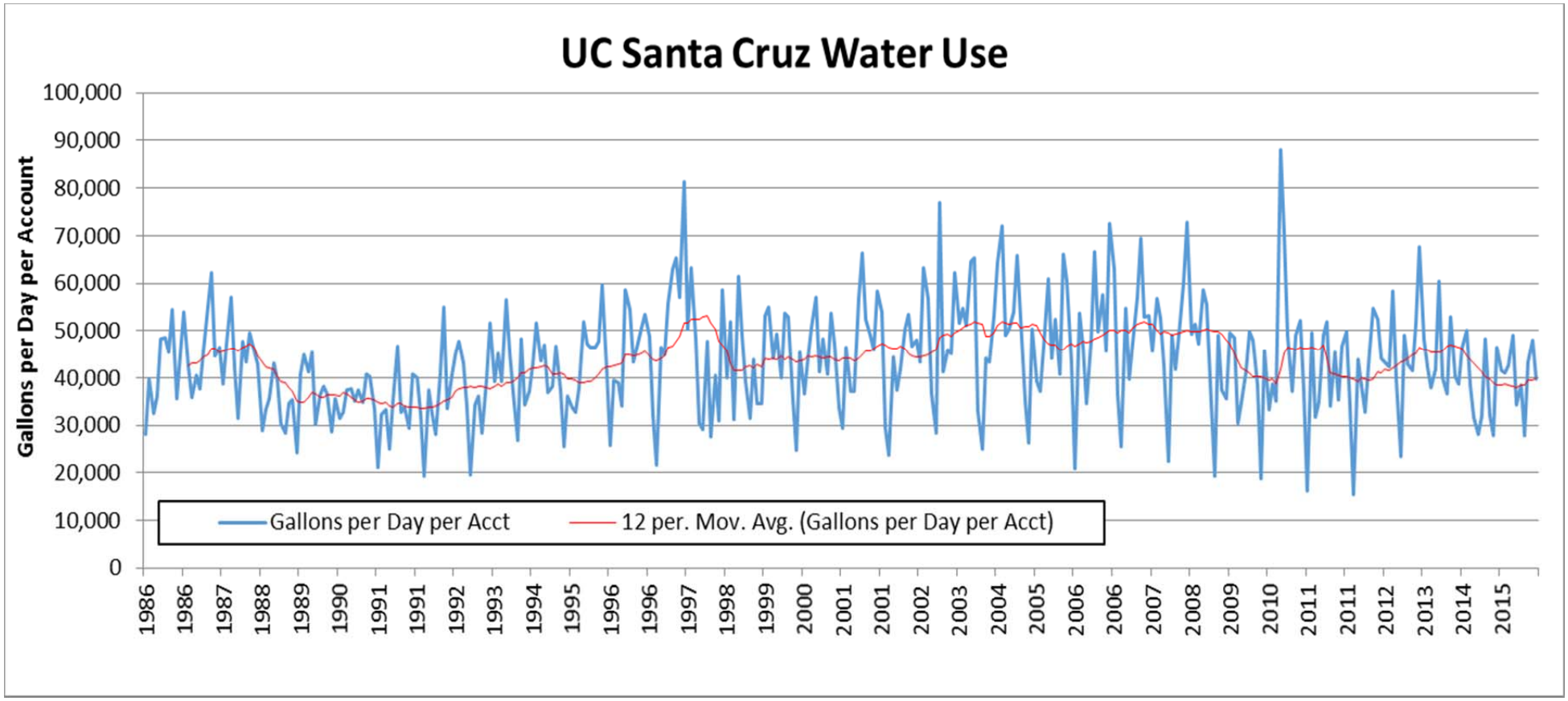

* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-7. Commercial Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-8. UC Santa Cruz Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

Average monthly usage per account per day for the remaining lower water-using four primary types of customers in the City, Industrial, Municipal, Golf, and Irrigation is presented in Appendix B. Several observations can be made when looking at the historical record:

- The City experienced drought years in 1976-77, 1988-1992, and 2009-2015.
- The City experienced a recession in years 2008-2012.
- On January 17, 2014, Governor Edmund G. Brown, Jr. declared a drought state of emergency and directed state officials to take all necessary actions in response. Statewide mandated drought restrictions began in 2014 and are still in effect in the year 2016 at the time this Master Plan update is being written. Therefore, some of the decrease in water use is not actually a true long-term reduction in water use, but only a reflection of the drought restrictions.
- Most of the account growth over time has been in the single family category. Single family accounts have modestly grown 0.2% per year over the last five years. Commercial accounts are also growing slowly at 0.1% per year since 2010. Single family per account water use has decreased over the past five years, most likely due to a combination of the drought, economic recession, and conservation activities. Overall, the community is building out on existing parcels.
- Multifamily water use also has a downward trend, suggesting that newer accounts have been of the smaller size units or have separate irrigation meters and/or conservation programs, which are driving lower per account use.
- Commercial water use also has a gradual downward trend, suggesting shifts in types of commercial uses, smaller new accounts are being added, or commercial accounts are conserving, replacing turf, etc.
- Though the number of irrigation accounts has increased 0.8% per year over the past five years, as shown in Appendix B, irrigation account water use exhibits a significant downward trend due to the current restrictions on outdoor irrigation.

## 3.4 Baseline Survey Results

In 2011, the City sponsored a survey of its residential and commercial customers called the Residential and Commercial Baseline Water Use Survey Program (Baseline Survey) to develop a picture of the current state of water-using equipment within the service area. The Baseline Survey was designed to cover the City's three largest customer categories and excludes the large University of California Santa Cruz (UCSC) campus located within the service area as well as large landscape customers. Because of its non-comparability to other customers, including the UCSC campus in a random customer survey would have made little sense. Although UCSC is not a part of this study, Santa Cruz Water Department (SCWD) has a close relationship with UCSC and the campus has a water conservation plan in place that was developed specifically for the university, based on the results of a comprehensive campus-wide water audit in 2006/07[1] from which UCSC completed all identified high priority projects in the study. Large landscape customers are also excluded from this study because SCWD already has detailed information and conservation strategies in place for such customers.

[1] University of California Santa Cruz. College Water Efficiency Group, Water Conservation in Student Housing Report, 2012. Online: http://www.allianceforwaterefficiency.org/WorkArea/DownloadAsset.aspx?id=9027

The Baseline Survey was a random survey, statistically valid and designed to meet the following two goals: 1) to estimate the stock of indoor plumbing fixtures and appliances and to determine what percentage of this stock is compliant with the latest efficiency standards; and 2) to determine the prevalence, size, and characteristics of landscapes, irrigation systems, and other outdoor water using features, such as pools and spas. Additional information about the Baseline Survey can be found on the City's website at the following link: http://www.cityofsantacruz.com/home/showdocument?id=32326.

The Baseline Survey was very detailed and rigorous in order to sufficiently benchmark how much fixture replacement had been achieved in various sectors of the community. Some of the Baseline Survey findings are summarized in the following table. The percentage of indoor water using fixtures were used as a starting point (initial proportions) of these fixtures within the City in the determination of the indoor water use profile and the fixture water use plumbing code and standard potential savings. Any retrofit in the drought may shift savings earlier than planned but does not estimate any change in the overall anticipated volume of water savings.

**Table 3-2. Baseline Survey Findings**

| Indoor Water Use Characteristics by Sector - Percentage of Water-Efficient Devices | | | | |
|---|---|---|---|---|
| | **Efficiency Standard** | **Single Family** | **Multifamily** | **Commercial** |
| Toilets | ≤1.6 gallons/flush | 90% | 89% | 96% |
| Showerheads | ≤2.5 gallons/min | 92% | 95% | 95% |
| Bathroom Faucets | ≤2.2 gallons/min | 90% | 89% | Varies |
| Kitchen Faucets | ≤1.8 gallons/min | 71% | 92% | 63% |
| Clothes Washers | Front loading type | 63% | 46% | 52% |

Source: WaterWise Consulting, Inc. (2013), Residential and Commercial Baseline Water Use Survey City of Santa Cruz Water Department.

The landscape surveys provided detailed information about outdoor water uses. Lawn, a high water use plant, was found in only about half of residential properties and just 15% of the business sites (which included schools). For single family homes, less than 1/3 of the total landscape was typically devoted to lawn. Multi-family complexes were found to have about an even mix of lawn and other landscape plants. Other than schools, most commercial properties did not have lawn. Water-efficient drip irrigation was found in 44% of single family homes, 22% of multifamily, and 25% of businesses. These averages provided an overview of typical landscapes. However, survey results showed that landscapes varied a lot between properties in size, planting palette, and irrigation equipment used. This diversity adds an extra challenge when designing outdoor conservation programs and estimating the associated water savings.

## 3.5 Analysis of Large Users

An analysis was conducted of the City's top-100 water users. These users may be from any customer category. The UCSC campus is the largest user, with various golf courses, businesses, and institutional customers following in terms of annual demand. The businesses include hotels, supermarkets, dialysis centers, and laundromats; the institutional customers include several elementary schools. There are also several large multifamily complexes that are top water users in the City, including many mobile home parks. In addition to their customer account numbers and property addresses, the top users are tracked by customer category and the common name of the property. On average, top-100 users use approximately 20,000 gallons per day per account.

Those users with higher use per day may indicate increased opportunities to save water. One use of this data would be to set a goal of water use reduction through targeted conservation efforts. If the City sets a goal to save 10% of water use, this goal could be achieved by working with these top-100 high water customers and attempting to reduce each account accordingly. Identifying these additional opportunities for conservation may require a more detailed analysis to determine customer-specific opportunities for water savings. The following table presents the percentage of total demand that is used by the top-100 water users.

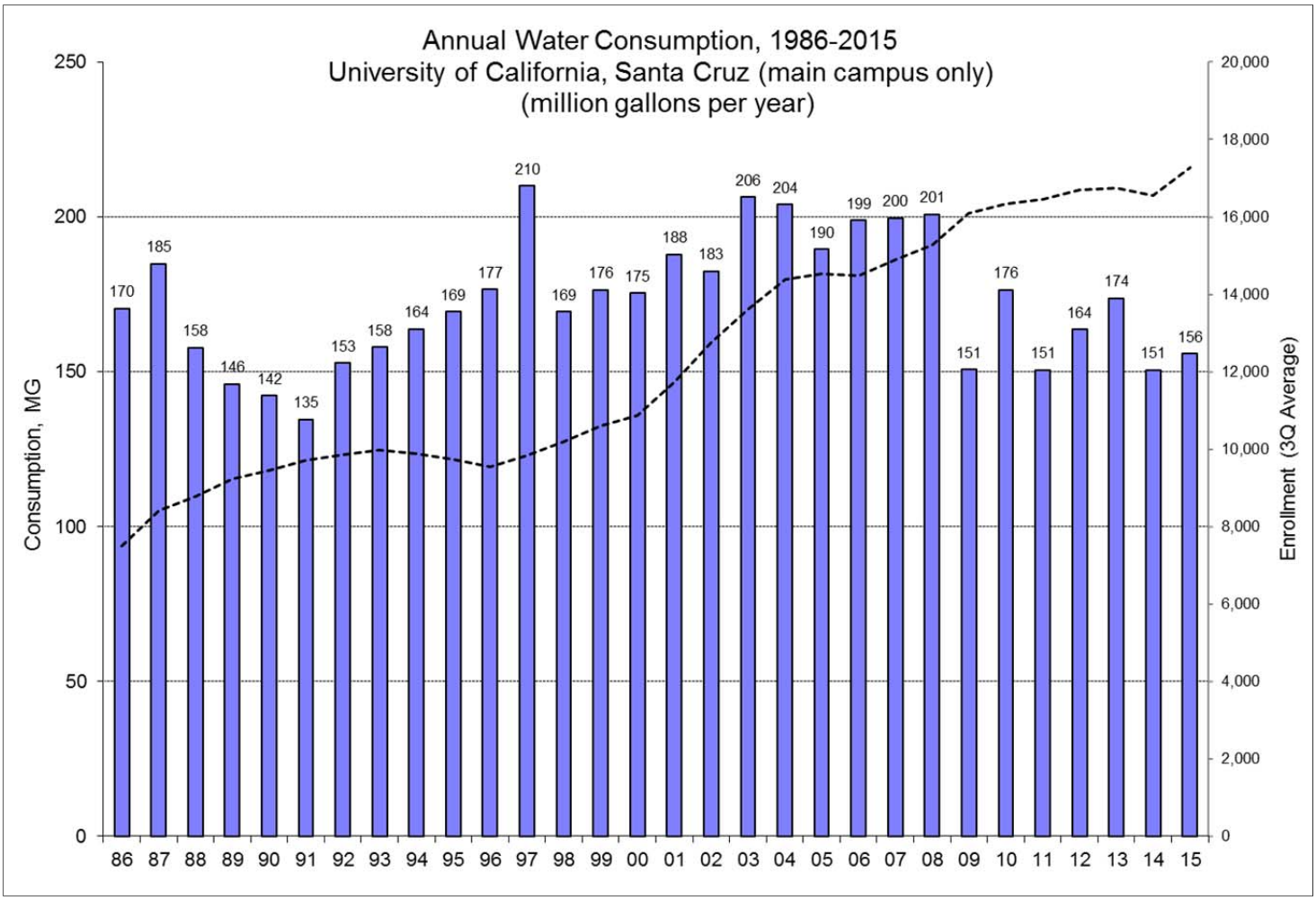
**Table 3-3. Top User Demand**

| Top-100 Large User Demand, MGY[1] | Total CII Demand, MGY[2] | Total Demand, MGY[3] | % Top-100 Large User Use of Total CII Demand | % Top-100 Large User Use of Total Demand |
|---|---|---|---|---|
| 743 | 853 | 2,481 | 87% | 30% |

[1] Top-100 large user demand for year 2012.
[2] Total CII demand represents year 2015 demand for business, industrial, municipal, UCSC, irrigation, and golf accounts.
[3] Total demand represents year 2015 total City water use (or production) including non-revenue water. The 2015 annual customer category consumption was approximately 2,229 MG.

The following chart presents the UCSC water use and enrollment. Note that despite a doubling in enrollment, annual water use remains relatively steady between 1986 and 2015. In fact, UCSC implemented 19 water saving projects, which reduced water use 15% from 2007 to 2011, based on the above-mentioned Water Conservation in Student Housing Report findings (UCSC, 2012).

**Figure 3-9. UCSC Main Campus Annual Water Consumption and Enrollment, 1986-2015**




## 3.5.1 Peak Demand Analysis

The composition of the peak water use was analyzed and methods were further brainstormed to reduce peak water use by all customer types and redesign measures or develop new measures to address this issue.

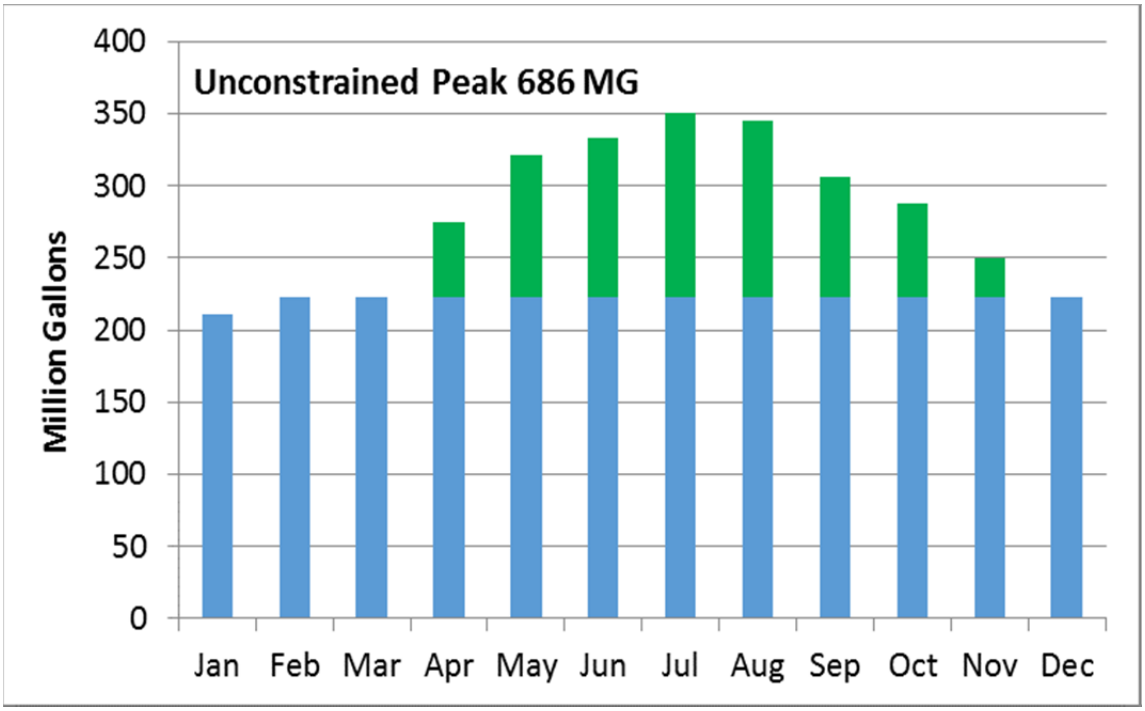
In Santa Cruz, having a pleasant coastal climate, only about 20-25% of the total water use is used for outdoor purposes. Seasonal use is also influenced by tourism, which is primarily in the summer months when visitors enjoy the City's beach lifestyle. In that context, there could be many definitions of what is peak water use, such as:

- Is it the highest water use day of the year? Is it the highest water use month of the year?
- Is it the total water use in the summer?
- Or is it the water use above a baseline of indoor use?

For purposes of this analysis, it was decided to focus on the latter, the total water used for peak use assuming that it is predominately driven by outdoor water demand, principally landscape and turf irrigation. In Santa Cruz, there is measureable outdoor use in the (eight) months of April through November. The highest use month is July, followed closely by August. Most of the nonresidential irrigation water use is separately metered making its quantification easier.

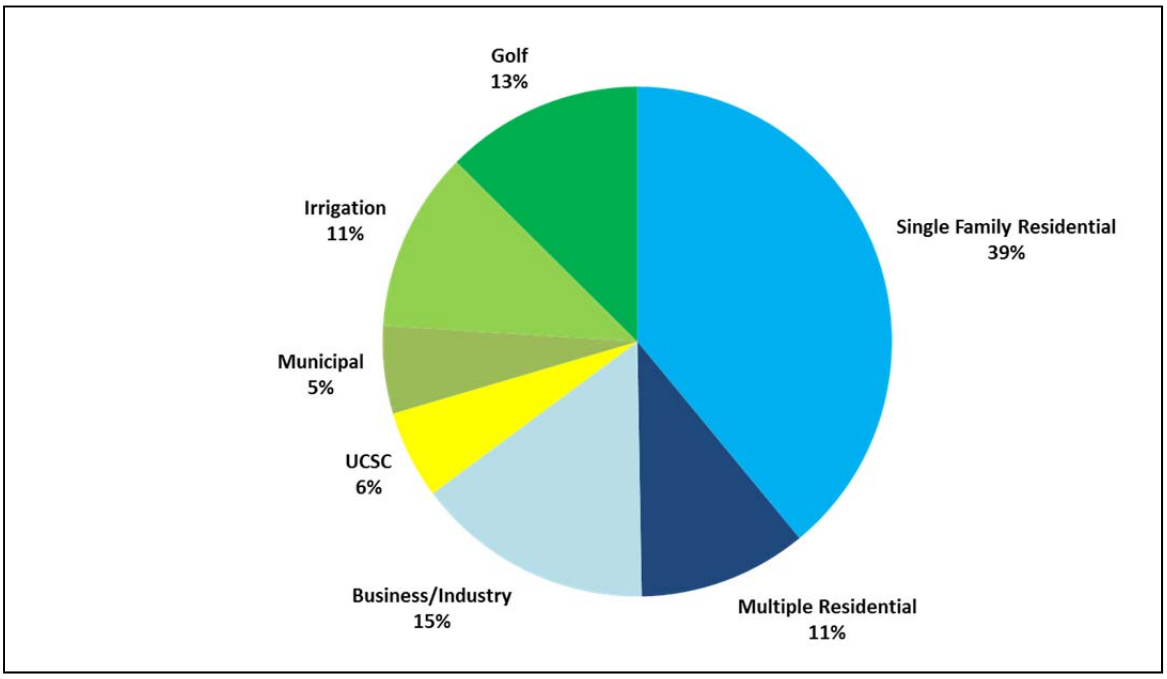
The City's interest is to maximize water savings regardless of whether it is focused on indoor or outdoor use. Due to the nature of how the City uses water, most components of the plan focus on indoor use. Nevertheless, there are some outdoor use reduction components that are useful to the intent of this current assignment of evaluating how best to reduce peak water use. The goal of the peak demand reduction analysis was to define the peak and assess what could be done to reduce it. The following figure presents the City's average monthly consumption for years 2012 and 2013. It is estimated that a total annual non-drought year, post-recession year total annual production would be approximately 3.3 billion gallons (BGY), of which peak water use represents nearly 700 MGY. As this volume is higher than occurred in 2012 or 2013, the monthly volumes shown below were adjusted upwards (about 6%) to reflect the higher annual volume. The green tips on the summer month columns represent the peak.

**Figure 3-10. Monthly Consumption**




The following figure presents the composition of peak season consumption by customer category for years 2012 and 2013. This is the breakdown of peak water use among the City's customer category who are contributors to peak consumption. Residential use accounts for half of the peak demand.

**Figure 3-11. Composition of Peak Season Demand by Customer Category, 2012 & 2013**



# 4. HISTORICAL AND CURRENT WATER CONSERVATION PROGRAMS

The City's past and current conservation efforts can be characterized into the following categories: utility operations programs; public information and education programs; residential; commercial, industrial, and institutional (CII); and landscape. It also includes a category for periodic water shortage management. This section presents a summary of the City's historical and current water conservation efforts.

## 4.1 Summary of Historical and Current Programs

The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient. Figure 4-1 on the following page presents the Water Conservation Program Timeline as a summary of historical water conservation program activities.

## 4.2 Overview of Current Program

The City of Santa Cruz has long recognized the importance of conserving water as a responsible water management strategy to help protect the area's natural resources; to stretch existing water supplies; to help downsize and/or delay the need for costly additional water supply, treatment, and distribution upgrades; and to fulfill the City's overall goal of ensuring a safe, reliable, and adequate water supply. In essence, water conservation involves making or inducing changes to many small end uses that individually have minimal effect on overall water use, but that collectively can constitute significant reductions in system demand. The City's Water Conservation section is responsible for promoting efficient water use and implementing management practices that reduce customer demand for water. Its responsibilities and major activities fall into the following four general categories:

Public Awareness and Education: to promote public awareness and education regarding the City's water resources and the importance of water conservation; to provide timely and accurate information to utility customers and the general public about conservation practices and technologies as well as the City's conservation programs and policies.

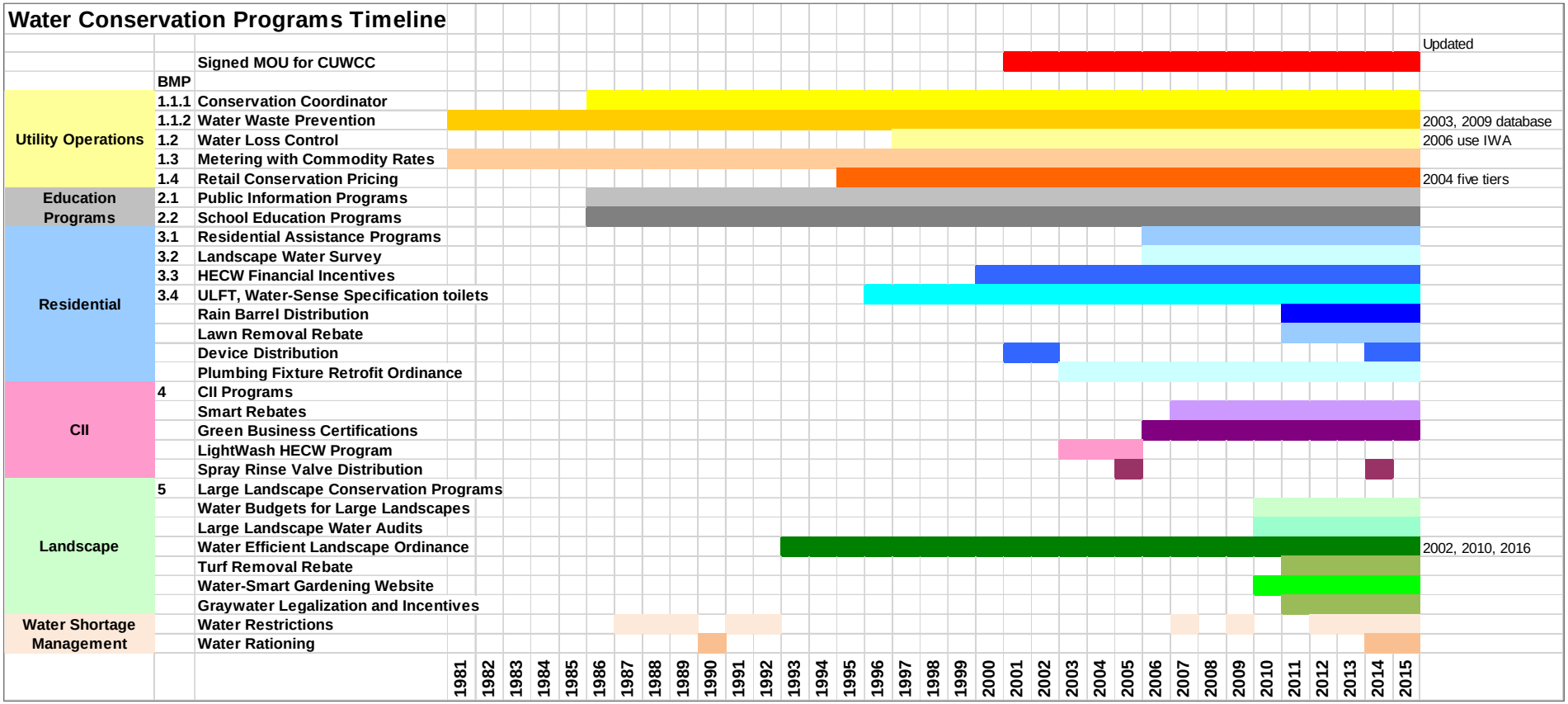
Water Demand Monitoring: to monitor water production, consumption and system water losses; to track weather and population data; to evaluate trends in per capita water use; to track demand associated with new service connections; to compare actual water demand with projected use by customer category; to develop and maintain water demand forecasts for the water service area for use in supply planning.

Long-Term Water Conservation Programs: to develop and implement various conservation projects and programs that result in a sustained reduction in customer water demand; to track water savings from ongoing conservation programs; to evaluate the need for program modifications to improve efficiency, customer service, and water savings in keeping with conservation goals.

Planning and Emergency Management: to periodically update and implement the City's Water Shortage Contingency Plan and the Urban Water Management Plan; to assist in Departmental and City-wide emergency planning and management activities.

Since 2000, the Water Conservation section's priorities and work plan have been guided by two principal documents: 1) MOU Regarding Urban Water Conservation in California; and 2) the Department's previous Long-Term Water Conservation Plan.

**Figure 4-1. Water Conservation Program Timeline**



In June 2001, the City of Santa Cruz became a signatory to the MOU and joined the CUWCC in promoting water conservation locally and statewide. By becoming a signatory, the City committed to implementing all 14 urban water conservation Best Management Practices (BMPs) contained in the MOU deemed to be locally cost-effective and to periodically report progress made to the CUWCC. Subsequently, the CUWCC MOU was updated in 2008 at which time the 14 BMPs were consolidated down to 5 BMPs.

Effectively, the City's water conservation program addresses every significant end use of water in every major customer sector (residential, commercial, and landscape), with emphasis on measures that: 1) are quantifiable; 2) make a lasting reduction in average daily water use; 3) provide the greatest water savings; 4) are socially acceptable; and 5), have widespread appeal to the City's water customers. The City's water conservation program is funded by a combination of water rates, system development charges, and miscellaneous service fees. Customers also incur expenses in installing various devices and following suggested changes in water use patterns.

The City has created maps to illustrate its efforts for its water use efficiency measures. These maps can be found in Appendix D. The measures are presented in the following sections.

## 4.3 Recent Accomplishments

Much of the City's recent conservation activity is presented in the 2013 and 2014 CUWCC coverage reports found in Appendix E.

## 4.4 Utility Operations Programs

This section presents the City's water utility operations programs including the operations practices of a water conservation coordinator and water waste prevention ordinance as well as water loss control, metering, and retail conservation pricing.

### 4.4.1 Operations Practices

This measure encompasses two elements that the City takes to facilitate conservation program implementation and prevent water waste.

#### Water Conservation Coordinator

The City of Santa Cruz has employed a full-time water conservation coordinator since 1986. The current Water Conservation Coordinator is responsible for planning, organizing, and directing the operations of the Water Conservation section and for reporting on water conservation implementation.

The Water Conservation Coordinator meets regularly with the Water Director and senior managers to coordinate conservation activities with the administration, engineering, production, distribution, and customer service sections.

The Water Conservation section is staffed with one Environmental Projects Analyst, and two Water Conservation Representatives who operate existing programs and assist with new program development.

#### Water Waste Prevention

The definition of water waste prevention under the MOU consists of enacting, enforcing, or supporting legislation, regulations, ordinances, or terms of service that prohibit water waste in new development and by existing users, or that facilitate implementation of water shortage response measures.

The City's water conservation ordinance (Santa Cruz Municipal Code 16.02) has been in operation since 1981 and was updated last in 2003. Under the ordinance it is unlawful for any person to use water for any of the following:

- Unauthorized use of water from a fire hydrant,

- Watering of landscaping in a manner, or to an extent, that allows excess water running off the property,
- Once notified, allowing plumbing leaks to go unrepaired,
- Outdoor washing of structures, vehicles, or surfaces without the use of an automatic shut-off nozzle, and
- Operation of a fountain, unless water is recycled.
- Provisions of the ordinance regulating **new development** include prohibitions on the following:
    - The use of water in new ice-making machines and any other new mechanical equipment that utilizes a single pass cooling system to remove and discharge heat to the sanitary sewer
    - Washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment
    - The use of water for new non-recirculating industrial clothes wash systems
    - The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use

The ordinance is in effect at all times. However, during mandatory water restrictions, violating the water waste ordinance is punishable by a fine levied on the offender's utility bill ranging from $100 up to $500. Under a declared water shortage, field staff actively patrols the water service area to enforce restrictions, including water waste violations, seven days per week.

The Water Conservation Office also encourages the community to report water waste by calling the "leak line", 831-420-LEAK, or sending an email through the City website. Customers may also submit an online form found on the City's website. Staff respond to water waste complaints in a combination of ways including site visits, in-person customer contact, phone, and/or mail correspondence is used to resolve the issue. New software was acquired in 2009 to help document, track, and manage water waste complaints, including the photo evidence of water waste incidents. Since then, the City documented and addressed over 6,000 cases with this software.

In addition, the City has a comprehensive landscape water conservation ordinance (Santa Cruz Municipal Code 16.16) to ensure landscapes and irrigation systems in new and renovated development are designed to avoid runoff, overspray, low-head drainage, and other similar conditions where water flows off site onto adjacent property. Information on the Water Efficient Landscape Ordinance can be found under Landscape Programs.

### 4.4.2 Water Loss Control

The City's Water Conservation Office has conducted an annual water audit of the City's water distribution system since 1997 using the approach described in the American Water Works Association (AWWA) M36 Manual of Water Supply Practices. The purpose of the audit is to quantify how much water and revenue is lost through physical leaks and apparent losses and to identify steps to minimize system losses and improve the operational efficiency of the water system. As of 2006, the City also uses the water balance approach developed through the International Water Association (IWA), now advocated by AWWA, to better characterize water losses in the distribution system.

Water audit results provide average system water losses as a percent of total water production. Of this amount, included is an estimated amount lost due to physical leakage in the distribution system and another separate portion that is not physically lost but goes uncaptured on the billing system due to sales meter inaccuracies. Results from water audits from 1997 to 2014 showed that on average the City's water loss is approximately 7.5% of total treated water production or 266 mgy. Of this amount, it is estimated that 5-6% (198 mgy) is lost due to physical leakage in the distribution system, also referred to as "real" losses, including leaking service lines, valves, fittings, and water mains. It is estimated that another 1-2% (68 mgy) is not physically lost but goes unreported on the billing system primarily due to sales meter inaccuracies, billing and accounting errors, and other factors. In 2010, the Water Department adopted a new

Meter Testing, Repair, and Replacement Policy that accelerates large meter replacement and should help improve overall meter accuracy.

To address physical leakage, service line repairs, leak repairs, and line replacements occur on an ongoing basis, the City has a multi-year service line replacement program to eliminate all polybutylene service lines, which was a widely used material between the early 1970s and the late 1980s until it was found to be defective. To date, over 6,000 polybutylene service lines on the system have been replaced with copper lines. Although a formal leak detection program is currently not in place, the Water Department uses sonic leak detection equipment to locate and repair leaks in the water system. In addition, the Water Department monitors for leaks on the customer's side of the meter by reviewing exception reports for high meter readings. Customers are notified so they can take appropriate action to repair leaks, even before they receive their water bills. Starting in year 2010, the City's top irrigation customers began receiving Water Use Reports in which customers, property managers, and landscapers can see their irrigation usage, including unexpected spikes due to leaks. Because these reports are sent to vested multiple parties for each property, there is an increased opportunity and incentive to notice and repair outdoor leaks in a timely manner.

In 2015, the City contracted with Water Systems Optimization, Inc. (WSO) to examine the City's water system and operations practices, validate where losses are occurring, evaluate options, and set forth a formal strategy to improve water accountability and reduce lost water. WSO's proposed scope of work is organized into three tasks, involving the following elements:

- Water audit validation, to assess the accuracy of the system input meters and data transfer systems, and to perform a business process review of meter testing, reading, and billing activities;
- Component analysis of real losses, to quantify the volume of different types of leaks and determine the economic level of leakage – the balance between the value of the water that is lost through leakage and the cost of finding and fixing leakage or reducing leakage through pressure management; and
- Water loss control program design, to outline the most cost-effective strategies for reducing both real and apparent losses over time.

The recommendations produced from this year-long study will be used to guide development of a robust water loss control strategy and will serve as a foundation for completing and reporting future annual water audits to the state beginning in 2017 under the requirements of SB 555 of 2015.

### 4.4.3 Metering with Commodity Rates

All of the City's 24,534 water connections are fully metered with Automated Meter Reading (AMR) technology. Water meters are required for all new service connections. Approximately 15% of all City water meters are now connected with Advanced Metering Infrastructure (AMI) technology, allowing access to hourly meter reads. In addition, a separate, dedicated irrigation meter is required for all new and renovated multifamily and commercial landscape projects with over 5,000 square feet of landscaped area.

All meters are read and billed monthly according to the volume of water consumed. Monthly billing was first instituted inside the City in 2005 mainly to facilitate rising rates for all City utilities, but it also served in aiding in leak detection and allowing for more accurate monitoring of individual account usage and categorical water consumption. Outside City customers were later transitioned to monthly billing in April 2014 to facilitate water rationing.

#### Water Conservation-Oriented Pricing

The Customer Service section, also referred to as "Santa Cruz Municipal Utilities" provides customer service and handles utility billing for water, sewer, refuse, and recycling services to the residents and businesses of the City of Santa Cruz as well as provides services for water-only to the unincorporated surrounding areas and part of the City of Capitola. The water portion of the City's utility bill consists of three components: 1) a fixed monthly "readiness-to-serve" charge; 2) a

volumetric charge; and 3) for customers residing in elevated pressure zones, an elevation charge. The readiness-to-serve charge varies by meter size and location.

For the volumetric charges, the City has had a multi-block, inclining rate structure in place for single family residential customers since 1995. In 2004, following a comprehensive water rate study, a new, five-tier rate structure was adopted that applies to residential accounts with either one or two dwelling units. This new rate structure was intended to encourage more efficient use by single family residential and two-unit customers during the peak summer season, when the system relies more heavily on reservoir storage to meet daily demands. For all other customers, including multifamily (3 or more dwelling units), business, industrial, municipal, and irrigation customers, water was billed at a uniform rate up until the October 2016 rate changes.

In August 2014, the Santa Cruz City Council adopted an annual 10% water rate increase over the next five years to complete several critical infrastructure projects. These projects included: Phase 3 of the North Coast System pipeline ($10 mil), rehabilitating and replacing six filter basins at the Graham Hill Treatment Plant ($6 mil), converting the Bay Street Reservoir to two modern, 6-million gallon tanks ($25 mil), annually replacing 2-4 miles of aging main, and rehabilitated storage tanks, pumps, and completing the Beltz 12 well project. All utility rates and rate change proposals are established by resolution of the City Council.

The City of Santa Cruz recently developed long-range, 10-year financial plan completed in June 2016 and undertook a 5-year rate study completed in August 2016 to support the Department's ongoing operations and planned capital improvement programs. Capital projects during the first five years will be focused on system rehabilitation and replacement projects. Major investments to implement the Water Supply Augmentation Strategy are anticipated to occur in the second five years of the financial planning horizon. The new rate study was completed in Fall 2016**.** Table 4-1 shows the rate design that was implemented October 2016 in order to meet both conservation pricing and other pricing objectives.

**Table 4-1. Recommended Basic Rate Structures for Customer Classes**

| Customer Category | Basic Rate Structure |
|---|---|
| **Single Family Residential** | Keep inclining rates but reduce both tier width and number of tiers |
| **Multi-Family Residential** | Change from uniform to tiered rates based on number of dwelling units |
| **Commercial/Municipal/UCSC** | Maintain uniform rate structure |
| **Landscape Irrigation** | Transition all irrigation accounts to a simple water budget-based rate, as proposed in Section 7 of this plan |
| **North Coast Agriculture** | Maintain uniform rate structure |

The new, recommended rate structure has changed to a structure that collects about 90% of revenues from volume charges (based on the amount of water used). The prior rate structure in 2015 collected only 65% of revenues from volume charges. Other new changes include:

- Establishing an Infrastructure Reinvestment Fee that will collect the funding needed to support pay-as-you-go capital and debt service costs. The fee would be collected as a separate charge based on water use.
- Establishing a $1.00/CCF surcharge on water use beginning in July 2017 to increase the Department's Rate Stabilization Fund. This fund would be used to mitigate the potential revenue instability associated with the recommended rate structure, and augment revenues in normal years should consumption fall below a level of 2.5 billion gallons per year.

- Retaining the existing Drought Cost Recovery Fees that are triggered by a City Council declared water shortage and would be collected as a fixed charge for the full fiscal year.

The financial plan and new rates are needed to ensure the long-term financial health of the utility, and enable the Water Department to support ongoing operations and maintenance of the water system and make the capital investments required to comply with regulations, rehabilitate and replace aging infrastructure.

## 4.5 Public Information and School Education Programs

This section presents the City's public information and school education programs.

### 4.5.1 Public Information

The City of Santa Cruz Water Department actively values and promotes public awareness and education about the City's water resources and the importance of water conservation. The City of Santa Cruz disseminates information to the general public in different forms including: media, workshops and community events, billing and customer service, and school education programs.

The City uses media coverage in order to broadly share information and updates on events, programs, and news to the public in the following ways:

- "SCMU Review", utility newsletter which includes news and information on water conservation topics;
- City of Santa Cruz Water Conservation website/ Water Supply Advisory Committee website;
- Formal water supply outlook published three times a year sharing the water conditions/ supply availability;
- Weekly water conditions webpage;
- Paid advertising in local newspapers;
- Opinion page coverage;
- Marketing and advertising of EPA's "Fix a Leak Week"; and
- Television and radio news interviews and community television programs.

In addition, the City uses workshops and community events to engage and interact with the public by the following:

- Public meetings and speaking events to community organizations, industry and homeowners' associations, and service groups;
- Tabling at local fairs, farmers' markets, and events;
- Participation in regional water forums;
- Participation with other local water agencies in local events and sponsorships of water conservation-related activities;
- Free workshops on irrigation efficiency, new irrigation technologies, and water conservation strategies for the landscape; and
- Financial support to the Green Gardener Program, California Water Awareness Campaign, Water-Smart Gardening Faire, Green Business Program, and the Water Education Foundation.

The City of Santa Cruz also uses a personable approach to public education and outreach through billing and customer service, which includes the following:

- Marketing and distribution of free water conservation devices and literature;
- Marketing of rebates and distribution of rebate applications;
- Bill inserts;
- Field representatives showing customers how to read their meter and check for leaks at their properties;
- Partnership with the Monterey Bay Area Green Business Program;
- Messages and information on customer's bills showing daily consumption and a graph charting monthly consumption for the entire year;
- Water supply tours; and
- Water school (offered to residential and irrigation customers who went over their allotment during rationing).

### 4.5.2 School Education Programs

The City offers school education activities for students ranging from upper elementary age children up to the University level. Education materials and classes are designed to meet current state education framework requirements and are available to local schools free of charge. The program gives students an opportunity to learn about the City's water supply system, watershed and water conservation. School educational activities include:

- Field trips and ranger presentations at Loch Lomond Reservoir and San Lorenzo River;
- Loch Lomond Trout in the Classroom fish release field trip;
- Distribution of age and grade level appropriate curriculum and educational materials, including a water education booklet specially developed for Santa Cruz County students;
- Classroom presentations; and
- High School Watershed Academy program.

## 4.6 Residential Programs

Residential water use comprises almost two-thirds of system consumption and therefore is a main focal point of the City's water conservation efforts.

### 4.6.1 Residential Assistance Programs – Home Indoor and Landscape Water Surveys

The City has been conducting residential home water audits or "surveys" for customers since 2006 with a focus on high water-usage customers. This free service is designed to help residents control their utility costs and reduce water use. A conservation representative sets up the appointment for a specific date and time and spends about an hour and a half at the home. This service is geared toward households with above average water use, whose water use exceeds 14 hundred cubic feet (units) per month or more than 10,000 gallons per month.

The Home Water Survey program is a free service offered to single and multi- family residences and consists of reviewing billing and consumption information, showing how to read a meter and detect leaks, inspecting home plumbing fixtures and offering free showerheads, faucet aerators, and rebate forms. The survey also assesses outdoor water use and needs by checking the irrigation system and timer, and evaluating the landscape area, design, and plants. The City has provided 504 home water surveys since its inception in 2006. The City anticipates that with the new rate increases, participation will increase as customers will need more support in learning how to read their meter, detect leaks, and find ways to conserve at home.

### 4.6.2 High Efficiency Clothes Washers

Clothes washing is one of the major end uses of water in the residential sector. It is also one with very significant water conservation potential in terms of the opportunity to reduce per capita water use on a long-term basis. Starting in 2000, the City offered a $100 rebate when a resident purchased an Energy Star® labeled high efficiency clothes washer (HECW). In July 2016, the City modified its high efficiency clothes washer rebate as mentioned in the water conservation master plan, by offering a two tiered rebate. The new rebate program offers $100 for any Energy Star® certified clothes washer, and offers an additional $100 for any current Most Efficient Energy Star® clothes washer. Energy Star® clothes washers have water factors of 4.3, whereas the Most Efficient of Energy Star® have an even lower water factor of 3.2 (lower is better). On average, Energy Star® washers use only around 15 gallons per load and about half the total gas and electric energy compared to a standard clothes washer. Since 2000, the City has rebated over 9,000 Energy Star® high efficiency clothes washers.

### 4.6.3 WaterSense Specification Toilets

Toilets are another area where there is potential for long-term reduction in per capita water use in the residential sector. The City's residential toilet replacement program has two components: 1) a rebate program; and 2) a plumbing fixture retrofit regulation. The City has operated a rebate program to promote the installation of ultra-low-flush or high efficiency toilets in residential accounts since 1995. The program originally featured a $75 rebate as a financial incentive for customers to remove their higher-volume toilets and replace them with 1.6 gallon ultra-low-flush toilets. This $75 rebate was discontinued in 2010. The City's current toilet rebate program offers $150 rebate for toilets meeting Water Sense criteria of 1.28 gallon per flush maximum. Eligibility requirements depend on the flush volume of the toilet that customer is replacing. Older, higher usage toilets of 3.5+ gallons per flush are eligible with the replacement of a high efficiency toilet of 1.28 gpf or lower. Customers who have toilets less than 3.5 gallons per flush must install ultra-high efficiency toilets of 1.0 gallons per flush or less to be eligible. Nearly 14,000 fixtures have been replaced under this program, saving approximately 100 million gallons of water annually.

Additionally, the DWR started a program in 2015 that provides rebates for replacing toilets in single family residences to support California's drought response. The $6 million program budget is expected to support the replacement of 60,000 toilets throughout the state. Up to $100 will be rebated for purchase and installation of one qualified HET (1.28 gallons per flush or less) per household that replaces a less efficient toilet (using more than 1.6 gallons per flush).

### 4.6.4 Plumbing Retrofit Ordinance – Residential

In 2003, the City adopted a plumbing fixture retrofit ordinance. This regulation requires that all residential, commercial, and industrial properties be retrofitted with low consumption showerheads, toilets, and urinals when real estate is sold. As part of the initial program implementation, the City worked closely with the County of Santa Cruz and the City of Capitola to have similar ordinances passed in these other jurisdictions.

As a result, the retrofit regulation applies uniformly throughout the entire water service area, regardless of jurisdiction. This ordinance implements the City's Long-Term Water Conservation Plan and fulfills the City's obligation under the MOU to carry out a toilet replacement program that is "at least as effective as requiring toilet replacement at time of resale" (CUWCC, 2014).

Under the law, the seller of the property is responsible for retrofitting any older toilets, urinals, and showerheads on the property with low consumption fixtures, and for obtaining a water conservation certificate from the Water Department. There is an option in the ordinance that allows the responsibility for retrofitting to be transferred from the seller to the buyer, if both parties agree. In either case, the City tracks real estate sales and requires every property to be inspected to verify that the plumbing fixtures on the property meet the low consumption standards; toilets flushing no more than 1.28 gallons per flush (1.6 gpf toilets are exempt), showerheads at 2.0 gallons per minute, and urinals flushing at 0.5 gallons per flush. A custom database program was developed by a consultant to manage property sales data on local properties and retrofitting records as well as follow-up enforcement of the ordinance.

Since 2003, the City has processed, inspected, and/or certified 9,523 properties through the plumbing retrofit ordinance. Because the City has had a Plumbing Fixture Retrofit (PFR) Ordinance in place since 2003, it is in compliance with the requirements of SB 407 of 2009.

## 4.7 Commercial, Industrial, and Institutional (CII) Programs

The City of Santa Cruz Water Department provides water to over 1,900 commercial and industrial accounts within the service area, accounting for 26% of total system water use. Commercial customers are billed for water and sewer service based on the volume of water consumed. Conserving water can lower the cost of doing business by reducing water, sewer, and energy expenses.

### 4.7.1 Smart Business Rebate Program

The Smart Business Rebate Program was offered as a result of the conclusion of the statewide Smart Rebate program in 2013. The City's Smart Business Rebate Program mirrors the old statewide program by offering businesses rebates for installing water efficient fixtures including:

- High-Efficiency Clothes Washer (Energy Star certified): up to $400
- High-Efficiency Toilet (1.28 gpf or less): up to $200
- High-Efficiency Urinal (.125 gpf or waterless): up to $300

In the Smart Business Rebate Program, 46 businesses have participated and received a total of 97 rebates, saving an estimated 10.2 million gallons per year.

### 4.7.2 Green Business Certification

The Monterey Bay Area Green Business Program is a partnership of environmental agencies, utilities, and nonprofit organizations, all of which assist, recognize, and promote businesses that volunteer to operate sustainably. To be certified "green," participants must be in compliance with all regulations and meet program standards for conserving water and energy, preventing pollution, and minimizing waste. The City became a participant in the program in 2006. It is coordinated through the City Public Works Department.

Businesses must meet a set of indoor and outdoor water conservation standards as part of achieving their Green Business Certification. All businesses are required to meet basic, mandatory measures (i.e., low consumption fixtures and fittings), as well as a minimum number of elective requirements from several categories (e.g., cleaning, landscape irrigation). Customers are also required to meet additional measures specific to their type of business (i.e., low flow spray rinse valves for restaurants).

The Water Conservation Office has conducted 150 commercial water audits as part of the program, including a diverse list of businesses like auto repair establishments, office buildings, hotels, restaurants, hospitality services, medical facilities, retail outlets, construction companies, churches, landscape contractors, and laundromats.

### 4.7.3 Plumbing Fixture Retrofit Regulations – Non-Residential

The Plumbing Fixture Retrofit Ordinance's retrofit regulations also apply to commercial and industrial properties, in addition to residential properties. Any older toilets, showerheads, and urinals are required to be replaced with low consumption fixtures and fittings at the time of sale. Although commercial properties do not turn over at the same rate as residential properties, over time this ordinance has triggered the complete retrofit of some of the largest commercial properties in the water service area, including Chaminade Resort & Spa, the Dream Inn, and the University Inn and Conference Center.

### 4.7.4 Other CII Conservation Programs

The City has operated other commercial water conservation programs in the past which have been completed and are no longer active. Some of these activities include:

- Smart Rinse (2005): kitchen spray valve replacement in restaurants and dining service facilities, coordinated by the City and Ecology Action;
- LightWash (2003-2005): high efficiency clothes washer statewide rebate program for institutional and multifamily customers;
- Distribution of bed linen reuse, towel reuse, drinking water upon request cards to hotels and restaurants;
- CII facility water audits (2006-present); and
- Partnering with UC Santa Cruz to improve the university's water use efficiency.

## 4.8 Landscape Programs

This section presents the landscape water use efficiency measures available in the City.

### 4.8.1 Water Efficient Landscape Ordinance

The City of Santa Cruz first adopted an ordinance establishing landscape water conservation regulations for major development projects situated in the City's service area in 1993 (Santa Cruz Municipal Code Chapter 16.16). The ordinance was rewritten in 2001, and revised again in 2010 in response to AB 1881, the Water Conservation in Landscaping Act of 2006. It was adopted to promote efficient water use in landscapes and to help manage water demand when water needs are the highest. Its overall purpose is to ensure that the City's limited water supply is used efficiently and effectively in new landscapes within the City's water service area and to avoid certain landscape and irrigation design aspects that have the potential to result in water waste. The ordinance is currently in the process of a new update in response to April 2015 California Governor's Executive Order B-29-15.

The City's ordinance applies throughout the entire water service area as a condition of receiving water service. Landscape and irrigation plans meeting specific water conservation standards are required as part of the building plan application process for the following projects:

- New commercial, industrial, and public development projects requiring a building permit, land use approval, or new/modified water service
- Existing developments required to re-landscape as part of approval
- Developer-installed residential landscaping equal to or greater than 2,500 square feet
- New single-family and two-unit residential developments (requirements dependent upon parcel size)
- New recreation areas

The ordinance contains provisions for:

- Dedicated irrigation meters for new landscapes or expansion of existing landscapes over 5,000 square feet, except single and two-unit properties;
- Landscape water budget based on 55% (residential) and 45% (non-residential) of reference evapotranspiration;
- Turf, high water use plants and water features are limited to 25% on residential projects (turf not permitted for non-residential);
- Requiring very low to moderate water using plant materials, grouping plants with similar water needs;
- Irrigation design to avoid conditions that lead to runoff and overspray;

- Appropriate irrigation equipment, including requiring weather-based irrigation controllers and flow sensors to maximize water efficiency and detect leaks;
- Soil preparation and mulching;
- Storm water management; and
- Alternative water sources.

Per City Code, a complete landscape plan must be submitted and found to satisfy the standards where applicable before a building permit can be issued. Water Conservation staff reviews the landscape plans for compliance with the ordinance, coordinates plan review with Water Engineering and other City Departments and jurisdictions, and once installed, performs final inspections of the completed landscape. Large projects that underwent the City's landscape plan review process were the Highway 1/17 interchange landscaping, live-work development at 2120 Delaware Avenue, Safeway renovation on Mission Street, and Tannery Arts complex on River Street.

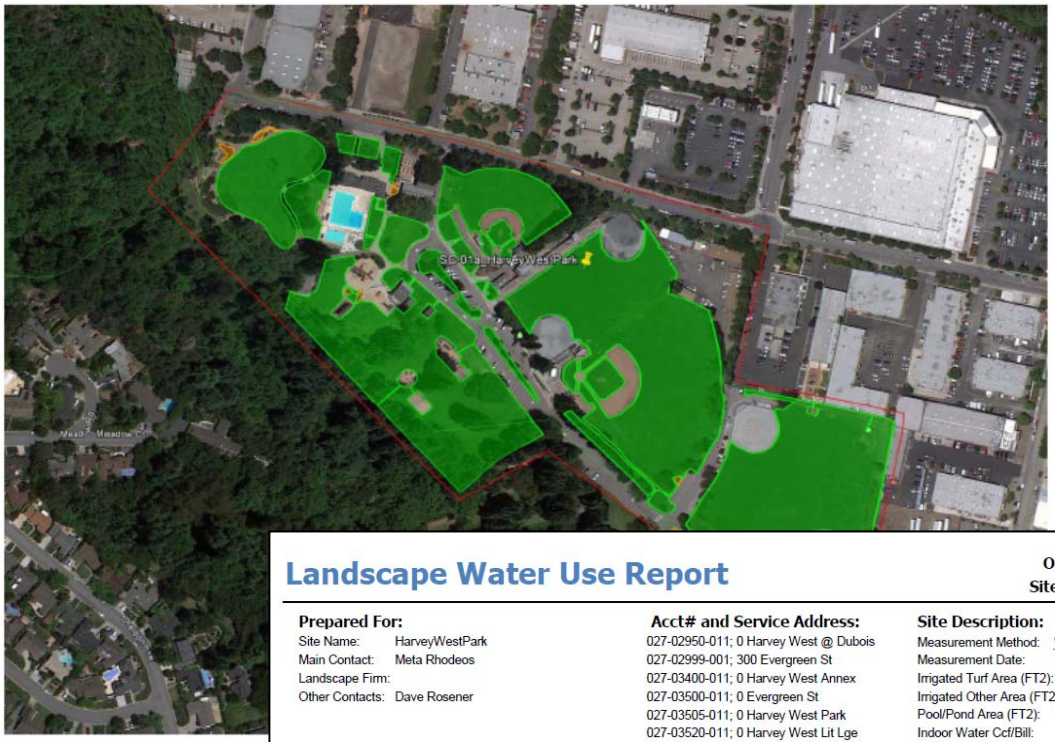
### 4.8.2 Large Landscape Water Budgets

In July, 2010, the City launched a new program for customers with large landscapes and dedicated irrigation accounts. After converting all dedicated irrigation accounts to monthly meter reading, the City contracted with a consultant, Waterfluence LLC, to map landscape areas using aerial imagery, to develop irrigation budgets for the City's 110 largest irrigation customers, and to distribute the information through monthly Landscape Water Use Reports. Since then the program has expanded its participation to 230 sites representing 426 acres or 18.5 million square feet of irrigated area and over 250 million gallons per year of water. For each site, Waterfluence provides a site-specific irrigation budget based on landscape size and plantings, type of irrigation, and real-time local weather conditions that is obtained from the CIMIS station located at the DeLaveaga golf course. Customers receive monthly reports via mail or email comparing their actual consumption to the irrigation budget over a 1-3-year long period. A 2013 program assessment showed annual savings equal to about 15 million gallons per year. With these accounts being rationed the last two years, however, water use at large landscape sites was temporarily reduced by more than 130 million gallons in 2015. Further evaluation is needed in the future to better quantify long-term program impact.

In addition to receiving monthly reports, participants in the program are also eligible for a professional irrigation audit performed by Waterfluence. The audits include an assessment of irrigation efficiency, notation of irrigation issues (scheduling, tilted nozzles, leaks, breaks, pressure, overspray etc.), and a confirmation of the landscape area measurements. Customers receive a detailed report with site photos noting irrigation problems, a sprinkler condition analysis, cost-effective recommendations, scheduling suggestions, and a list of water management essentials (see Figure 4-2 below for example).

In preparation for the new rate changes in October 2016, Waterfluence mapped all irrigation sites that used above 10 CCF during 2015 and enrolled customers that used over 100 CCF into the Waterfluence program. These included city and county parks, schools, commercial properties, homeowner association golf courses, churches, and cemeteries. For customers using 10 CCF or below for 2015, the City assigned a generic budget for those accounts. Together, outdoor water use at these properties adds up to 265 million gallons per year, almost 10% of the City's total water consumption. In the future, the City anticipates that more of these mapped or noted sites will be enrolled in the Waterfluence program if water usage increases.

**Figure 4-2. Landscape Irrigation Surveys and Water Budget Program Success**




## Landscape Water Use Report

October 2012
SiteID: SC-01a

**Prepared For:**
Site Name: HarveyWestPark
Main Contact: Meta Rhodeos
Landscape Firm:
Other Contacts: Dave Rosener

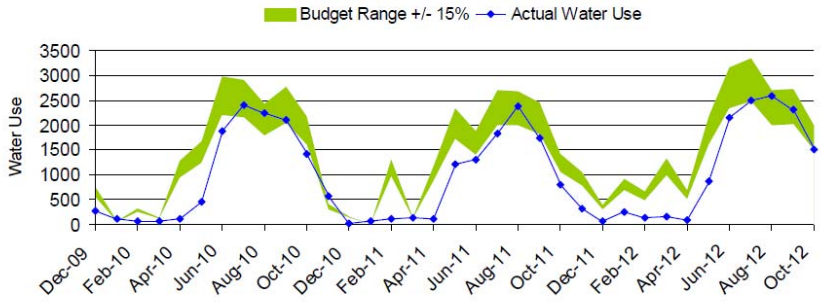
**Acct# and Service Address:**
027-02950-011; 0 Harvey West @ Dubois
027-02999-001; 300 Evergreen St
027-03400-011; 0 Harvey West Annex
027-03500-011; 0 Evergreen St
027-03505-011; 0 Harvey West Park
027-03520-011; 0 Harvey West Lit Lge

**Site Description:**
Measurement Method: View Site Map
Measurement Date: 7/10/2012
Irrigated Turf Area (FT2): 576,180
Irrigated Other Area (FT2): 2,889
Pool/Pond Area (FT2): 5,180
Indoor Water Ccf/Bill: 0

CITY OF SANTA CRUZ
HARVEY WEST PARK
809 CENTER ST RM 101
SANTA CRUZ CA 95060-3826

**Site Percentile**
88
100=top score

**Water Use History**




| Savings Potential | Last Month | Last 12 Months | Last 24 Months | Last 36 Months |
|---|---|---|---|---|
| Over Water Ccf | 0 | 244 | 614 | 805 |
| Over Water % | 0% | 2% | 3% | 2% |
| Dollars Lost $ | $0 | $975 | $2,458 | $3,219 |

| Read Date | Actual Water Ccf | Budget Water Ccf | Over Water Ccf | Over Water % | Weather ETo-Rain Inches |
|---|---|---|---|---|---|
| 10/9/2012 | 1,502 | 1,739 | 0 | 0% | 3.48 |
| 9/10/2012 | 2,317 | 2,373 | 0 | 0% | 4.75 |
| 8/10/2012 | 2,592 | 2,348 | 244 | 9% | 4.70 |
| 7/11/2012 | 2,486 | 2,898 | 0 | 0% | 5.80 |
| 6/11/2012 | 2,158 | 2,743 | 0 | 0% | 5.49 |
| 5/11/2012 | 865 | 1,881 | 0 | 0% | 3.77 |
| 4/11/2012 | 96 | 591 | 0 | 0% | 1.19 |
| 3/13/2012 | 161 | 1,153 | 0 | 0% | 2.31 |
| 2/10/2012 | 135 | 572 | 0 | 0% | 1.15 |
| 1/11/2012 | 253 | 799 | 0 | 0% | 1.60 |
| 12/12/2011 | 74 | 347 | 0 | 0% | 0.70 |
| 11/10/2011 | 324 | 908 | 0 | 0% | 1.82 |

**Messages**

Source: Waterfluence, 2012: http://www.waterfluence.com (last accessed May 31, 2013.

### 4.8.3 Rain Barrel Program

In winter 2010, the City began offering a subsidized rain barrel distribution program. This program served to educate the community about water conservation for landscapes and stormwater management. In addition, the pilot allowed the City to assess consumer interest and satisfaction with rain water harvesting systems. Initially, the Water Conservation Office purchased two shipments of 65-gallon MOBY rain barrels and made them available at a reduced cost to City water customers. Water Distribution personnel delivered the barrels. Due to popularity, the rain barrel program has been modified. Currently, the Water Conservation Office offers the 50-gallon, 100% recycled plastic Ivy rain barrel at a discounted price of $50.00 that is available for pick up at distribution events located at the City corporation yard. More than 4,000 rain barrels have been sold since then saving about 0.8 mgy.

### 4.8.4 Turf Removal Rebate

In 2010 the Water Conservation Office began offering a rebate program to promote turf removal to encourage and expand landscape water conservation opportunities for customers and to provide an option for customers seeking to mitigate high utility bills. The rebate offer was originally $0.50 per square foot of lawn removed, up to $500 or 1,000 sq. ft. for single family and $2,500 or 5,000 sq. ft. for multifamily. Prior to the drought, customers must have met the following requirements to qualify:

- Have green lawn that is watered with an in-ground irrigation system
- Remove or cap their overhead spray system in the area to be converted
- Replace lawn with low or very low water use plants and mulch (with or without low volume drip irrigation) or install no-water-use permeable hardscape options
- Agree to pre- and post-inspections to take measurements and ensure eligibility requirements have been met
- Complete the landscape conversion within 120 days of pre-approval

These requirements were later modified due to drought conditions in 2014. In response to rationing, customers allowed their lawns to brown and were more reluctant to planting. Due to these changes, the following eligibility requirements have been modified:

- Lawns do not have to be green to receive the rebate.
- The project does not need to be completed within 180 days or by a deadline. Customers are asked to wait and plant when water conditions return to normal.

In July 2016, the rebate was increased to $1 in order to provide more incentive for customers to convert their lawns. Since 2010, the City has processed 507 lawn rebates for the removal of 496,712 square feet with an estimated water savings of 9.5 mgy.

In 2015, the DWR also implemented turf removal rebate program for single family customers who remove their turf and replace it with low water use landscapes to support California's drought response. Santa Cruz Municipal Utility customers may apply for both the City and State rebate to receive up to $2 per square foot removed. In addition, customers who did not qualify for the City rebate due to lack of pre-site inspection are also encouraged to participate in this program.

### 4.8.5 Graywater Workshops and Rebate

In 2011, the City amended its Sewer System Ordinance (Santa Cruz Municipal Code Chapter 16.08) to enable graywater systems to be constructed and operated in agreement with the California Plumbing Code. The amended ordinance now

allows residents to legally build a “Laundry-to-Landscape” type graywater system without a permit, and for other types of graywater systems to be developed, consistent with the Plumbing Code, with appropriate permits and oversight. In 2013, the City started offering a Laundry to Landscape rebate of $150 to customers who install a laundry to landscape greywater system and attend a workshop offered by Central Coast Grey Water Alliance. The requirement to attend a workshop is intended to ensure systems are installed in accordance with guidelines listed in the CA plumbing code. Customers also have the option of hiring a licensed greywater laundry to landscape contractor listed by Central Coast Grey Water Alliance. Applicants who reside in the City must also sign and agree to an Installation and Maintenance Agreement through Public Works to qualify for the rebate. Since 2013, the City has rebated 17 Laundry to Landscape graywater systems.

## 4.9 Other Water Conservation Initiatives

The City has been active in implementing other water conservation measures beyond the BMPs listed in the MOU. These include the previously presented rain barrel and gray water programs. This section presents additional water conservation initiatives conducted by the City.

The Conservation office has been providing free water-saving items to customers in the City of Santa Cruz Water Department service area since 2001. Items that may save water in the home or workplace can be picked up at the Water Conservation Office. Items include the following:

**Showerheads.** Low-flow, 2.0 gallon per minute showerheads with adjustable flow pattern.

**Kitchen Faucet Aerators.** Low-flow, 2.2 gallon per minute kitchen aerators with an easy-to-use lever to adjust the flow of water without changing the hot/cold mix. Made of chrome-plated brass.

**Bathroom Faucet Aerators.** Low-flow, 1.5 gallon per minute aerators made of chrome-plated brass.

**Toilet Tank Leak Detection Dye Tablets.** Toilets are the most common source of indoor leaks. These non-toxic dye tablets help check toilets for leaks. Drop a tablet into the toilet tank, and wait a few minutes. If blue color appears in toilet bowl, there is a leak.

**Garden Hose Shut-Off Nozzles.** Multiple spray patterns. Saves water by cutting off hose water that would run if left unattended.

**Garden Hose Timer.** Manual spring timer has settings from 15 to 120 minutes. Ideal for timing use of hose end sprinklers.

**Water-Smart Gardening in Santa Cruz County CD.** CD-ROM database featuring information regarding local gardens, plants, and resources to help save water in the garden.

**Practical Plumbing Handbook.** This booklet gives an overview of preventive maintenance and explains some of the ways residents can conserve water while keeping the home in good condition.

**Shower Timer.** Five-minute timer, works like an egg-timer. Helps change shower habit, encouraging shorter showers. A suction cup holds plastic timer to shower wall.

**Showerhead Control Valve.** Control valve used to retrofit existing showerhead to have an adjustable flow pattern.

**Water Wise Gardening Literature.** Several illustrated booklets on a variety of water saving garden topics.

# 5. PROJECTED FUTURE WATER DEMANDS WITH AND WITHOUT PLUMBING CODE

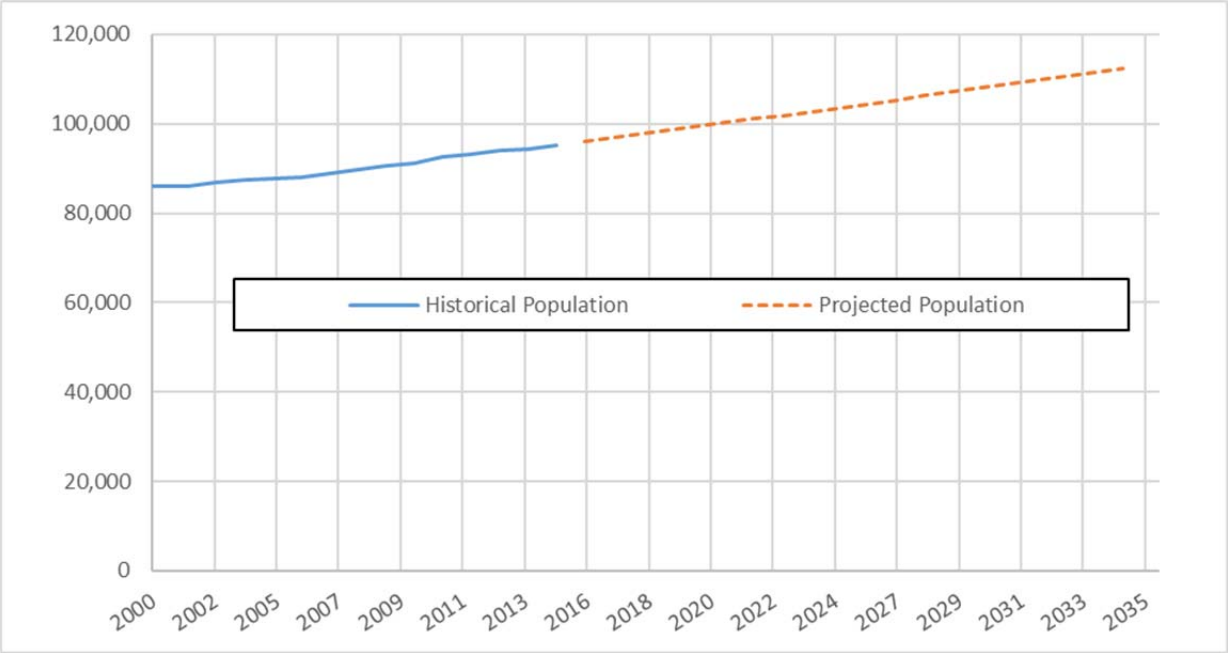
The purpose of this section is to document the demand projections developed for the Program. This section presents:

- Population and account projections;
- Demand methodology overview;
- Basis for Demand Forecast;
- Water use data analysis inputs and key assumptions for the DSS Model; and
- Water demand projections with and without the plumbing code savings through 2035 (this is the demand before incorporating planned water savings from future active conservation efforts).

## 5.1 Population and Water Account Projections

The main source of population projections used to generate future water demands for the Conservation Master Plan are summarized in the City of Santa Cruz Water Demand Forecast (M.Cubed, 2015). The forecast of service area population is divided into its inside-city and outside-city components. The inside-city component comes directly from the Association of Monterey Bay Area Governments (AMBAG) 2014 Regional Growth Forecast (AMBAG, 2014) and is inclusive of the UCSC population. The outside-city component is derived by Water Department staff using data from the 2014 Regional Growth Forecast. The following figure presents the City's historical and projected population. Historical population values through year 2015 are based on the Department of Finance (DOF) estimates for the City and relevant outside city jurisdictions. Specific year 2000 and 2010 population values are based on the 2010 U.S. Census and Geographic Information System (GIS) analysis. All other things being equal, higher service area population would normally translate to higher water demand over time.

**Figure 5-1. Historical and Projected Population**




Note: Population projections for the City of Santa Cruz are based on AMBAG projections.

The following table presents the City's projected population.

**Table 5-1. Current and Projected Population**

| Year | Population |
|---|---|
| **2010** | 91,291 |
| **2015** | 95,251 |
| **2020** | 99,403 |
| **2025** | 103,620 |
| **2030** | 107,989 |
| **2035** | 112,390 |

Note: Population projections for the City of Santa Cruz are based on AMBAG projections.

The following table presents the City's projected growth in accounts by customer category in five-year increments.

**Table 5-2. Current and Projected Accounts by Customer Category**

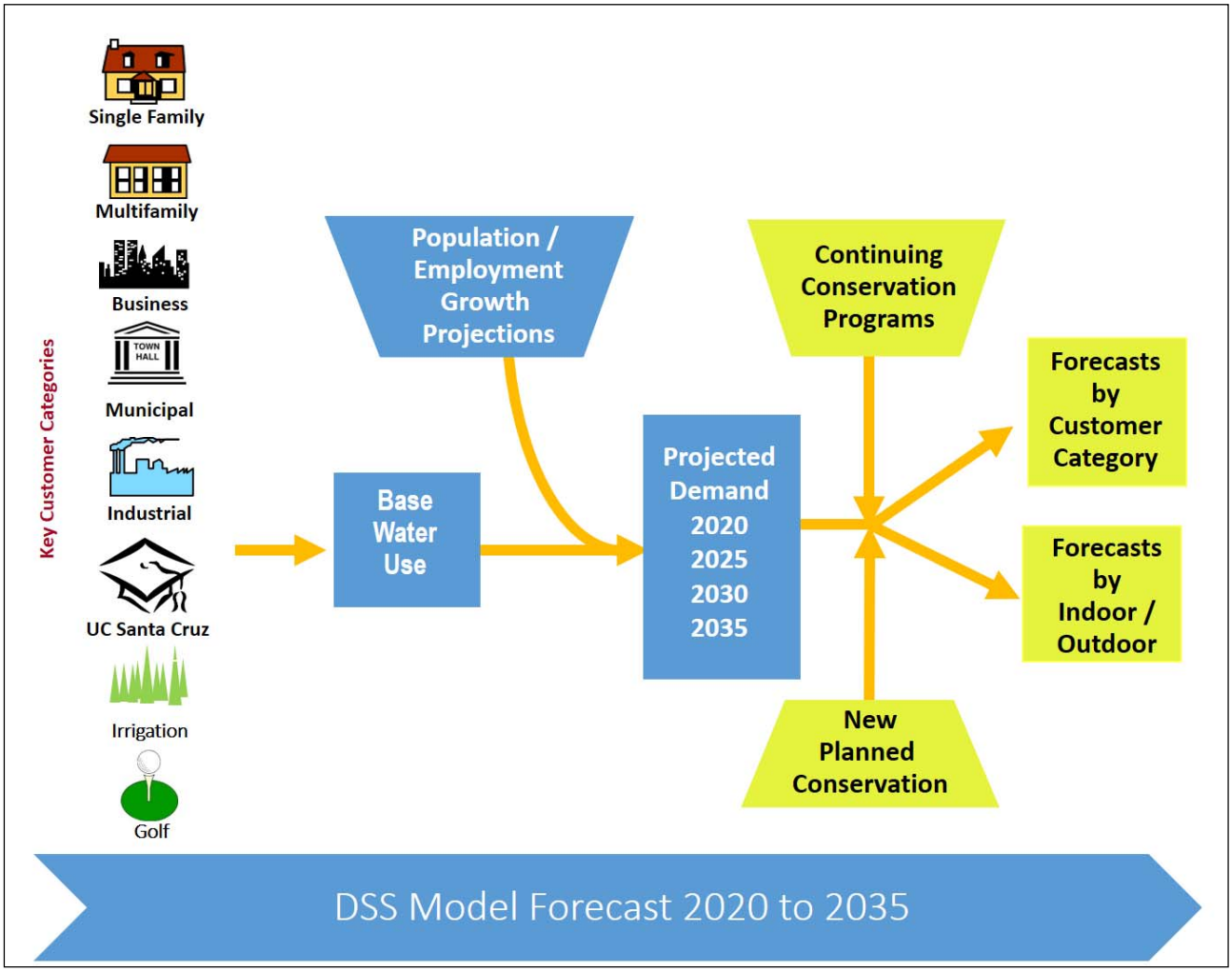
| Year | Single Family | Multifamily | Business | Municipal | Industrial | UC Santa Cruz | Irrigation | Golf | Total |
|---|---|---|---|---|---|---|---|---|---|
| **2015** | 19,029 | 2,745 | 1,897 | 312 | 40 | 11 | 460 | 2 | 24,496 |
| **2020** | 19,456 | 2,886 | 1,948 | 218 | 39 | 12 | 651 | 2 | 25,212 |
| **2025** | 19,854 | 2,972 | 1,971 | 218 | 41 | 14 | 723 | 2 | 25,795 |
| **2030** | 20,260 | 3,122 | 2,008 | 218 | 43 | 16 | 845 | 1 | 26,514 |
| **2035** | 20,636 | 3,238 | 2,055 | 218 | 43 | 18 | 951 | 1 | 27,162 |

## 5.2 Demand Methodology Overview

Maddaus Water Management (MWM) employed its Least Cost Planning Decision Support System Model (DSS Model) for the technical analysis. In addition to considering historical demand trends based on billing consumption data, the DSS Model takes into account the following parameters: total population, single family population, multifamily population, UC Santa Cruz population, commercial employment, business-industrial growth, and municipal growth.

As shown in the following figure, the first step for forecasting water demands using the DSS Model was to gather customer category billing data from the City. The next step was to check the model by comparing water use data with available demographic data to characterize water usage for each customer category (single family, multifamily, commercial, municipal, industrial, USCS, irrigation, and golf) in terms of number of users per account and per capita water use. During the model calibration process, data was further analyzed to approximate the indoor/outdoor split by customer category. The indoor/outdoor water usage was also further divided into typical end uses for each customer category. Published data on average per capita indoor water use and average per capita end use was combined with the number of water users to verify that the volume of water allocated to specific end uses in each customer category was consistent with social norms from end-use studies on water use behavior (e.g., for flushes per person per day).

**Figure 5-2. DSS Model Flow Diagram**




### 5.2.1 Water Use Data Analysis and Key Inputs to the DSS Model

The demand analysis process includes an investigation of baseline average water use per customer. This analysis includes the following elements:

- *Model Start Year* – This is the starting year for the analysis. For this project, the start year for the model is 2015. The DSS Model includes 20 years of data projecting information until the year 2035.
- *Base Year for Indoor Water Use Factors* – Based on an analysis of historical water billing data, the City selected years that are representative of current water use and used as a base year demand factor for developing future indoor water use projections. An average of 2007 and 2008 was used for all customer categories and was chosen by the City for the following reasons:
  - Note that it is recognized that the years 2009-2011 show a dip in water demand in many areas nationally due to reduction in economic activity.
  - The years selected had relatively "normal" climate conditions (i.e., not a drought or excessively wet year), so no significant weather adjustments were necessary. More recent years (2012-2015) were affected by drought conditions. The water billing or production data shown in Section 3.2 was normalized for this analysis.
  - Section 3.3 presents historical customer category water use graphs. Historical water use was provided by the City, taken from the Department of Water Resources' (DWR's) annual Public Water System Statistics

(PWSS) reports, or taken from previous modeling efforts conducted by MWM. The data was reviewed and confirmed by the City. Units shown are average gallons of water per account per day. These graphs were reviewed to better identify outlier data points and years so that a representative baseline water use value (of average account water use by category) could be determined. The effects of drought, economic recessions, and other influences on water use are typically evident in these figures.

- *Average gal/day/acct* – This is the amount of water in gallons that is used per day, per account.
- *Indoor/outdoor Water Use* – This is the amount of water per account split into the percent that is used indoors and outdoors.
- *Consumption by Customer Class* – This shows the annual amount of water used for an entire calendar year, broken down by customer class (Single Family, Multifamily, Commercial, Irrigation, etc.).
- *Non-Revenue Water (NRW)* – This is the sum of all water input to the system that is not billed (metered and unmetered), including apparent (metering accuracy) and real losses. The values were calculated by taking the difference between the amount of water produced and the amount of water sold.
- *Census Data* – Census data was used as a general reference when determining household sizes for the City.
- *Current Service Area Population* – Year 2015 City population is based on the Department of Finance City of Santa Cruz and relevant jurisdictional estimates. The population forecast of service area population comes directly from the AMBAG 2014 Regional Growth Forecast and the Water Department staff's usage of data from this forecast.

The following table presents the key inputs and assumptions used in the model. The assumptions having the most dramatic effect on future demands were the natural replacement rate of fixtures, how residential or commercial future use is projected, and the percent of estimated non-revenue water. More details on these assumptions, including screenshots of where they are incorporated into the DSS Model, can be found in Appendix C.

**Table 5-3. Water Use Data Analysis and DSS Model Key Assumptions**

| Parameter | Model Input Value, Assumptions, and Key References | | |
|---|---|---|---|
| **Model Start Year** | 2015 | | |
| **Non-Revenue Water in Start Year** | 7.5% | | |
| | This value can be found in the green Non-Revenue Water section of the DSS Model. | | |
| **Population Projection Source** | AMBAG 2014 Regional Growth Forecast | | |
| **Start Year Water Use Profile** | | | |
| **Customer Categories** | **Water Use Distribution** | **Indoor Use %** | **Residential Indoor Water Use (GPCD)** |
| **Single Family** | 42% | 77% | 57 |
| **Multifamily** | 25% | 88% | 54 |
| **Business** | 18% | 83% | N/A |
| **Municipal** | 2% | 32% | N/A |
| **Industrial** | 2% | 81% | N/A |
| **UC Santa Cruz** | 6% | 73% | N/A |
| **Irrigation** | 3% | 0% | N/A |
| **Golf** | 2% | 0% | N/A |
| **Total** | 100% | N/A | N/A |
| **Residential End Uses** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study," (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses) and AWWA Research Foundation (AWWARF) Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).<br>Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition. 2013.<br>http://www.map-testing.com/content/info/menu/perc.html<br>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet. | | |
| **Non-Residential End Uses, %** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use).<br>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet. | | |
| **Efficiency Residential Fixture Current Installation Rates** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any).<br>Key Reference: California Urban Water Conservation Council Potential Best Management Practice Report "High Efficiency Plumbing Fixtures – Toilets and Urinals" (Koeller, 2005 – Page 42, Table 8 and Table 9: Residential toilet installation rates in California).<br>Key Reference: Consortium for Efficient Energy (www.cee1.org).<br>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures. | | |

| Parameter | Model Input Value, Assumptions, and Key References |
|---|---|
| **Water Savings for Fixtures, gal/capita/day** | Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).<br>Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study" (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses). WCWCD supplied data on costs and savings; professional judgment was made where no published data was available.<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model. |
| **Non-Residential Fixture Efficiency Current Installation Rates** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: 2010 U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Assume commercial establishments built at same rate as housing, plus natural replacement.<br>California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures. |
| **Residential Frequency of Use Data, Toilets, Showers, Faucets, Washers, Uses/user/day** | Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Summary values of the report can be found in the following presentation: http://watersmartinnovations.com/documents/pdf/2014/sessions/2014-T-1458.pdf<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Key Reference: Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016.<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category. |
| **Non-Residential Frequency of Use Data, Toilets, Urinals, and Faucets, Uses/user/day** | Key References: Estimated based on AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use).<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Based on three studies of office buildings in which the numbers varied from 2.0 to 3.45 toilet flushes per employee per day: Darell Rogers cited in Schultz Communications (1999); Konen Plumbing Engineer (July/August 1986); and Eva Opitz cited in PMCL (1996). Fixture uses over a 5-day work week are prorated to 7 days.<br>Non-residential 0.5 gpm faucet standards per Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances – 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition, 2013. http://www.map-testing.com/content/info/menu/perc.html<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category. |
| **Natural Replacement Rate of Fixtures (% per year)** | Residential Toilets 2% (1.28 gpf and lower), 3% (1.6 gpf toilets), 4% (3.5 gpf and higher toilets). |
| | Non-Residential Toilets 2% (1.6 gpf and lower), 3% (3.5 gpf and higher toilets). |
| | Residential Showers 4% (corresponds to 25-year life of a new fixture). |

| Parameter | Model Input Value, Assumptions, and Key References |
|---|---|
| | Residential Clothes Washers 10% (based on 10-year washer life).<br>Key References: "Residential End Uses of Water" (DeOreo, 2016) and "Bern Clothes Washer Study, Final Report" (Oak Ridge National Laboratory, 1998). |
| | Residential Faucets 10% and Non-Residential Faucets 6.7% (every 15 years). California Energy Commission (CEC) uses an average life of 10 years for faucet accessories (aerators). A similar assumption can be made for public lavatories, though no hard data exists and since CII fixtures are typically replaced less frequently than residential, 15 years is assumed. CEC, Analysis of Standards Proposal for Residential Faucets and Faucet Accessories, a report prepared under CEC's Codes and Standards Enhancement Initiative, Docket #12-AAER-2C, August 6, 2013. |
| | Model Input Value is found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model. |

## 5.3 Baseline Demand Forecast

In August 2015, M.Cubed conducted an econometric analysis of water demand and developed independent forecasts of class-level customer demands and total system production through 2035. (M.Cubed, 2015) The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee. Its purpose was to update the Department's existing demand forecast adopted as part of the 2010 UWMP to reflect current information on water usage and to account for effects of current conservation (using DSS Model Program A), water rates, and other factors expected to impact the future demand for water. With the start of Phase 2, MWM's DSS Model was carefully updated to incorporate this econometric analysis by inputting the regression equations and data sets used by M.Cubed and calibrated to ensure consistency between the two demand forecast models.

The updated DSS model starts with a "baseline" demand forecast, which is not the same forecast as presented by M.Cubed. It differs in that it backs out the earlier estimates for plumbing code savings and the estimated future water saving associated with the City's current water conservation program that were provided by MWM to M.Cubed in 2015 and embedded in that final demand forecast. All other variables, including average water use per account, forecasts of account growth, and economic factors used to forecast water use in the M.Cubed report, were taken directly from that model and used to populate the DSS model.

Table 5-4 below compares the primary water demand forecast presented by M.Cubed without the code savings and program savings that were previously generated from the DSS Model analysis completed in October 2014 compared to the updated DSS "baseline" demand completed in February 2016.

**Table 5-4. Comparison of M.Cubed Demand Forecast and DSS "Baseline" Forecast**

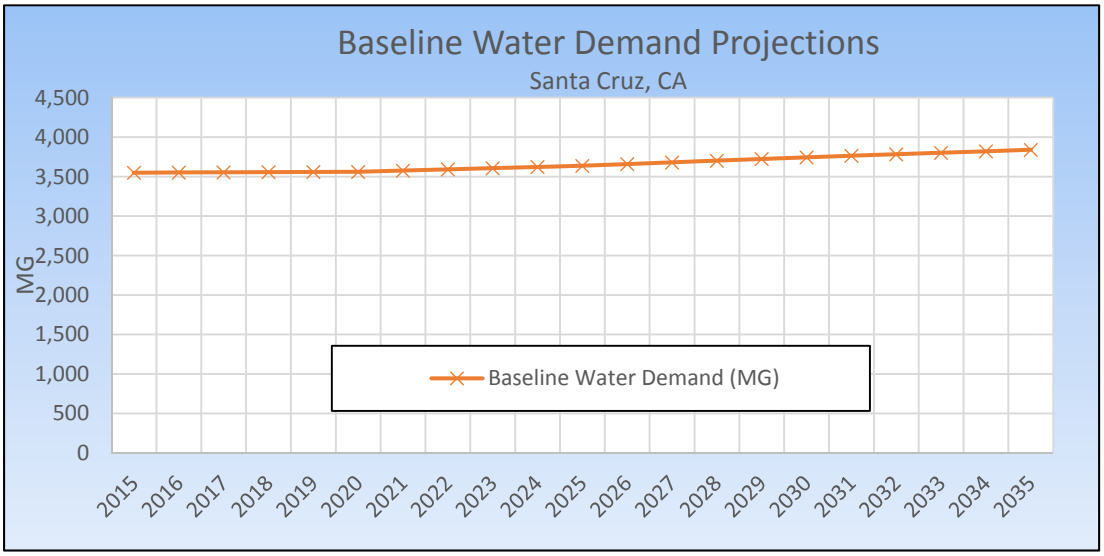
| Demand (MG) | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **M.Cubed Final Demand Forecast, October 2015** | 3,385 | 3,351 | 3,388 | 3,442 |
| **2014 Estimate of Plumbing Code Savings (Prior DSS Model version)** | 65 | 132 | 197 | 235 |
| **M.Cubed Final Demand Forecast without Plumbing Code or Conservation Program Savings** | 3,560 | 3,626 | 3,724 | 3,811 |
| **DSS Model "Baseline" Demand** | 3,560 | 3,636 | 3,743 | 3,838 |
| **Difference, MG** | 0 | 10 | 19 | 27 |
| **Difference, %** | 0.0% | 0.3% | 0.5% | 0.7% |

**Note: Plumbing code and program savings: M.Cubed, 2015, Attachment 8, were originally based on results from the DSS Model prior work in 2014 by Maddaus Water Management, which are updated with the most recent DSS Model results from February 2016.**

As can be seen in the above table, the two models are in close agreement and in all years differ by less than 1%.

The baseline demand forecast is shown in the following Figure 5-3. As referenced in the M.Cubed report, the baseline forecast is predicated on average weather and normal economic conditions and is not expected to match realized demand, especially in the short term. City staff will continue to monitor production and consumption through and following the drought.

**Figure 5-3. Baseline Demand Forecast Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

The next step involves calculating the effect of passive savings against the "baseline" demand described in the following Section 5.4. The results differ from earlier estimates of plumbing code savings presented in 2014-15 for two reasons: 1) lower baseline demand and 2) additional passive savings due to recent changes in California codes resulting from 2015 emergency conservation regulations adopted in California, effective December 1, 2015 (after the publication of the M.Cubed report).

## 5.4 Water Demand Projections with Plumbing Code Savings

Future community-wide conservation savings will be achieved by implementing both passive and active measures. Passive measures are federal and state codes and standards that increase conservation savings as older appliances and fixtures are replaced naturally over time with more water efficient models. Active measures are those in which the City will invest to promote water conservation, such as incentives and educational programs. As explained previously, the September 2015 M.Cubed baseline forecast was closely matched before the MWM DSS Model applied plumbing code savings.

### 5.4.1 Basis for Plumbing Code Savings

Since it is beneficial to model the impact of the natural changes in the mix of types of appliances, the DSS Model forecasts service area water demand aggregated at the fixture level. In the codes and standards part of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category using the Baseline Survey results as a starting place and projecting future replacements. These fixtures and plumbing codes can be added to, edited, and/or deleted by the user. This yields two demand forecasts – one with and one without plumbing code savings.

Key inputs in the model are fixture water use and life as well as the initial proportions of individual fixtures in each customer class. The following figure presents an example of the initial proportions used in existing single family accounts. Further in this section, Figure 5-4 provides the list of fixtures, average water use, and assumptions for fixture life used in this analysis.

**Figure 5-4. Initial Fixture Proportions for Single Family Toilets**

| Initial Fixture Proportions - Single Family Toilets | |
|---|---|
| 1.28 gpf HET Residential | 7.2% |
| 1.6 gpf ULFT Residential | 82.7% |
| High Use Toilet Residential | 10.1% |
| <1.0 gpf Toilet Residential | 0.0% |
| Total | 100.0% |

Source: Screen shot from the DSS Model.

Data collected from the recently completed City of Santa Cruz Water Use Baseline Survey was used for this purpose. Other input parameters include estimates for annual replacement rate and assumed market share for both replacement and new equipment at various points in the planning horizon.

The scope of analysis involved assessing the rate of change for toilets, shower heads, lavatory and non-lavatory/kitchen faucets, and clothes washers in both existing single family and multifamily accounts; and toilets, urinals, and lavatory and non-lavatory/kitchen faucets in commercial accounts.

Fixture characteristics are also tracked in new accounts, which are subject to the requirements of the 2015 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission on September 1, 2015. This was an update in Phase 2, from the prior work in Phase 1, of preparing the DSS Model.

The controlling law for **toilets** is Assembly Bill (AB) 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California as of January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California as of January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high-efficiency (0.5 gpf) urinals starting in 2014 that was modeled during the WCMP Phase 1.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. Even though both front loading and top loading models will still be available for the foreseeable future, national water efficiency standards for both types are becoming more stringent over time. In March 2015, the federal standard reduced the maximum water factor for non-Energy Star® certified top- and front-loading washing machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for standard top-loading machines will be further reduced to 6.5. Beginning in 2015, the maximum water factor for Energy Star® certified washers has been 4.3 for top-loading machines and 3.7 for front-loading.

**Showerhead** flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gallons per minute (gpm) or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

**Faucet** flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucet/aerators sold or offered for sale on or after January 1, 2016 to be 0.5 gpm at 60 psi and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

Plumbing code related water savings are considered reliable, long-term savings and can be counted on over time to help reduce the City's overall system water demand. This assumption of permanent savings is based on when fixtures are replaced at minimum with similarly efficient equipment given fixture efficiency levels are mandated under state law. It does not take into account any reductions efficiency from aging fixtures or hypothetical higher savings from newer technology that will come on the market in the future.

This projection further assumes no active involvement by the City and that the costs of purchasing and installing replacement equipment (as well as new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the fixture life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

Table 5-5 on the following page presents the list of fixtures, average fixture water use and assumed fixture life use in the DSS model.

**Table 5-5. List of Fixtures**

| Fixture Name | End Use | Average Water Use | Units | Fixture Life (yrs.) |
|---|---|---|---|---|
| **Efficient Front Loader** | Clothes Washers | 13.0 | gal per use | 10 |
| **Medium Efficient Front Loader** | Clothes Washers | 19.0 | gal per use | 10 |
| **Top Loader** | Clothes Washers | 34.0 | gal per use | 10 |
| **0.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.1 | gal per use | 15 |
| **1.2 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.3 | gal per use | 10 |
| **2.2 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 10 |
| **2.2 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 15 |
| **2.5 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 10 |
| **2.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 15 |
| **>2.5 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.9 | gal per use | 10 |
| **>2.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.9 | gal per use | 15 |
| **1.8 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 10 |
| **1.8 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 15 |
| **2.2 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 10 |
| **2.2 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 15 |
| **2.5 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 10 |
| **2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 15 |
| **>2.5 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 10 |
| **>2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 15 |
| **High Efficiency 1.5 gpm** | Showers | 10.4 | gal per use | 25 |
| **High Efficiency 1.8 gpm** | Showers | 12.5 | gal per use | 25 |
| **High Efficiency 2 gpm** | Showers | 13.9 | gal per use | 25 |
| **Low Flow 2.5 gpm** | Showers | 18.3 | gal per use | 25 |
| **High Flow > 3 gpm** | Showers | 23.5 | gal per use | 25 |
| **<1.0 gpf Toilet Non-Residential** | Toilets | 1.0 | gpf | 50 |
| **1.28 gpf HET Residential** | Toilets | 1.3 | gpf | 50 |
| **1.28 gpf HET Non-Residential** | Toilets | 1.3 | gpf | 50 |
| **1.6 gpf ULFT Residential** | Toilets | 1.8 | gpf | 33 |
| **1.6 gpf ULFT Non-Residential** | Toilets | 1.8 | gpf | 50 |
| **High Use Toilet Residential** | Toilets | 3.5 | gpf | 25 |
| **High Use Toilet Non-Residential** | Toilets | 3.5 | gpf | 33 |
| **Waterless Urinal** | Urinals | 0.0 | gpf | 50 |
| **Pint Urinal** | Urinals | 0.1 | gpf | 50 |
| **Quart Urinals** | Urinals | 0.3 | gpf | 50 |

More information and assumptions about plumbing code and appliance standards can be found in Appendix A.

### 5.4.2 State Building Code for New Development – 2015 CALGreen

The 2015 CALGreen requirements effect all new development in the State of California after July 1, 2015.[2] The DSS Model includes the CALGreen requirements that effect all new development in the State of California after July 1, 2015. The DSS Model modeled water savings from the CALGreen building code by adding Multi-family and Commercial customer categories as appropriate to applicable conservation measures.

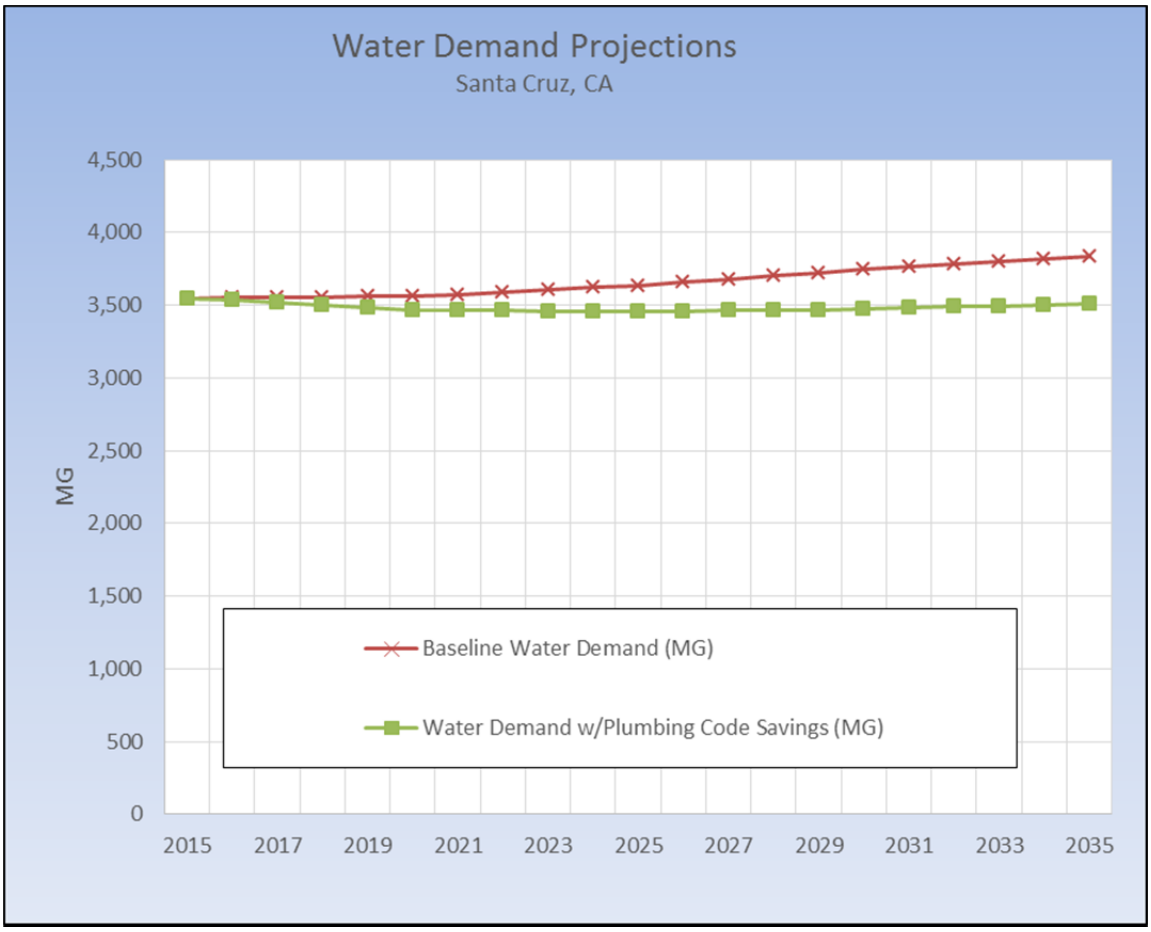
### 5.4.3 Baseline Demands with Passive Savings 2015-2035

The DSS Model estimates total cumulative plumbing code savings of 329 million gallons per year in 2035. As seen in Figure 5-5, water savings from fixture and appliance codes alone is expected to reduce total water demand (without plumbing code) from approximately 3.8 billion gallons per year to about 3.5 billion gallons by 2035, a reduction of about 8.6% due to plumbing code savings. As shown in Figure 5-5, overall water demand adjusted for plumbing code savings is expected to be essentially level over the 20-year planning horizon, with savings from plumbing codes effectively offsetting added demand from expected population growth and economic development within the City's service area.

Note that demand projections are normalized, without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

[2] More information on the California Building Standards Commission reference documents are available online: http://www.bsc.ca.gov/pubs/bullet.aspx

**Figure 5-5. Demand Forecast With and Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

Water demand projections were developed to the year 2035 using the DSS Model. Table 5-6 shows the savings in 5-year increments for the plumbing codes and the projected demands in 5-year increments with plumbing codes and appliance standards.

**Table 5-6. Water Demand Forecast With and Without Plumbing Code Savings**

| Water Demand Forecast With and Without Plumbing Code Savings | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand without Codes or Conservation (MGY) | 3,560 | 3,636 | 3,743 | 3,839 |
| Plumbing Code Savings (MGY) | 96 | 179 | 269 | 329 |
| Demand with Plumbing Code Savings (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |

Note: Values include Non-Revenue Water (NRW).

# 6. GOAL SETTING AND POTENTIAL NEW WATER CONSERVATION MEASURES

This section presents the City's conservation planning goals and the conservation measure screening process the City undertook to accomplish these goals.

## 6.1 Conservation Planning Goals and Approach

The goal of the Water Conservation Master Plan is to further enhance the existing water conservation program. To accomplish this goal, additional measures could be added to the existing program. Most of these measures are targeting new technologies to support customers to be more efficient with their water use.

Experience from many utilities has shown that there is a reasonable limit to how many measures can be feasibility implemented at one time. Programs that consist of a large number of measures are historically difficult to implement successfully; therefore, prioritization of measures is important both as an outcome of this planning effort and as the program is implemented. The approach to program implementation is viewed as a "living" process where new opportunities may be adopted as new technologies become available over time.

## 6.2 Potential New Conservation Measures and Measure Screening Process

As discussed at a public kickoff meeting March 4, 2013, development of the City's Water Conservation Master Plan involved a systematic process to evaluate a range of possible conservation measures and determine which measures were best suited to the City's service area. The overall goal was to create a roadmap to achieve maximum practical water use efficiency through 2035.

As part of this effort, the City cast a wide net to request that the community review existing implementation methods, including pros/cons of current efforts, and consider implementing additional conservation measures presented in this Plan.

It was envisioned that roughly 20-25 measures would be selected for further evaluation, including the existing measures that are currently being implemented and are planned to continue and new conservation measures not yet implemented. Sometimes not all programs need to be modeled to be incorporated into the plan (but can be qualitatively included in the plan instead), such as water waste prohibition or other non-quantifiable best practices like public education.

An important step in updating the water conservation program was the review and screening of new water conservation measures. This task included a review of the current water conservation measures, identification of measures that may be appropriate for the City's service area, and the screening of these measures to a short-list for detailed evaluation (benefit-cost analysis). To complete this process, a list of potential demand management measures (DMMs) for qualitative evaluation (screening) was compiled. This list, in Appendix F, includes 54 potential types of conservation measures in a variety of program implementation approaches that, when combined, total 99 individual measures ranging from those aimed at reducing real water losses to programs designed to improve customer awareness. The list also reflects the focus of specific programs based on the following categories:

- All Customers
- Residential
- Commercial, Industrial, and Institutional
- Landscape Irrigation
- System (focused on measures for the public water system rather than customers)

Additionally, the list reflects whether customer participation in a program is solely voluntary, encouraged with incentives, or mandatory through adopted rules or ordinances. This can significantly impact anticipated levels of adoption, with those that are purely voluntary likely to have the least participation, those with incentives leading to greater market penetration, and mandatory measures potentially having the highest levels of adoption. These classifications also have cost implications, with incentive programs being popular but adding expense to the utility, whereas required programs typically involve minimal cost to the utility, but may result in some costs for customers.

Appendix F lists the conservation measures considered potentially appropriate for the Santa Cruz community. The table includes devices or programs (e.g., a new high efficiency toilet that would save water if installed by the City, contractor, or customer) that can be used to achieve water conservation, the means through which the device or program will be implemented, and what distribution method, or mechanism, can be used to activate the device or program.

The list of potential measures in Appendix F was drawn from MWM's general experience and review of what the City and other water agencies with conservation programs are currently implementing. Current Program Measures implemented in the project service area as of March 2013 are indicated in the column "Current City Program" in Appendix F, mostly reflecting the City's conservation activities.

The Water Commission and community members were welcomed to add additional measures to the list presented in Appendix F. City staff and MWM reviewed these ideas as part of developing recommendations for the selection of conservation measures to be evaluated in detail. The City set up the ability to suggest ideas through its website for the project.

The screening was conducted by City staff with advice and facilitation support from MWM. Input was welcomed following the Water Commission Meeting on April 1, 2013. The public comment period, provided to stakeholders and policy makers to add new ideas to the list of potential measures, was closed after two weeks on April 15, 2013 in order to allow for the screening process to take place from April 17-24, 2013. The results of the screening process and the measures recommended for selection for the benefit-cost analysis were provided to the Water Commission at the May 6, 2013 meeting for final review and acceptance.

The screening was conducted by Water Department staff in consultation with MWM. MWM described each measure prior to the rating and answered questions about its applicability as well as potential savings and costs. MWM did not specifically recommend any one measure.

Ratings with respect to each criterion were made on a scale of 0 to 5, where 5 was the highest score. Ancillary benefits were rated on a scale of 0 to 2, where 2 was the highest score. It should be emphasized that a measure that passed the screening was not necessarily included in the recommended conservation plan, but it was analyzed.

The measures were screened using the following six criteria:

- *Water Savings Potential (Service Area Match) – emphasis on the measure's ability to reduce average daily water use within the Santa Cruz community (e.g., largely based on individual end use savings and current level of saturation)*
    - Higher savings = 5 (e.g., high end use water savings, low saturation), lower savings (e.g., low end use savings, or very saturated) = 0
- *Sustainable Water Savings – emphasis on savings lifetime/reliability*
    - Permanent = 5 (e.g., codes and technological changes ensure future reliable savings), short, temporary savings or draconian behavioral change = 0
- *Quantifiable Water Savings – emphasis on measures where water savings can be accurately predicted*

  - Highly quantifiable = 5 (substantial evidence exists to demonstrate reliable, accurate conservation savings), measure savings not quantifiable = 0

- *Widespread Community & Social Acceptance (Technology/Market Maturity) – emphasis on willingness to participate, out of pocket expenses, equity/perceived fairness, aesthetics*
  - High expected participation = 5, low expected acceptance/reject mandatory participation =0
- *Feasibility of Implementation/Secondary Impacts – emphasis on ability to achieve objectives*
  - Fully within City capacity/legally possible = 5, fatally flawed = 0 (insurmountable obstacle to implementation)
- *Ancillary Benefits – emphasis on achieving additional goals, including reduction in energy/greenhouse gases (GHG) and/or reduction in peak season use, providing valuable customer service, or other non-quantifiable benefits (behavioral change, public awareness)*
  - Multiple benefits = 2 and singular or very limited benefits = 0

Ratings were summed for all six criteria. A passing score was selected so that the number of measures with the highest scores passing the screening was 20-25 measures total.

The initial screening of all the conservation measures was a very iterative process, as was the screening and selection of the conservation measures to be included in the Recommended Program. From this iterative screening process, the Water Commission added to and approved the recommended list of measures from the technical analysis phase of the project.

More information about the City's measure screening process can be found in Appendix F.

## 6.3 Additional Measures to Address Peak Season Water Use

During the WSAC Report development, several additional measures were considered and added to the program. The result of the WSAC work on demand management was to shift the focus more toward reducing peak season use to increase supply reliability. It did so not only by considering measures to reduce outdoor use in residences and large landscapes, but also by enhancing base or indoor measures that lessen overall demand or that target specific uses, including visitor-serving uses, thereby helping to reduce the City's peak season water use. More information about the City's peak water use can be found in section 3.5.1.

# 7. CONSERVATION MEASURE EVALUATION

This section presents the conservation measures evaluated in the DSS Model. The total list of measures evaluated includes the recommended measures list published in the October 2015 Water Supply Advisory Committee Final Report on Agreements and Recommendations, Table 14.

## 7.1 Conservation Measures Evaluated

A total of 33 individual measures were evaluated in the Santa Cruz DSS Model. For each measure selected to be modeled, a measure description, as well as details on each measure's utility and customer costs, time period, and targets, can be found in the DSS Model's measure inputs.

Some of the key assumptions used in evaluating the water savings, benefits, and costs include the following:

- Applicable customer class
- Applicable end use
- Estimated annual account participation rates
- Estimated number of fixtures per account
- Evaluation start and end year
- Measure length, years
- Measure life, years
- Utility unit cost, $
- Customer unit cost, $
- Estimated annual administration and marketing overhead, %

The measures listed in Table 7-1 presents a basic description of each active measure and the types of customers each measure targets. Measures 29-35 listed in the table were requested additions by the WSAC in October 2015. More detailed information and assumptions for each modeled measure were developed in collaboration with City staff and are presented in Appendix C.

Water use efficiency savings due to plumbing codes, such as CALGreen (California Statewide New Development Building Code), SB 407 (Plumbing Fixture Retrofit on Resale or Remodel), and any new development ordinances, are included in the DSS Model and presented in Section 4.6.4 and Appendix A. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any program.

**Table 7-1. Conservation Measure Descriptions[1]**

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **1** | System Water Loss Reduction | System | This measure's purpose is to identify and reduce water losses in the City's water system. The City is currently doing a water loss control study to review its annual water audit, look at water losses, and design a cost-effective water loss control program. The City currently loses an average of 7.5% of all treated water due to leaks, meter inaccuracies, and other problems. The goal of this measure is to reduce the City's system water losses on a long-term basis by an average of 1%. A new state law passed in 2015 that will require water suppliers to conduct water system audits, verify, and report water losses every year to the state beginning in 2017. |
| **2** | Advanced Metering Infrastructure (AMI) | Single Family (SF), Multifamily (MF), Commercial (COM) | This measure involves a major investment to upgrade meter reading technology and data management abilities. The City currently uses an Automatic Meter Reading (AMR) system in which water meters are read monthly by radio equipment that then transmits the information back to the City. This system may increase the frequency of meter reading from once a month to once an hour. The main water conservation (savings) benefits are for customer in-home or outdoor leak detection and increased customer awareness of water use. Other benefits include more action in enforcing the drought restrictions and more efficient customer service. Utility billing would continue to be on a monthly basis. |
| **3** | Large Landscape Budget-Based Water Rates | Irrigation (IRR) | This measure includes the development of individual monthly water budgets for irrigation customers. Water budgets are connected to a water rate schedule where water rates increase when a customer goes above their landscape water budget, or decreases if they are below budget. Budgets are typically based on factors like the size of the irrigated area, plant material, and changes in weather conditions. |
| **4** | General Public Information | SF | This measure addresses opportunities to use public information programs as an effective tool to inform customers of the need for water conservation and conservation-related benefits. The current campaign is called "*Surf City Saves"* program. This measure includes paid and public service advertising, newsletters, bill inserts, information on the utility bill, a website, flyers and brochures, media campaigns, community meetings, direct mailings, community engagement at local activities, and other techniques. Public information is often carried out and coordinated with other agencies, groups, and schools. |
| **5** | Public Information (Home Water Use Report) | SF | This measure involves contracting with a firm to produce a detailed water billing report for high-use customers that is in addition to their normal utility bill. This billing report compares water use in the neighborhood and offers suggestions to customers on ways to reduce water use. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| 6 | Residential Leak Assistance | SF, MF | Customer leaks can go uncorrected at homes where owners are not able to pay the costs of repair. This measure would involve the City either paying part of the repair or paying the entire cost of the repair with funds that are paid back from customer water bills over time. This measure may also include an option to replace inefficient plumbing fixtures at low-income residences. |
| 7 | Single Family Residential Surveys | SF | This measure provides an outdoor water survey for existing single family residential customers. High water users will be targeted. This measure may include giving away water-efficient showerheads, faucet aerators, and toilet devices. This measure would provide a basic outdoor survey (look for leaks, irrigation problems and scheduling, plant information, etc.) and promote landscape and irrigation programs and improvements to reduce peak season water use. |
| 8 | Plumbing Fixture Giveaway/ Opt | SF, MF | The City would buy large amounts of efficient showerheads, kitchen and lavatory faucet aerators, shower timers, and hose timers. Hose nozzles and leak detection tablets would be available for distribution at the Utility office and at community events. |
| 9 | Residential Ultra High Efficiency Toilet Rebates | SF, MF | This measure provides a rebate or voucher for the installation of an ultra-high efficiency toilet (UHET) that uses 1.0 gallons of water or less per flush (gpf). |
| 10 | High Efficiency Clothes Washer Rebates | SF, MF | The City would provide a rebate for high efficiency clothes washing machines (HECW) to single family homes and in-unit condo/apartment complexes that do NOT have common laundry rooms. This program would be similar to the City's current program, except that higher rebate amounts would be increased for qualifying machines that are listed as Energy Star® “Most Efficient” Clothes Washers. |
| 11 | High Efficiency Clothes Washer - New Development | SF, MF, COM | This measure would involve amending the City’s building regulations to require building developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons per load). Inspections would be coordinated with City and County building departments to make sure that an efficient washer is installed before the new home or building is occupied. |
| 12 | Hot Water On Demand - New Development | SF, MF, COM | The City would work to pass an ordinance requiring developers and permitted building remodels to equip new homes or buildings with efficient hot-water-on-demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line looping back to the hot water heater. |
| 13 | Toilet Retrofit at Time of Sale | SF, MF, COM | This measure involves tracking real estate sales within the City’s water service area and working with buyers, sellers, and the real estate industry to retrofit older, inefficient toilets, showerheads, and urinals with the most efficient, upgraded fixtures when real estate is sold. A property inspection by either City staff or a licensed plumbing/general building contractor would be required to verify compliance with the regulation. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **14** | COM, MF Common Laundry Room High Efficiency Clothes Washer[4] | MF, COM | This measure provides a rebate for the installation of a high efficiency commercial washer (HEW) in COM laundromats and MF common area laundry rooms. |
| **15** | COM Incentives | MF, COM | After getting a free water use survey (Measure 17), the City will analyze the survey recommendations and determine if the MF or COM site qualifies for a financial incentive (reward). Financial incentives will be provided after analyzing the benefit-cost ratio of each proposed project. Incentives are designed to fit each individual site as each site has varying water savings potentials. Incentives will be given based on the decisions of the City specifically and while the money lasts. |
| **16** | Pre-Rinse Spray Nozzle Installation | COM | The City will provide free 1.3 gpm (or lower) pre-rinse spray nozzles, and possibly free installation of nozzles, in restaurants and other commercial kitchens. |
| **17** | COM Surveys | MF, COM | This measure will offer top MF and COM water customers a professional water survey that would evaluate ways for the site to save water and money. The surveys would be for large accounts (accounts that use more than 5,000 gallons of water per day, or the top 3%), such as hotels, restaurants, stores, and schools. |
| **18** | High Efficiency Urinal Program | COM, Municipal (MUN), Industrial (IND) | The City will provide a rebate or voucher for the replacement of older, high use urinals with high efficiency urinals (HEU) and flush valves using 0.125 gpf (1 pint) or less. |
| **19** | Public Restroom Faucet Retrofit - MUN | MUN | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in institutional (public) buildings, such as schools, hospitals, etc. High-use municipal building will be focused on first. |
| **20** | Public Restroom Faucet Retrofit - COM | COM | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in commercial buildings, such as businesses. High-use commercial buildings will be focused on first. |
| **21** | School Retrofit | MUN | This school retrofit program involves schools receiving funding to replace non-efficient fixtures, retrofit mixed use meters to dedicated irrigation meters, and upgrade irrigation systems. |
| **22** | Water Efficient Landscape Ordinance | SF, MF, COM, MUN, IND | This measure accounts for the lower irrigation water use that new accounts have due to their more efficient landscape designs, which are a result of the City's Landscape Code (implementation of Statewide Model Landscape Ordinance). The City is in the process of updating this code to keep up with new state regulations and technology for irrigation controllers and irrigation equipment. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **23** | Single Family Residential Turf Removal | SF | This measure provides a per-square-foot incentive to SF customers to remove and replace turf (grass) with low-water-use plants or permeable hardscape (pavers, concrete, etc. that allows water to soak through and into the ground). This is modeled after the City's current program. The rebate is currently $0.50 per square foot and capped at $500 for a single family residence. To increase participation, this measure would increase the rebate to $1 per square foot and a $1,000 maximum, or more in both cases. |
| **24** | Multifamily Residential/CII Turf Removal | MF, COM, MUN, IRR | This measure provides a per-square-foot incentive to MF, COM, MUN, and IRR customers to remove and replace turf with low-water-use plants or permeable pavers (or other permeable hardscape). The rebate is currently $0.50 per square foot of turf removed and capped at $2,500 for multifamily or commercial residences. This measure would increase the rebate to $1 per square foot and a $5,000 maximum or more to increase participation. |
| **25** | Expand Large Landscape Survey/Water Budgets | IRR | This measure expands on the City's existing landscape water budget program to include more dedicated irrigation accounts. Outdoor water audits will be offered for existing customers with problems of overwatering or water waste. Normally, those with high water use are focused on and provided a customized report telling them how to save water. All multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. This measure is connected to Measure 3 above, Large Landscape Budget-Based Water Rates. |
| **26** | Sprinkler Nozzle Rebates | SF, MF, COM | The City will provide rebates to replace standard spray sprinkler nozzles with more efficient rotating nozzles. Nozzles cost about $6 each. |
| **27** | Gray Water Retrofit | SF | The City will hold a workshop to support a Gray Water Challenge or similar program. A rebate will be offered that will help to cover a portion of the cost to single family homeowners per year who install gray water systems. A gray water kit/package, available from local hardware stores, would be supported by this City rebate. |
| **28** | Residential Rain Barrels | SF | The City will provide an incentive for the installation of rain barrels. This could involve rebates, purchasing rain barrels in high quantities, and giveaways of barrels as well as workshops on proper installation and use of captured rain water for landscape irrigation. |
| **29**[2] | Climate Appropriate Landscaping and Rainwater Infiltration | SF, MF, COM, MUN | This measure will provide incentives for the installation of climate-appropriate and rainwater infiltration landscape (soaks up water on-property as opposed to running off-property). This measure will provide rebates to Home Owners Associations (HOAs), businesses, and institutions that increase their outdoor water use efficiency by replacing qualifying high water use landscape and/or upgrading to qualifying high efficiency irrigation equipment or climate appropriate landscape. To qualify, sites must participate in a pre-inspection before beginning their project or purchasing materials. Single family homes, multifamily homes, and business properties with qualifying irrigated landscape (i.e., irrigated turf or a functional swimming pool) can receive rebates for replacing high water use landscape (e.g., irrigated turf grass) with a minimum |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| | | | of 50% plant coverage consisting of low water use plants from the Approved Plant List.<br><br>Recommendations from the Water Supply Alternatives Committee (WSAC) Report include:<br>• Increase turf conversion rebate<br>• Require conversion of spray to drip for shrub irrigation<br>• Discourage runoff through rainwater infiltration features (i.e., permeable pavers)<br>• Support local actions for climate-appropriate landscaping<br>• Focus on landscape narrower than 10 feet – no spray irrigation and/or next to hardscapes |
| **30 SF**[2] | SF Conservation Pricing - Water and Sewer[3] | SF | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **30 MF**[2] | MF Conservation Pricing - Water and Sewer[3] | MF | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **30 COM**[2, 4] | COM Conservation Pricing - Water and Sewer | COM | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **31**[2, 4] | Single Family, Multifamily Dishwasher Rebates | SF, MF | This measure provides incentives for the purchase of water efficient dishwashers (Residential WF of 6.25 or less). |
| **32**[2, 4] | Hot Water Recirculation Systems | SF, MF, COM | This measure provides incentives for the installation of a hot water recirculation system. Having hot water discharge promptly is important for energy and water use efficiency. A hot water recirculating system enables the cold water in the hot water pipes to be continually returned to the water heater and reheated before the hot water faucet is turned on. Rebates would be available to the following water customer groups:<br>- single family dwellings, including townhomes and mobile homes<br>- apartment complexes<br>- commercial institutions<br>- commercially zoned businesses or institutions<br><br>Maximum rebates allowable: 1) $300 per single family account per year; and 2) $3,000 per commercial, industrial, or institutional account (e.g., laundromats and apartments) per year. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **33**[2, 4] | Rewarding Businesses for Adopting Best Practices | COM | This measure offers commercial customers who employ best practices an increased water supply reliability and a lower price. For a business, the difficulty of rationing water during severe drought years can have a negative effect on its profits. This measure proposes that the City's Water Shortage Contingency Plan be changed so that businesses who adopt best practices, such as efficient plumbing fixtures, hotel laundry recycling, and climate-appropriate landscaping, would get a lower level of water usage reduction during a severe drought. For example, in a Stage 4 drought, with a system-wide goal of 35% reduction, the current plan is to have the water allotment of businesses be 87% of their normal year water use. Under this measure, businesses adopting best practices would be expected to cut back to only 95% of normal use, rather than 87%. These businesses could also be rewarded with a lower rate for their water use. |
| **34**[2, 4] | Additional Building Code Requirements for New Development | SF, MF, COM, MUN, IND | New CALGreen Building Codes already included in the DSS Model (see Section 5.4) takes many of the items recommended by WSAC into account.<br>This measure currently cannot be measured with regard to future additional CALGreen updates and water savings. This measure involves the coming together of a working group of planners, builders, conservation groups, and Water Department personnel to evaluate possible additions to current codes and fee structures that would encourage water conservation. Some examples include: 1) requiring high efficiency washers in new development; and 2) requiring hot water on demand/structured plumbing in new development. It is also intended that the work group track and incorporate new technologies in future City codes. |
| **35**[2, 4] | Innovation Incubator Program | SF, MF, COM, MUN | This measure would establish an Innovation Incubator Program allowing Santa Cruz to continue its leadership in water management by creating a program that supports new developments in:<br>• New technologies, customer financing programs, and customer outreach programs; and<br>• Pilot projects to promote popular adoption of rainwater for toilets and washers, new technology toilets in institutional buildings, onsite recycling of graywater, rainwater irrigated lawns, and promotion of native plant landscapes. Small grants would be offered to local businesses and/or working with state and national organizations like California Urban Water Conservation Council, California Water Foundation, California Urban Water Agencies, University of California (Santa Cruz or Davis), Alliance for Water Efficiency, Water Research Foundation, US Bureau of Reclamation, or other coalitions of utilities or research-focused organizations. |

**Notes:**

AMI – Advance Metering Infrastructure
AMR – Automatic Meter Reading System
COM – commercial
gpf – gallons per flush
gpm – gallons per minute
HECW – high efficiency clothes washing machine
HEU – high efficiency urinal
HEW – high efficiency commercial washer
HOA – Home Owners Association
IND – industrial
IRR – irrigation
MF – multifamily
MUN – municipal
SF – single family
UHET – ultra-high efficiency toilet
WF – water factor, gallons per cubic foot
WSAC – Water Supply Alternatives Committee

[1] Source: Santa Cruz Final Technical Memorandum (City of Santa Cruz, 2016).
[2] Measures 29-35 were requested additions by the WSAC in October 2015.
[3] A comprehensive cost of service water rate study was being conducted by Raftelis Financial Consultants, Inc. when the modeling effort for this conservation plan was finalized. It was later completed in August 2016. The DSS model is set up to analyze the impacts of the new rates and rate structure on water consumption in the future if needed.
[4] These measures target both CII and residential customers.

## 7.2 Assumptions about Avoided Costs

The four main sources of water for the City are 1) the North Coast sources; 2) the San Lorenzo River; 3) Loch Lomond Reservoir; and 4) the Live Oak Wells. The avoided cost of water to the City is estimated to be $2,550/MG as a place holder value set to be five times the variable cost of current annual supplies. Until the City has a recommended water supply project approved with known costs, a better avoided cost is not available. For this evaluation, the avoided cost of treated water is assumed to be $2,500/MG (water production operational costs) and the avoided cost of wastewater is assumed to be $50/MG (wastewater operational costs). These values can be found in the "Avoided Costs" red section of the City's DSS Model. It is recommended in the future that this cost be updated when new cost information becomes available. It is important to note that $10,000/MG is the average total program cost threshold established by the WSAC; this value is lower than the expected unit cost of various supply augmentation projects recommended to be pursued as a result of the WSAC's work.

## 7.3 Comparison of Individual Measures

Table 7-2 presents each measure's water savings in million gallons (MG) per year for year 2035 as a result of each measure's design and implementation schedule. Year 2035 savings include ongoing savings still valid since the measure's start. Savings per measure presented in the table assume measures are implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses).

It is important to understand that the savings from measures presented in the table which address the same end use(s) are not simply additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. For example, if two measures are planned to address the same end use and both save 10% of the prior water use, then the net effect is not the simple sum (20%). Rather it is the cumulative impact of the first measure reducing the use to 90% of what it was without the first measure in place, then reducing the use another 10% to result in the use being 81% of what it was originally. In this example the net savings is 19%, not 20%. Using impact factors, the model computes the reduction as follows: 0.9 x 0.9 = 0.81 or 19% water savings.

Since interaction between measures has not been accounted for in Table 7-2, it is not appropriate to include a total in the bottom row. However, the table is useful to give a close approximation of the savings of each individual measure.

The four measures that save the most water (more than 20 million gallons per year in 2035) include:

2. Advanced Metering Infrastructure: 45.94 MGY
10. High Efficiency Clothes Washers: 36.20
1. System Water Loss Reduction: 34.87 MGY
6. Residential Leak Assistance: 22.03 MGY

Of the remaining 31 measures, five measures are each estimated to save between 10 and 20 MGY in 2035, and the remaining 26 measures all save less than 10 MGY each.

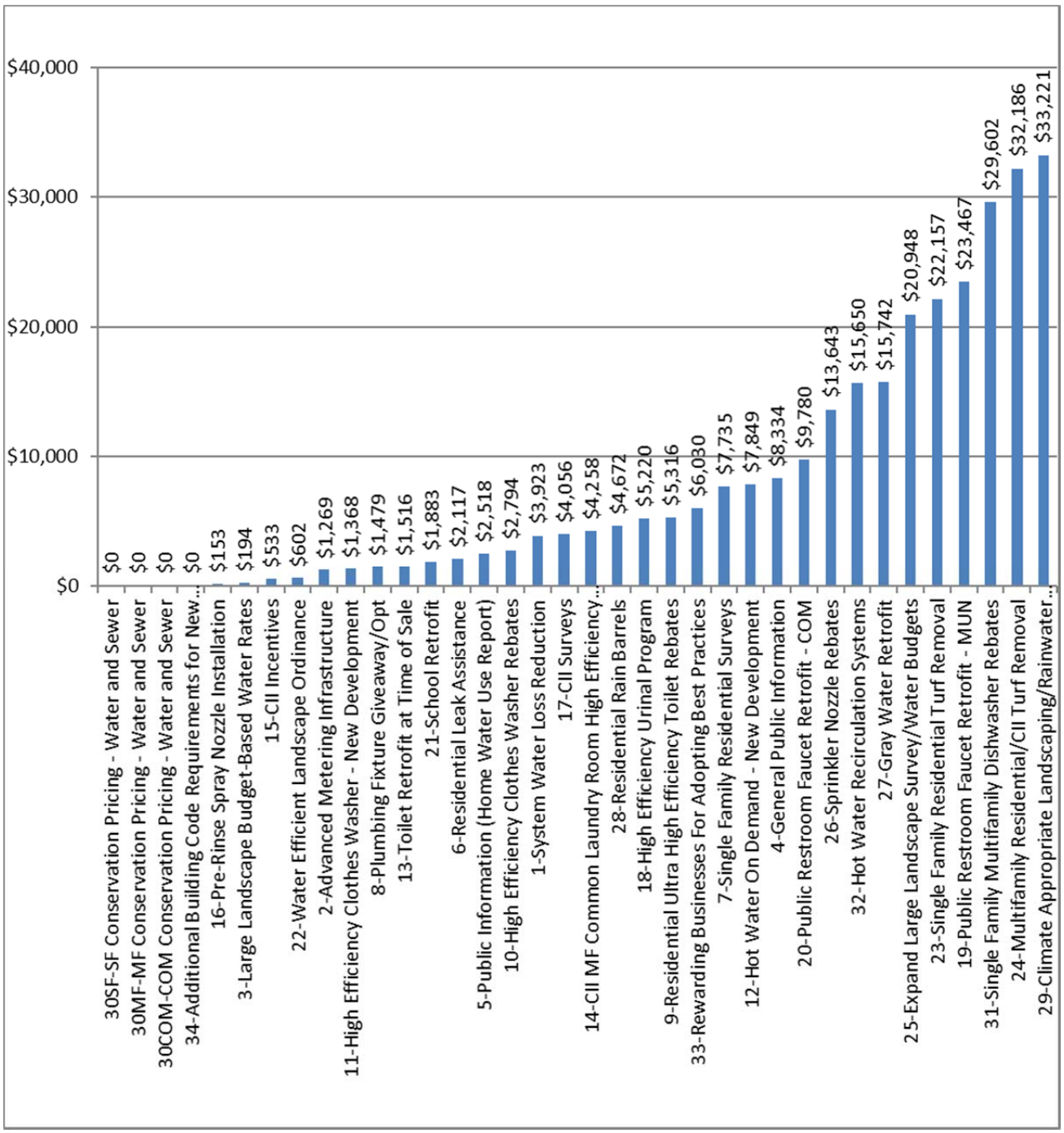
**Table 7-2. Individual Measure Estimated Cost of Water Saved and 2035 Water Savings[1]**

| No. | Measure Name | Estimated Cost of Water Saved ($/MG) | Estimated 2035 Water Savings (MGY) |
|---|---|---|---|
| **1** | System Water Loss Reduction | $3,923 | 34.87 |
| **2** | Advanced Metering Infrastructure | $1,269 | 45.94 |
| **3** | Large Landscape Budget-Based Water Rates | $194 | 12.83 |
| **4** | General Public Information | $8,334 | 5.73 |
| **5** | Public Information (Home Water Use Report) | $2,518 | 11.39 |
| **6** | Residential Leak Assistance | $2,117 | 22.03 |
| **7** | Single Family Residential Surveys | $7,735 | 2.78 |
| **8** | Plumbing Fixture Giveaway/Opt | $1,479 | 2.03 |
| **9** | Residential Ultra High Efficiency Toilet Rebates | $5,316 | 2.91 |
| **10** | High Efficiency Clothes Washer Rebates | $2,794 | 36.20 |
| **11** | High Efficiency Clothes Washer - New Development | $1,368 | 12.53 |
| **12** | Hot Water On Demand - New Development | $7,849 | 4.46 |
| **13** | Toilet Retrofit at Time of Sale | $1,516 | 8.70 |
| **14** | CII MF Common Laundry Room High Efficiency Clothes Washer | $4,258 | 3.07 |
| **15** | CII Incentives | $533 | 18.39 |
| **16** | Pre-Rinse Spray Nozzle Installation | $153 | 9.16 |
| **17** | CII Surveys | $4,056 | 19.24 |
| **18** | High Efficiency Urinal Program | $5,220 | 3.22 |
| **19** | Public Restroom Faucet Retrofit – MUN | $23,467 | 0.29 |
| **20** | Public Restroom Faucet Retrofit – COM | $9,780 | 8.47 |
| **21** | School Retrofit | $1,883 | 2.88 |
| **22** | Water Efficient Landscape Ordinance | $602 | 6.66 |
| **23** | Single Family Residential Turf Removal | $22,157 | 4.18 |
| **24** | Multifamily Residential/CII Turf Removal | $32,186 | 2.39 |
| **25** | Expand Large Landscape Survey/Water Budgets | $20,948 | 1.97 |
| **26** | Sprinkler Nozzle Rebates | $13,643 | 3.35 |
| **27** | Gray Water Retrofit | $15,742 | 0.24 |
| **28** | Residential Rain Barrels | $4,672 | 3.42 |
| **29**[2] | Climate Appropriate Landscaping and Rainwater Infiltration | $33,221 | 8.26 |
| **30SF**[2] | SF Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **30MF**[2] | MF Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **30COM**[2] | COM Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **31**[2] | Single Family Multifamily Dishwasher Rebates | $29,602 | 0.20 |
| **32**[2] | Hot Water Recirculation Systems | $15,650 | 1.38 |
| **33**[2] | Rewarding Businesses for Adopting Best Practices | $6,030 | 3.64 |
| **34**[2] | Additional Building Code Requirements for New Development[4] | N/A | N/A |
| **35**[2] | Innovation Incubator Program | $121,679 | 1.08 |

[1] Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Feb 16, 2016. This table does not contain a total in bottom row since interaction between measures has not been accounted for in table but is accounted for at the program level.
[2] Measures 29-35 were requested additions by the WSAC in October 2015.
[3] Pricing measure costs and savings not yet available. Awaiting results of ongoing rate study scheduled to be completed in 2016.
[4] New CALGreen Building codes, effective January 2016, are already modeled. This measure is awaiting support from a Working Group yet to be formed.

Figure 7-1 shows the costs of water saved for individual measures ranked from lowest to highest (excluding Measure 35 Innovation Incubator Program). The measures to be implemented in the next several years are a mix of some lower cost and some higher cost measures. It was assumed by the City's Water Supply Advisory Committee that the recommended program, even with higher cost measures included, would incur an average total program cost of no more than $10,000 per million gallons of water saved.

**Figure 7-1. Conservation Measures Unit Cost of Water Saved**




Notes:

1. Units are $/MG.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

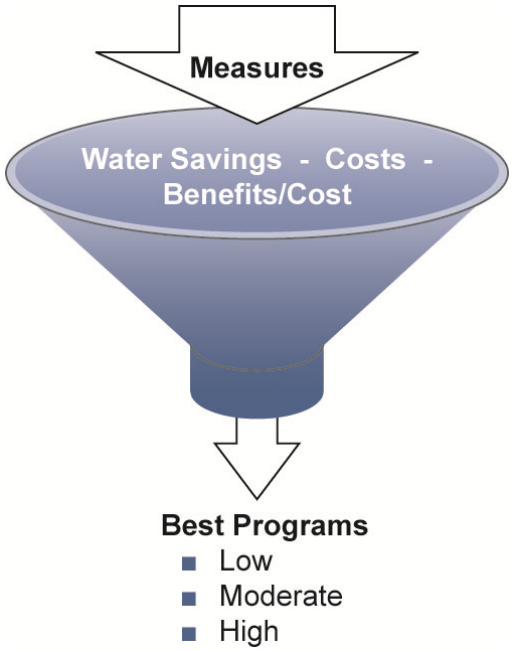
# 8. RECOMMENDED PROGRAM

This section of the Plan addresses the public and technical process involved to evaluate all measures available and how the final selection of measures for the Recommended Program was made. It also addresses estimated per capita water use reductions, projected total water savings, and the overall cost of water saved.

## 8.1 Selection of Measures for Recommended Program

During the evaluation process, as presented in Section 7 and below, the water savings and costs were estimated for the quantifiable measures using assumptions for each measure that were collaboratively developed by MWM and City staff. Benefits and costs were compared in a formal present value analysis. Conclusions were drawn about which measures produce cost-effective water savings and these were then further discussed and evaluated. This process can be considered an economic screening process (Figure 8-1). Packaging the best measures into alternative program scenarios allowed the City to consider what level of conservation was appropriate.

**Figure 8-1. Overview of the Conservation Measure Evaluation Process**




As part of this Program development, several measure combinations were developed and program scenarios explored in order to develop the Recommended Program that is presented below. These included several iterations with the City Staff, Water Commission and then the WSAC. The reviews included discussions on mix of measures as well as various measure design levels (e.g., more or less accounts targeted and earlier or later, longer or shorter measure lengths) such that these recommended measures were well vetted with stakeholder input.

Appendix C presents the assumptions and inputs used in the City's DSS Model to evaluate each water conservation measure, including water reduction methodology, perspectives on benefits and costs, present value parameters, and assumptions about unit costs, water savings, measure costs, and market penetration.

Benefit-cost analysis has been used by many water agencies to evaluate and select water supply alternatives, including water conservation measures best suited to local conditions. For the City's Water Department, this analysis requires a Santa Cruz-specific set of data, such as historical water consumption patterns by customer class, population projections, results of the pilot projects and Baseline Water Use Study, and prior conservation efforts. The end result is the recommended measures previously described above in Table 7-1.

The City's Recommended Program consists of both passive and active elements. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any program – the savings are based on customers following applicable current local, state, and federal laws, building codes and ordinances. Recommended Program active measures fall within one of four categories (see Table 8-1): 1) general measures; 2) residential measures (indoor); 3) commercial measures (indoor); and 4) irrigation measures (outdoor).

The following table lists the Recommended Program active measures and how each falls within one of four categories.

**Table 8-1. Elements of Recommended Program**

| Utility Measures | Residential Measures | CII Measures | Landscape Measures |
|---|---|---|---|
| System Water Loss Reduction | Residential Leak Assistance | CII Incentives | Large Landscape Budget-Based Water Rates |
| Advanced Metering Infrastructure | Single Family Residential Surveys | Pre-Rinse Spray Nozzle Installation | Water Efficient Landscape Ordinance |
| SF, MF, COM Conservation Pricing - Water and Sewer | Plumbing Fixture Giveaway/Opt | CII Surveys | Single Family Residential Turf Removal |
| General Public Information | Residential Ultra High Efficiency Toilet Rebates | High Efficiency Urinal Program | Multifamily Residential/CII Turf Removal |
| Public Information (Home Water Use Report) | High Efficiency Clothes Washer Rebates | Public Restroom Faucet Retrofit - MUN | Expand Large Landscape Survey/Water Budgets |
| | Gray Water Retrofit | Public Restroom Faucet Retrofit - COM | Sprinkler Nozzle Rebates |
| | | School Retrofit | Residential Rain Barrels |
| | Hot Water On Demand - New Development | Hot Water On Demand - New Development | Climate Appropriate Landscaping and Rainwater Infiltration |
| | Toilet Retrofit at Time of Sale | Toilet Retrofit at Time of Sale | |
| | CII MF Common Laundry Room High Efficiency Clothes Washer* | CII MF Common Laundry Room High Efficiency Clothes Washer* | |
| | Single Family/Multifamily Dishwasher Rebates* | Rewarding Businesses for Adopting Best Practices* | |
| | Hot Water Recirculation Systems* | Hot Water Recirculation Systems* | |
| | Additional Building Code Requirements for New Development* | Additional Building Code Requirements for New Development* | |
| | Innovation Incubator Program* | Innovation Incubator Program* | |

* These measures target both CII and residential customers.

## 8.2 Projected Total Water Savings of Program

The following Table 8-2 presents the benefit cost analysis summary for the Recommended Program, which includes all the measures evaluated as discussed in Section 7.

Cost categories are defined as follows:

- Utility Costs – those costs that the City as a water utility will incur to operate the measure, including administrative costs
- Utility Benefits – the avoided cost of producing water

The column headings in Table 8-2 are defined as follows:

- Average Cost of Water Saved ($/MG) = average cost to implement the program divided by the water savings over the life of the conservation measure
- Water Savings in 2035 (MGY) = water saved in million gallons. The year 2035 is presented as this represents the end of the planning horizon for both the 2015 UWMP and this analysis effort.

**Table 8-2. Recommended Program Costs and Savings**

| Conservation Program | Average Cost of Water Saved ($/MG) | Water Savings over "Baseline" Demand in 2035 (MGY) |
|---|---|---|
| Recommended Program with Plumbing Code Savings | $4,572/MG | 619 |

Notes:
1. Across the modeling time period of 2015-2035, administrative costs average approximately 22% of total utility costs annually.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Table 8-3 shows the savings in 5-year increments for the plumbing codes, Recommended Program, and the Recommended Program with plumbing code savings.

**Table 8-3. Long Term Conservation Program Savings over "Baseline" Demand**

| Conservation Program | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand without Codes or Conservation (MGY) | 3,560 | 3,636 | 3,743 | 3,839 |
| Plumbing Code (MGY) | 96 | 179 | 269 | 329 |
| Recommended Program (MGY) | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings (MGY) | 233 | 411 | 538 | 619 |

Source: City of Santa Cruz. DSS Model, Feb 16, 2016.

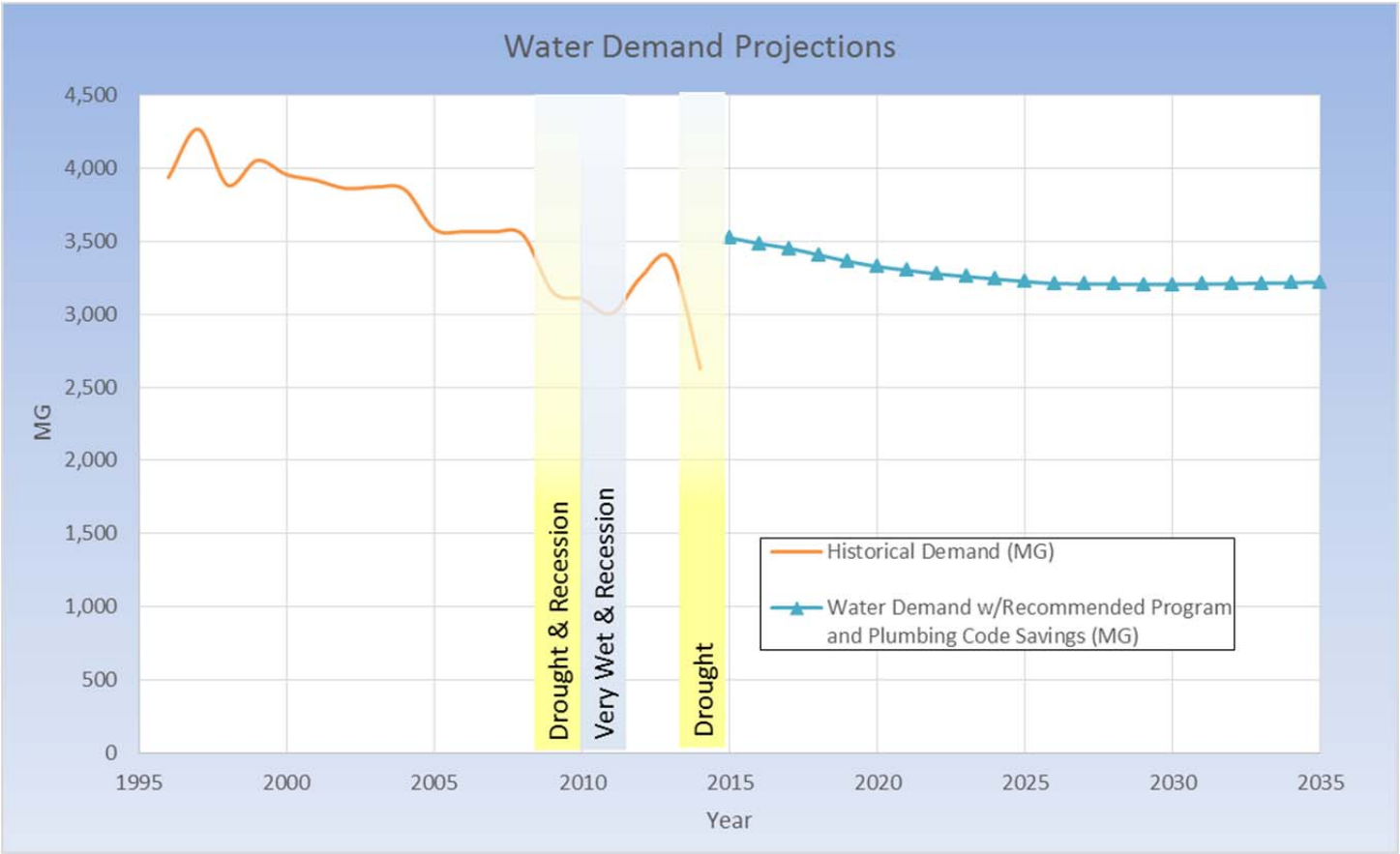
The Recommended Program is envisioned to include strong customer participation to support additional planned growth while keeping total water use relatively constant for the next 20 years. New development will be built to water efficient standards following the 2015 CALGreen Plumbing Code, 2015 CEC Code, and other local ordinances (e.g., City's landscape ordinance). Water use in new homes should be more efficient than existing homes on comparable lot sizes. Table 8-4 and Figure 8-2 below present the Recommended Program projected water demands. Note that the Recommended Program with Plumbing Code is lower than the Demand Forecast by M.Cubed shown in Table A-1 in Appendix A of this Plan. The Recommended Program forecast is 222 MGY lower (6%) than the M.Cubed forecast in 2035. This is due to increased savings by the new plumbing codes and new conservation programs that would be added over time. As seen in Table 8-4, total water savings from both plumbing code and the recommended program is expected to reduce total water demand from approximately 3.8 billion gallons per year to about 3.2 billion gallons per year, a reduction of over 600 million gallons or more than 16% by 2035.

**Table 8-4. Normalized Water Use Projections**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| "Baseline" Demand | 3,560 | 3,636 | 3,743 | 3,839 |
| Demand with Plumbing Code (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |
| Demand with Plumbing Code and Recommended Program (MGY) | 3,327 | 3,225 | 3,205 | 3,220 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

**Figure 8-2. Projected Water Demands with Recommended Program**




Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The current and projected number of connections and deliveries to the City's water distribution system by sector are identified in the following table. Note that total deliveries include plumbing code savings, Recommended Program savings, and Non-Revenue Water.

**Table 8-5. Accounts and Recommended Program Demands by Customer Category***

| | | Single Family | Multi-family | Business | Municipal | Industrial | UC Santa Cruz | Irrigation | Golf | Non-Revenue Water | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | # of accounts | 19,456 | 2,886 | 1,948 | 218 | 39 | 12 | 651 | 2 | N/A | 25,212 |
| | Deliveries MGY | 1,277 | 772 | 574 | 46 | 56 | 196 | 81 | 58 | 267 | 3,327 |
| 2025 | # of accounts | 19,854 | 2,972 | 1,971 | 218 | 41 | 14 | 723 | 2 | N/A | 25,795 |
| | Deliveries MGY | 1,223 | 714 | 541 | 43 | 59 | 234 | 87 | 52 | 273 | 3,225 |
| 2030 | # of accounts | 20,260 | 3,122 | 2,008 | 218 | 43 | 16 | 845 | 1 | N/A | 26,514 |
| | Deliveries MGY | 1,191 | 690 | 525 | 41 | 60 | 271 | 100 | 47 | 281 | 3,205 |
| 2035 | # of accounts | 20,636 | 3,238 | 2,055 | 218 | 43 | 18 | 951 | 1 | N/A | 27,162 |
| | Deliveries MGY | 1,170 | 678 | 519 | 40 | 61 | 308 | 110 | 46 | 288 | 3,220 |

*Demands include plumbing code savings and Recommended Program savings.

## 8.3 Estimated Per Capita Water Use Reductions

The City currently and in the future is projected to exceed the two possible conservation targets that are being tracked by the City, both in terms of the State's SB X7-7 mandate and the voluntary California Urban Water Conservation Council MOU commitments. As published in the 2010 and 2015 UWMPs, the City has selected to aim to achieve SB X7-7 Method 3: 95% of State Hydrological Region Target by 2020. The City's baseline and target GPCD are as follows:

- Baseline GPCD = 113 GPCD
- 2015 Interim Target = 111 GPCD
- 2020 target = 110 GPCD
- CUWCC 2018 target = 101 GPCD

Table 8-6 below shows the projected per capita water use in gallons per day per person (GPCD) in 5-year increments for the projected demand with no plumbing code savings, projected demand with plumbing code savings, and projected demand with Recommended Program implementation and plumbing code savings. Note that demand projections are normalized, without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

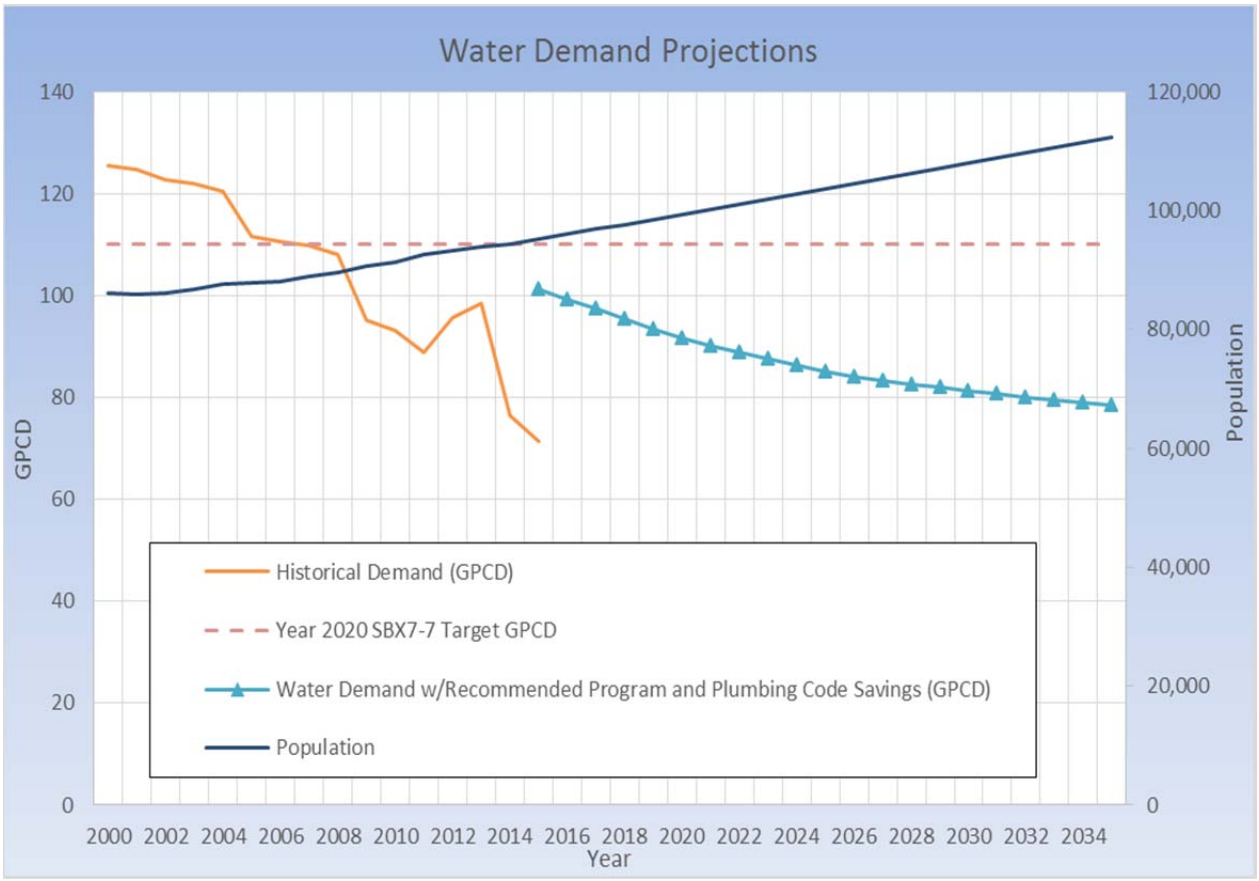
**Table 8-6. Projected Population and Per Capita Water Use[1]**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Population [2] | 99,403 | 103,620 | 107,989 | 112,390 |
| "Baseline" Demand without Plumbing Code (GPCD) | 98 | 96 | 95 | 94 |
| Demand with Plumbing Code (GPCD) | 95 | 91 | 88 | 86 |
| Demand with Plumbing Code and Recommended Program (GPCD) | 92 | 85 | 81 | 78 |

[1] Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.
[2] Source: WSAC Final Report, October 2015.

Figure 8-3 below presents the SB X7-7 year 2020 GPCD target and historical and projected GPCD estimates with plumbing codes and Recommended Program savings. As seen below in Figure 8-3, the City has already met its state-mandated 2020 target and surpassed its voluntary CUWCC 2018 goal. The goal of the City's plan is to press beyond these state targets and instead maximize conservation savings to help meet local resource needs for current and future customer water demands.

**Figure 8-3. Water Conservation Program Savings Projections – SB X7-7 Target**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 8.4 Overall Cost of Water Saved

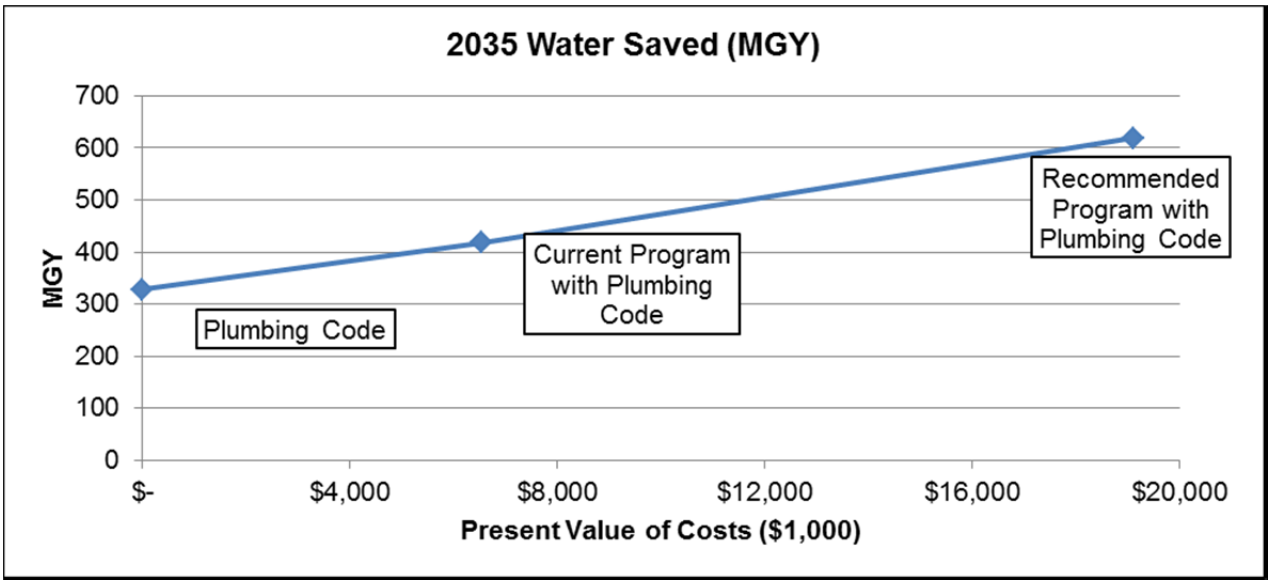
The cost of water saved per unit volume ($/MG) for the Recommended Program is $4,572/MG. This is below the Water Supply Alternatives Committee's recommended threshold for overall cost of water saved, which is $10,000/MG.

Several of the measures addressing peak season water use have the highest unit costs, but, together as a package, the Recommended Program is $4,572/MG, well below $10,000/MG (City of Santa Cruz, 2016), the maximum level established by the WSAC, which is lower than the expected unit cost of supply augmentation projects recommended to be pursued as a result of the WSAC's work.

It should be noted that the cost of water saved value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

The following figure shows how the costs and savings of the City's current water conservation program compare to the Recommended Program as more utility dollars are spent to achieve greater water savings.

**Figure 8-4. Present Value of Utility Costs vs. Cumulative Water Saved**




## 8.5 GHG Savings Analysis

The City has a Climate Action Plan an expressed goal to reduce greenhouse gases. For the conserved water supply, there is an estimated embedded energy intensity of 1,948 kWh/MG saved, estimated in 2015 from the Pacific Gas and Electric (PG&E) GHG Inventory and City staff. The total annual GHG savings can be estimated simply by multiplying the water savings times the energy intensity times the PG&E GHG emission factor.

The following assumptions were made in estimating the GHG emissions savings:

- Estimated water savings in 2020 are 233 MGY and in 2035 are 619 MGY (Table 8-3).
- Same energy intensity as 2015 of 1,984 kWh/gallon saved (which is considered to be a preliminary estimate of future savings provided that the City is not required to add more energy intensive treatment facilities).
- PG&E emission factor of 290 lb. $CO_2$/MWh estimated for 2020 as provided in their November 2015 Guidance for PG&E Customers. Note that the recent average emission factor from 2009-2013 was 457 lb. $CO_2$/MWh. Emission factors are estimated based on the California Public Utilities Commission calculator who regulates private energy utilities and requires tracking and reporting of GHG emissions. The CPUC calculator was developed prior to the drought with reduction in hydropower and also does not extend to 2035, such that the 2020 value was used.
- Additional GHG savings from hot water savings at the end user level and from reduced wastewater collection, treatment, and disposal energy use is not quantified in this analysis.

Based on the parameters above, the total projected annual savings due to conserved water from the 2015 water supply sources is estimated to be a total of 61 metric tons of $CO_2$ per year equivalent savings in 2020 and 162 metric tons of $CO_2$ per year equivalent savings in 2035. Cumulative greenhouse gas reduction over the 20-year planning horizon is expected to be approximately 307 metric tons of $CO_2$.

# 9. IMPLEMENTATION STRATEGY

Each year a progress update will be used to analyze the progress being made regarding meeting the Recommended Program's targeted water savings. It will be imperative to track activities and water demand to understand the level of progress being made in meeting overall goals for the program.

The Program is intended to be dynamic and changes and adjustments are expected. Monitoring progress on implementing recommended measures should be a priority. Costs, participation rates, and water use should be tracked to ensure that the Program is on target to meet goals. As new promising technologies emerge, they should be tested and possibly replace programs that are underachieving. Summary reports should be issued citing progress and recommending changes in program content.

The following sections outline the recommended schedule as well as estimated budget and staffing needs to implement the Recommended Program. It also describes recommendations for potential future activities in support of the Santa Cruz Water Conservation Master Plan, including:

- Concepts for data collection and management systems
- Considerations of emerging new technologies
- Implications for responding to water shortages
- Future DSS Model updates

## 9.1 Proposed Implementation Schedule

The following Figure 9-1 presents the planned Recommended Program implementation schedule. A description of each measure can be found in Table 7-1. Some measures involve modifying existing programs and are relatively simple to implement. Other measures could involve extensive planning and or additional authority to implement. At least three measures involve the City passing new ordinances or amending building codes. One measure, No. 16 (Pre-Rinse Spray Nozzle Installation), has already been completed in conjunction with drought response during 2014.

**Figure 9-1. Recommended Program Planned Implementation Schedule**

| No. | Measure | Time Period | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | System Water Loss Reduction | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 2 | Advanced Metering Infrastructure | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 3 | Large Landscape Budget-Based Water Rates | 2018 - 2020 | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 4 | General Public Information | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 5 | Public Information (Home Water Use Report) | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 6 | Residential Leak Assistance | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 7 | Single Family Residential Surveys | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 8 | Plumbing Fixture Giveaway/Opt | 2015 - 2017 | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 9 | Residential Ultra High Efficiency Toilet Rebates | 2015 - 2020 | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 10 | High Efficiency Clothes Washer Rebates | 2015 - 2026 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 11 | High Efficiency Clothes Washer - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 12 | Hot Water On Demand - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 13 | Toilet Retrofit at Time of Sale | 2015 - 2019 | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 14 | CII MF Common Laundry Room High Efficiency Clothes Washer | 2015 - 2024 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 15 | CII Incentives | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 16 | Pre-Rinse Spray Nozzle Installation | 2015 - 2016 | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| 17 | CII Surveys | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 18 | High Efficiency Urinal Program | 2015 - 2018 | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | |
| 19 | Public Restroom Faucet Retrofit - MUN | 2021 - 2023 | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| 20 | Public Restroom Faucet Retrofit - COM | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 21 | School Retrofit | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 22 | Water Efficient Landscape Ordinance | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 23 | Single Family Residential Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 24 | Multifamily Residential/CII Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 25 | Expand Large Landscape Survey/Water Budgets | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 26 | Sprinkler Nozzle Rebates | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 | Gray Water Retrofit | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 | Residential Rain Barrels | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 | Climate Appropriate Landscaping and Rainwater Infiltration | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30SF | SF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30MF | MF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30COM | COM Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 | Single Family Multifamily Dishwasher Rebates | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 32 | Hot Water Recirculation Systems | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 33 | Rewarding Businesses For Adopting Best Practices | 2020 - 2035 | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 34 | Additional Building Code Requirements for New Development | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 35 | Innovation Incubator Program | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Source: City of Santa Cruz. DSS Model.

## 9.2 Estimated Implementation Budget

Over the next five years (2015-2020), the average annual cost to the City to implement the Recommended Program is approximately $1,064,000 per year of additional budget and includes additional staff time, materials, rebates, giveaways, etc. The annual utility cost and administrative cost breakdown for each conservation measure can be found in the DSS Model measure screen shots in Appendix C.

This budget was developed as part of the DSS Model evaluations for level of activity by year. The opportunities for State grants or cost sharing partnership with other County utilities or other means for lowering the cost of a conservation measure would lower the budgetary needs for implementation. The City should develop a detailed annual work plan;

use the DSS Model to monitor progress on demand reductions; and update the implementation cost estimates and associated budgets on an annual basis.

**Table 9-1. Five-year Implementation Budget**

| Measure | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Total Utility Costs | $991,343 | $995,453 | $984,192 | $1,228,850 | $1,147,135 | $1,032,241 |
| Total Admin Costs | $199,333 | $200,346 | $196,967 | $257,707 | $236,558 | $222,420 |
| Admin % of Total Costs | 20% | 20% | 20% | 21% | 21% | 22% |

Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Program Scenarios, Program Details, Feb 16, 2016.

**Table 9-2. Long Range Budget Forecast**

| | Costs | | |
|---|---|---|---|
| | Utility | Customer | Total |
| 2015 | $991,343 | $958,295 | $1,949,637 |
| 2016 | $995,453 | $963,305 | $1,958,757 |
| 2017 | $984,192 | $968,314 | $1,952,506 |
| 2018 | $1,228,850 | $1,329,686 | $2,558,536 |
| 2019 | $1,147,135 | $1,295,705 | $2,442,840 |
| 2020 | $1,032,241 | $1,307,901 | $2,340,142 |
| 2021 | $1,512,745 | $2,864,331 | $4,377,076 |
| 2022 | $1,518,574 | $2,871,599 | $4,390,173 |
| 2023 | $1,418,219 | $2,593,586 | $4,011,805 |
| 2024 | $1,384,731 | $2,580,369 | $3,965,100 |
| 2025 | $1,363,955 | $2,562,136 | $3,926,090 |
| 2026 | $1,383,788 | $3,247,801 | $4,631,588 |
| 2027 | $993,319 | $2,955,101 | $3,948,420 |
| 2028 | $998,287 | $2,961,365 | $3,959,652 |
| 2029 | $1,003,255 | $2,967,629 | $3,970,884 |
| 2030 | $1,008,223 | $2,973,893 | $3,982,116 |
| 2031 | $888,237 | $2,770,177 | $3,658,414 |
| 2032 | $892,379 | $2,776,042 | $3,668,422 |
| 2033 | $896,522 | $2,781,907 | $3,678,430 |
| 2034 | $900,665 | $2,787,772 | $3,688,438 |
| 2035 | $904,808 | $2,793,638 | $3,698,445 |

Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Program Scenarios, Recommended Programs, Feb 16, 2016.

### 9.2.1 Overall Program Staffing Needs

The overall vision for conservation spans across the City's Water Department with multiple sections supporting planning and implementation tasks. A summary of each section's roles and responsibilities are as follows:

- Water Department: responsible for leading the efforts for both the internal and external conservation programs with a Conservation Section supported by four staff positions currently. It is estimated that the Water

Department may need to add up to two more full-time equivalent personnel to implement the additional workload represented by the recommended plan.

- Operations (Production and Distribution sections): responsible for implementation of the water loss control program as part of the water loss control program initiative.
- Customer Service section: responsible for responding to direct customer questions related to water conservation or for referring the questions to the appropriate staff, as well as meter shop operations.
- Communications staff: responsible for outreach and awareness campaigns to educate the public related to the need to use water wisely and the quality of the City's water in order to help sustain Santa Cruz's quality of life.
- In addition, implementation of the plan will require coordination and assistance of other City Departments, including IT, Finance, Planning and Community Development (building inspectors), Public Works, and Parks and Recreation.

The governing body for the Water Department is the Santa Cruz City Council. A seven-member Water Commission advises the City Council on policy matters involving the operations and management of the water system, including water conservation initiatives and activities.

Water conservation activities are also coordinated with neighboring water districts and other jurisdictions served by the City of Santa Cruz. These include the County of Santa Cruz, City of Capitola, Soquel Creek Water District, Scotts Valley Water District, San Lorenzo Valley Water District, and the City of Watsonville. The Regional Water Management Foundation and Resource Conservation District of Santa Cruz County also assist with coordination, outreach, integrated regional planning, and grant administration.

## 9.3 Conservation Data Collection and Management System

Tracking conservation data can and should be well organized. As conservation is a vital part of the water supply portfolio for City to meet projected future demands, estimating and analyzing water savings due to water demand reductions is necessarily based on reviewing customer usage data and conservation program activities. The City is embarking on a significant expansion of its existing efforts. As a result, taking an ad-hoc approach to data management where different employees maintain various program data inevitably leads to information having compatibility or quality issues over time as attempts at creating program activity summaries and water savings estimates are compiled. Different conservation measures have different options for tracking data. A summary of primary data tracking and management needs by program area are presented in Table 9-3.

Conservation database systems can be designed to integrate within a customer information system (e.g., billing system) and/or a work order system or be created as a stand-alone database (or utilize all three systems) to implement the conservation program (e.g., issue requests for surveys or water waste call follow-up sent to staff) and track data (e.g., post survey reports or water waste enforcement actions). Most systems track by address and not customer account number, given that these can open and close and legacy data can be lost. These information systems used to manage conservation program actions and data are custom to each utility, given the individual conservation measures and implementation strategies are unique to each agency and their existing data management system. Most important is a plan for data collection and due diligence on implementation of data tracking according to the Program. Without adequate data collection, analysis of past water savings and future planning adjustments for the conservation program become very challenging and end up being based mainly on assumptions or inferences of savings achieved or possible.

**Table 9-3. Overview of Data Tracking and Management Needs**

| Program Area | Primary Data Tracking and Management Needs |
|---|---|
| **Program Database Tracking** | • Budget tracking (especially rebate and incentive programs for funds remaining).<br>• Overall program water savings (e.g., calculator of quantifiable savings by activity or create a monitoring version of DSS Model using "actual" versus "planned activities").<br>• Workload planning (e.g., survey requests and technician assigned, through the customized work order system).<br>• Contracts and agreements.<br>• Overall programs and measures status.<br>• Demand Use Study data - flow meter logging or connection to an existing database.<br>• Saturation estimates of hardware or the measure (toilets, faucets, etc.) similar to the stats from the Baseline Water Use Survey and with updates every 3-5 years on a formal survey.<br>• Retail audit information from periodic checks with local hardware stores. |
| **Water Loss Control Program** | • Use both Geographic Information System (GIS) and Customer Information System (CIS).<br>• Manage data for annual AWWA system water audit software.<br>• Analyze data for capital planning purposes (e.g., repeat main breaks earmarked for replacement versus repair).<br>• Data from various leak detection products, data, etc.<br>• Main break and leak information - dates, time, location, size of main, etc. This can be linked to existing database. Annually create a summary of program statistics.<br>• Pipeline failure analysis - also can be linked to the existing database. Annually create a summary of program statistics.<br>• Cathodic protection (CP) information - CP testing data.<br>• Photo library of the main breaks - can be tied to mapping but it may be more organized through a data search and or location/demographic search. |
| **Public Awareness and Education** | • Customer Information System to manage customer contacts (e.g., attending classes, etc.).<br>• Inventory of current outreach materials.<br>• Educational classes for schools and to target groups such as school teachers, landscapers, etc. |
| **Water Waste Violations** | • CIS linked to GIS to manage customer water waste violations and repeat violation history and past fines. |
| **All Rebate and Incentive Programs** | • CIS linked to GIS to manage customer participating in any rebate or incentive program (e.g., allows for quick checking on exceeding number of eligible rebates, fraud protection, financial tracking on budget expended, etc.). |

| Program Area | Primary Data Tracking and Management Needs |
|---|---|
| **Residential Surveys** | • CIS linked to GIS to manage customer data (e.g., usage history queries, survey reports, notes customer needs [like medical for when drought comes to allow for variances], etc.). |
| **Commercial Surveys** | • CIS linked to GIS to manage customer data (e.g., usage history queries, survey reports, notes customer unique uses and needs [any issues for when drought comes to allow for variances], etc.). |
| **Landscape Surveys and Water Budgets** | • CIS linked to GIS to manage customer data (e.g., usage history queries, landscape survey reports, water budget tracking related to actual usage compared to budget, site photos, etc.). |

Data tracking will be customized to each measure. At a minimum, the City staff will need the data for the DSS Model updates if it is desired to use the model to estimate achieved water savings. Ideally, City staff would also include enough data to support an annual report and/or publish summary accomplishments on the City's website.

Related to supporting future DSS Model updates, as described in Section 9.3, the City will need to collect data regarding measure implementation in separate worksheets (i.e., one worksheet per measure). Important parameters to track on the individual measure worksheets include the following for measures that involve rebates:

- All parameters requested in the rebate application
- City cost
- Pre-retrofit consumption
- Post-retrofit consumption
- Estimated savings

Related to incentive program information, it is recommended that the City develop rebate application forms that require the customer to complete the following fields in order to receive their rebate:

- Measure name
- Customer name
- Customer address
- Customer phone number
- Customer City water account number
- Customer PG&E account number (only applicable if cost-sharing measure with PG&E)
- Assessor parcel number (if needed to cross reference with other utility program for cost sharing)
- Water use of fixture being replaced, including the year that the fixture was manufactured (particularly for the HET retrofit)
- Original type of plumbing or appliance data – means to determine water usage (e.g., date purchased [plumbing fixtures] or manufacturer and model number)
- Behavior use information, as appropriate (e.g., number of loads of clothes per washer per week)

- New equipment date purchased
- New equipment date installed
- Purchase price
- Brand
- Model number
- Store name
- Any customer satisfaction related questions (e.g., toilet double flushing experienced before with old fixture and then with new fixture)
- Year property built
- Square footage
- Property type (include check-boxes with all customer types eligible to receive a rebate for particular measure)

Additionally, it should be required that the City require that the following are submitted with rebate applications:

- Proof of purchase
- Signed application for rebate (to be developed and provided by City)

The City should take the same approach to collecting data on other measures (e.g., surveys) to track progress. The following parameters should be tracked on individual measure worksheets for surveys:

- Measure name
- Customer name
- Customer address
- Customer phone number
- Customer City account number
- Customer PG&E account number (only applicable if cost-sharing measure with PG&E)
- Water use of fixture being replaced, including the year that the fixture was manufactured (particularly for the HET retrofit)
- Survey date
- Total acres of turf surveyed (if landscape survey)
- Inventory of water using appliances (and appropriate usage information if seeking to estimate before water savings)
- Documentation of any upgraded equipment on site (already occurred, planned or potential future) – especially important if a rebate or other incentive for upgrade is to be offered
- Information related to cooling tower or other larger water using equipment on site (dependent on building type and occupant usage)

## 9.4 Track and Update for New Codes and Emerging Technologies

More challenging is tracking the changes in the consumer marketplace for the vast array of water-using appliances and plumbing fixtures in both the residential and commercial sectors. Some means for tracking the latest in national standards and building codes as well as technologies and emerging trends in customer preferences include the following resources:

- Having staff member(s) assigned to voluntarily participate on the AWWA Water Conservation Division's committees with attendance at the Annual Conference Committee Meetings and conference calls, in particular the Water Efficiency Programs and Technology Committee.
- Monitor the Alliance for Water Efficiency (AWE) for updates on changes in National Standards and Codes and opportunities to comment on future changes to codes and regulations at the national level.
- As a WaterSense Partner, the City should continue to track the U.S. EPA WaterSense new technologies and post updated equipment lists of newly labeled products and services. Frequently, AWE or CUWCC have performance testing results posted on their websites that provide very useful information to consumers. Performance information may also be available through Consumer Reports or Consortium for Energy Efficiency (http://www.cee1.org).
- Attend the WaterSmart Innovations Conference for exposure to the vendors participating in the exhibition and also to attend technical sessions on emerging trends in water conservation programs.
- Leverage the State and County process for adopting new building codes and regulations, especially building codes to help implement proactive changes in future development in Santa Cruz. Many new codes first appear in appendices that can be easily excluded.
- Maintain and use a network of ten to twenty key contacts at progressive utilities to inquire about new technologies (e.g., through known contacts or new contacts made at WaterSmart Innovations or AWWA conferences).
- Host events with other partner utilities and applicable stakeholders on related water loss control programs or conservation measures.
- Conduct surveys every three years with other utilities nationally to gain insight on programs and testing of products.

Staying on or ahead of the curve with tracking new technologies would lead to water savings without City investment for later upgrades through incentive programs. One caution is adopting new technologies that have yet to have adequate research or product testing. These emerging products may be worthy of pilot programs and potentially attractive for grant funding projects through agencies like the U.S. EPA or U.S. Bureau of Reclamation (USBR).

## 9.5 Implications for Responding to Water Shortages

Given the investment and response by the Community both with the most recent 2013-2015 drought and through implementation of this conservation program in the coming years, the City will need to revise its Water Shortage Contingency Plan. This is needed in order to modify its expectations in meeting future reductions during low water supply conditions as it's assumed that the City has been and will continue to be subject to "demand hardening." This term refers to the concept that certain upgrades or changes can only have realized savings once (e.g., replacing an older toilet with a new high efficiency 1.28 gpf toilet).

In an attempt to achieve equity, it is recommended that the City's policies and Water Shortage Contingency Plan be expanded to include additional definition for other customer user classes. It is also recommended that priority for fire, health, and sanitation protection be placed above other discretionary uses. In other states, such as California, the Water Code Section 350 sets priority for order of demand to be served in times of drought, including fire protection, health and sanitation, with more discretionary uses following later. The California Water Code in Section 10632(a) specifies requirements for any water supplier serving more than 3,000 acre feet or 3,000 connections to plan for up to a 50% reduction in demand in times of drought. Section 10632(b) sets the criteria for planning for minimum water supply conditions based on the driest three-year sequence on record. These sections of the Water Code are required to be addressed every five years in a Water Shortage Contingency Plan, which is to be filed with the California Department of Water Resources.

Given the goal to reduce peak water savings and preserve surface water storage supplies, more concentrated efforts aimed at lowering irrigation and non-potable demands in times of drought should be explored for potential inclusion in the City's Water Shortage Contingency Plan.

## 9.6 Suggestions for Future DSS Model Updates

With the level of investment in both capital projects that may be deferred due to this program and also investments in the program itself, City staff should be ready with an answer to the question: "How much water has been saved and at what cost?" In addition, due to the need for ongoing water conservation efforts to attain and maintain more water savings, the City will need to track program water savings, programs costs, and benefits (i.e., cost savings).

The DSS Model is only for the quantifiable measures that have estimates for water savings. There are two types of updates envisioned for the DSS Model: 1) regular monitoring of costs and water savings; and 2) model recalibration with updated base year data and model inputs and assumptions. The following describes each type of update in more detail:

- Annual or more frequent model monitoring updates: The conservation measure worksheets can each be used to track actual activities and compared to the planned activities defined as part of the model development for this program plan. This update is recommended to happen as part of developing an annual work plan and budget. At minimum, it should happen on the order of every 3-5 years.
- Recalibration of the model: The DSS Model has a base year set in 2015. Depending on water demand and account growth rates, it is advisable to update the base year on a 5-year basis, which can be a few percent change in the number of total accounts served by the City. This update requires reviewing historical demand trends, future population and demand forecasts, fixture models calibration, new or updated conservation measures, and cost and water savings assumptions. The next model recalibration update is likely due around 2020 after the next U.S. Census is completed and when development of the next Urban Water Management Plan is underway.

Specific triggers for updates may include:

- Significant cost in the water pumped (more than 10-20% energy or chemical cost increase or decrease would modify the "savings worksheet" and change the benefit cost ratios)
- Significant change in population or accounts by one of the billing categories (more than 5% shift)
- Revision to the end use (e.g., study of end uses that modify the breakdown of the water system balance on the Demand Scenarios Worksheet)
- Significant changes to water system balance (e.g., more than 10% change in water losses or other parameter on the Demands Section of the Model)

- New codes or regulations that affect natural replacement rates of fixtures (need to modify to fixture models)
- Alternatives for staffing versus outsource contracting or other change to cost of implementation of a conservation measure (change to conservation measure worksheet only)
- New technologies for conservation measure being considered (change or addition of new conservation measure worksheet)
- Any other change in conservation measures (e.g., updates to the measure worksheets can be changed or modified at any time without altering the water system balance worksheets or affecting fixture model calibration)

A separate deliverable of the DSS Model and accompanying model source data documentation are also being provided to the City under a license from Maddaus Water Management, Inc.

# 10. CONCLUSIONS

The City staff and community teamed with MWM and developed this comprehensive water conservation program over the course of 2 phases and 3 years. The Program is in full alignment with and supports the City's recommended plan outlined in the WSAC Report. Overall, this Conservation Plan strives to balance the three interdependent goals of cost effective demand reduction, affordability, and organizational stability or capability. This section provides a summary of the planning effort, overall benefits and key findings from this Plan's development.

## 10.1 Summary of Planning Efforts

Throughout this planning effort, MWM teamed with City staff to achieve the goals of providing conservation program planning services that included the following components:

- Development and implementation support of pilot projects, Baseline Water Use Study, economic analysis tools, and metrics to define the planning assumptions appropriate to the Santa Cruz community
- A measure screening and evaluation process to select the specific water conservation measures for City's water conservation program
- An outline for the schedule and budget to implement the selected conservation measures
- A blueprint for an organizational staffing structure to support the wide variety water demand-side management projects and programs to implement the measures

Santa Cruz and MWM with this Plan have now documented the Water Conservation Program that clearly defines the following:

- City needs and objectives with a recommended, phased implementation strategy for meeting the objectives including scope, budget, and schedule for each of conservation measures selected
- An organizational structure for the City's water conservation program
- A process for ongoing use of the DSS Model as a decision-making tool using benefit-cost analysis, or business case evaluations, for the current planned and potential future new conservation measures

## 10.2 Key Benefits from the Water Conservation Program

This Program, when successfully implemented, will deliver a host of benefits. These benefits are listed in this section.

### 10.2.1 Resource Sustainability

**Maximize available freshwater sources**: The Santa Cruz community has finite limits on fresh surface and groundwater supplies to meet supply reliability needs and a growing population. The more efficient the existing demands become with the Program being implemented, the more resilient the existing water supplies will become.

**Enhance stream ecosystems:** Local streams and waterways are unique ecosystems and are home to sensitive listed species such as steelhead and Coho salmon. Decreasing the amount of water diverted for municipal purpose through water conservation allows for increased habitat value and healthier ecosystems.

### 10.2.2 Economic Sustainability

Allow for accelerated investment in rehabilitation and replacement programs under the Capital Improvement Plan: The costs for all utility services are projected to increase; however, the costs will be lower than otherwise with conservation due to lower demands and less wear and tear on infrastructure. The City would also be better able to afford increasing fiscal demands to rehabilitate and replace aging infrastructure by avoiding adding costlier supplies to meet future demands or savings from debt service to the extent projects can be delayed. Any reductions in lower demand are offset by lower fiscal requirements from the cost-effective conservation program that has been selected for implementation.

**Utilize the least costly sources of supply**: Conservation is often the cheapest source of water when offsetting the cost of future supplies that may be more than $10,000/MG. The unit cost of the recommend conservation program is about half the estimated cost of new supply in terms of $/MG produced.

**Supply Augmentation Strategy**: The water conservation program is estimated to assist in meeting future demands of more than 700 MG per year through 2035.

### 10.2.3 Social Sustainability

**Support the City Council's sustainability initiatives**: The national trend to minimize reliance on imported oil and use all resources more efficiently has been evolving and accelerating in recent years. City has unique resources and natural biodiversity that leads the community to flourish economically through tourism and other industry and is wholly dependent on local residents and visitors respecting the need to live sustainably.

**Strengthen the socioeconomic conditions of Santa Cruz's residents**: By maintaining more reasonable costs for water, energy, and sewer utility bills, local residents and businesses can better afford to reinvest in their community and have more dispensable income to support the local economy.

## 10.3 Key Findings from the Water Conservation Program

As a result of this comprehensive analysis here are some summary observations and conclusions:

1. The additional, incremental water savings from the Recommended Program, compared to the City's recent demand forecast, amount to about 220 million gallons in 2035.
2. The estimated annual demand will decline over time to about 3.2 billion gallons per year (BGY) in 2035, versus about 3.4 BGY estimated in the demand study. That estimate is comparable to the actual level of water production experienced in the late 1960s, when the service area population was around 50,000. This decrease represents an almost 16% reduction is water use over 20 years.
3. The impact on water savings from 2015 changes in the fixture plumbing codes prompted by the emergency conservation regulations (which would not have been factored in but for the delay associated with the Water Supply Advisory Committee's process) is over 100 million gallons more than previously estimated.
4. The overall cost of water saved by the Recommended Program is about half of what the WSAC set as a recommended threshold.
5. Gross per capita water use is expected to gradually decline to a level of less than 80 GPCD in 2035.

## 10.4 Recommended Next Steps

Successful implementation of the Program will require a significant increase in efforts on the part of the City. Many new conservation measures will be employed and high participation rates are needed to achieve Program goals. At current staffing and budget levels, the City would have difficultly implementing such an aggressive conservation program. Additional resources are needed. Recommendations to assist with implementation include the following next steps:

- Budget an additional $1.1 million per year to cover the added cost of implementing this plan
- Prioritize measures for implementation with those that contribute the most to meeting water saving targets being given highest priority for implementation
- Consider working with the largest water using customers to try to reduce water use as described in Section 3.5
- Develop a Measure Implementation Plan that describes exactly how the plan measures will be designed and implemented

- Develop an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process)
- Update codes and ordinances, as necessary
- Form partnerships and apply for grants, where appropriate
- Contract to gain enough staff support to help administer or accelerate the new program measures, if needed
- Develop analytical tools to track water use by customer class and overall water use reductions adjusted for the weather and external factors
- Set up a database to store and manage measure participation, cost, and other data to gauge successes and failures
- Use the tools annually to help decide on priorities for the next plan year
- Use the DSS Model to annually update the Program, including actual measure participation, projected water savings, and expected per capita water use reductions, to ensure Program is on track to meet 2020 targets

To stay focused and on schedule, use input from the City's Water Commission and annual work planning process as the forum to amend the plan, budgets, staffing, contracting, schedule, and so forth to stay on track.

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# APPENDIX A – DEMAND & PASSIVE SAVINGS METHODOLOGY

Plumbing codes and appliance standards for toilets, urinals, faucets, clothes washers, and showerheads will continue to reduce indoor residential and non-residential water demands in the future. This reduction in demand is accounted for in Maddaus Water Management (MWM) Decision Support System (DSS) Model. Background on the DSS Model, as well as details on the method of determining plumbing code savings is presented in the following sections.


## A.1 DSS Model Overview

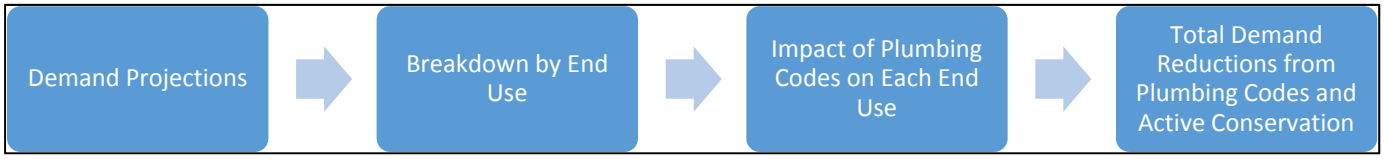
The DSS Model prepares long-range, detailed demand projections. The purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand. A rigorous modeling approach is especially important if the project will be subject to regulatory or environmental review.

The DSS Model is an end-use model that breaks down total water production (water demand in the service area) to specific water end-uses. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. The DSS Model may also use a top-down approach with a utility prepared water demand forecast.

To forecast urban water demands using the DSS Model, customer demand data are obtained from the water agency being modeled. The demand data are reconciled with available demographic data to characterize the water usage for each customer category in terms of number of users per account and per capita water use. The data are further analyzed to approximate the split of indoor and outdoor water usage in each customer category. The indoor/outdoor water usage is further divided into typical end uses for each customer category. Published data on average per-capita indoor water use and average per-capita end use are combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer category. In other words, the DSS Model checks that social norms from end studies on water use behavior (e.g., for flushes per person per day) are not exceeded.

The DSS Model evaluates conservation measures using benefit cost analysis with the present value of the cost of water saved ($/Acre-Foot). Benefits are based on savings in water and wastewater facility operations and maintenance (O&M). The figure below illustrates the process for forecasting conservation water savings, including the impacts of fixture replacement due to plumbing codes and standards already in place.

The DSS Model has been used for practical applications of conservation planning in over 250 service areas representing 20 million people including extensive efforts nationally in California, Colorado, Hawaii, Idaho, Utah, Georgia, Florida, North Carolina, Tennessee, Oregon, Texas, Ohio, and internationally in Australia, New Zealand and Canada. The California Urban Water Conservation Council (CUWCC) did a peer review and has endorsed the model since 2006. The model is offered to all of their members for use to estimate water demand, plumbing code and conservaiton program savings. For more information please see the CUWCC Website: [https://www.cuwcc.org/Resources/Planning-Tools-and-Models?folderId=776&view=gridview&pageSize=10](https://www.cuwcc.org/Resources/Planning-Tools-and-Models?folderId=776&view=gridview&pageSize=10)



The DSS Model forecasts service area water fixture use. In the codes and standards part of the DSS Model, specific fixture end use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. These fixtures and plumbing codes can be added to, edited, or deleted by the user. This yields two demand forecasts: 1) with plumbing codes, and 2) without plumbing codes.

Plumbing code measures are independent of any conservation program; they are based on customers following applicable current local, state and federal laws, building codes, and ordinances.

## A.2 Plumbing Codes and Legislation

The DSS Model incorporates the following items as a "code" meaning that the savings are assumed to occur and are therefore "passive" savings.

- National Plumbing Code
- CALGreen
- AB 715
- AB 407
- CA Code of Regulations Title 20 Sections 1601-1608 2015 Appliance Efficiency Rulemaking New Standards

### National Plumbing Code

The Federal Energy Policy Act of 1992, as amended in 2005, mandates that only fixtures meeting the following standards can be installed in new buildings:

- Toilet – 1.6 gal/flush maximum
- Urinals – 1.0 gal/flush maximum
- Showerhead – 2.5 gal/min at 80 psi
- Residential faucets – 2.2 gal/min at 60 psi
- Public restroom faucets – 0.5 gal/min at 60 psi
- Dishwashing pre-rinse spray valves – 1.6 gal/min at 60 psi

Replacement of fixtures in existing buildings is also governed by the Federal Energy Policy Act, which mandates that only devices with the specified level of efficiency (as shown above) can be sold as of 2006. The net result of the plumbing code is that new buildings will have more efficient fixtures and old inefficient fixtures will slowly be replaced with new, more efficient models. The national plumbing code is an important piece of legislation and must be carefully taken into consideration when analyzing the overall water efficiency of a service area.

In addition to the plumbing code, the U.S. Department of Energy regulates appliances, such as residential clothes washers, further reducing indoor water demands. Regulations to make these appliances more energy efficient have driven manufactures to dramatically reduce the amount of water these machines use. Generally, front loading washing machines use 30-50% less water than conventional models (which are still available). In a typical analysis, the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 12 gallons or less) so that by the year 2025 that will be the only type of machines available for purchase. In addition to the industry becoming more efficient, rebate programs for washers have been successful in encouraging customers to buy more water efficient models. Given that machines last about 10 years, eventually all machines on the market will be the more water efficient models. Energy Star® washing machines have a water factor (WF) of 6.0 or less - the equivalent of using 3.1 cubic feet (or 23.2 gallons) of water per load. The maximum water factor for residential clothes washers under current federal standards is 9.5. The water factor equals the number of gallons used per cycle per cubic foot of capacity. Prior to year 2000, the water factor for a typical new residential clothes washer was about 12. In March 2015, the federal standard reduced the maximum water factor for top- and front-loading machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for top-loading machines will be further reduced to 6.5. For commercial washers, the maximum water factors were reduced

in 2010 to 8.5 and 5.5 for top- and front-loading machines, respectively. Beginning in 2015, the maximum water factor for Energy Star® certified washers was 3.7 for front-loading and 4.3 for top-loading machines. In 2011, the Environmental Protection Agency (EPA) estimated that Energy Star® washers comprised more that 60% of the residential market and 30% of the commercial market (Energy Star®, 2011). A new Energy Star® compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s.

### State Building Code – 2015 CALGreen

The 2015 CALGreen requirements effect all new development in the State of California after July 1, 2015.[3] The DSS Model includes the CALGreen requirements that effect all new development in the State of California after July 1, 2015. The DSS Model modeled water savings from the CALGreen building code by adding Multi-family and Commercial customer categories as appropriate to applicable conservation measures.

### State Plumbing Code – AB 715

Plumbing codes for toilets, urinals, showerheads, and faucets were initially adopted by California in 1991, mandating the sale and use of ultra-low flush 1.6 gallon per flush (gpf) toilets (ULFTs), 1 gpf urinals, and low-flow showerheads and faucets. California Code of Regulations Title 20 California State Law (AB 715) required High Efficiency Toilets and High Efficiency Urinals be exclusively sold in the state by 2014. Effective January 1, 2014, Assembly Bill (AB) 715 (enacted in 2007) required that toilets and urinals sold and installed in California cannot have flush ratings exceeding 1.28 and 0.5 gallons per flush, respectively.

### California State Law – SB 407

SB 407 addresses plumbing fixture retrofits on resale or remodel. The DSS Model carefully takes into account the overlap with SB 407, the plumbing code (natural replacement), CALGreen, AB 715 and rebate programs (such as toilet rebates). SB 407 (enacted in 2009) requires that properties built prior to 1994 be fully retrofitted with water conserving fixtures by the year 2017 for single-family residential houses and 2019 for multifamily and commercial properties. SB 407 program length is variable and continues until all the older high flush toilets have been replaced the service area. The number of accounts with high flow fixtures is tracked to make sure that the situation of replacing more high flow fixtures than actually exist does not occur. SB 837 (enacted in 2011) requires that sellers of real property disclose on their Real Estate Transfer Disclosure Statement whether their property complies with these requirements. Additionally, SB 407 conditions issuance of building permits for major improvements and renovations upon retrofit of non-compliant plumbing fixtures. Each of these laws is intended to accelerate the replacement of older, low efficiency plumbing fixtures, and ensure that only high-efficiency fixtures are installed in new residential and commercial buildings.

### 2015 CALGreen and 2015 CA Code of Regulations Title 20 Appliance Efficiency Regulations

Fixture characteristics in the DSS Model are tracked in new accounts, which are subject to the requirements of the 2015 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. The CEC 2015 appliance efficiency standards applies to the following new appliances, if they are sold in California: showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, commercial pre-rinse spray valves, urinals, and toilets. The DSS Model accounts for plumbing code savings due to these standards effects on showerheads, faucets and aerators, urinals, and toilets.

[3] More information on the California Building Standards Commission reference documents are available online: http://www.bsc.ca.gov/pubs/bullet.aspx

- Showerheads: July 2016: 2.0 gpm; July 2018: 1.8 gpm
- Wall Mounted Urinals: 2016: 0.125 (pint) gpf
- Lavatory Faucets and Aerator: July 2016: 1.2 gpm at 60 psi
- Kitchen Faucets and Aerator: July 2016: 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi
- Public Lavatory Faucets: July 2016: 0.5 gpm at 60 psi

In summary, the controlling law for **toilets** is Assembly Bill (AB) 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California beginning January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California beginning January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high-efficiency (0.5 gpf) urinals starting in 2014.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. In March 2015, the federal standard reduced the maximum water factor for non-Energy Star® certified top- and front-loading washing machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for standard top-loading machines will be further reduced to 6.5.

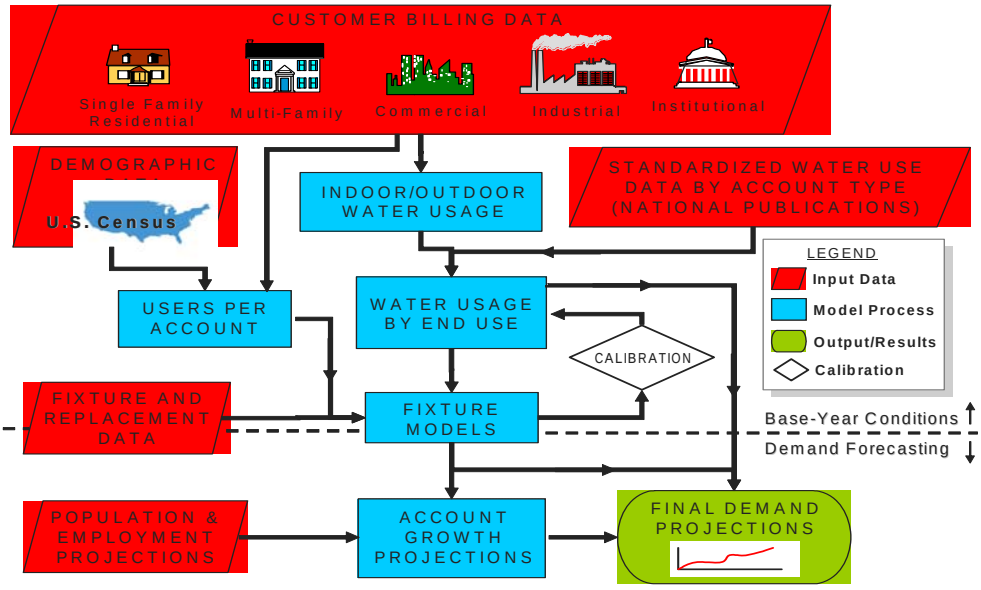
**Showerhead** flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gallons per minute (gpm) or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

**Faucet** flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucet/aerators sold or offered for sale on or after July 1, 2016 be 0.5 gpm at 60 psi, and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

Plumbing code related water savings are considered reliable, long-term savings, and can be counted on over time to help reduce the City's overall system water demand. The demand projections including plumbing code savings further assumes no active involvement by the water utility, and that the costs of purchasing and installing replacement equipment (and new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the Fixture Life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

The following figure conceptually describes how plumbing codes are incorporated into the flow of information in the DSS Model.

**Figure A-1. DSS Model Overview Used to Make Potable Water Demand Projections**




## DSS Model Fixture Replacement

The DSS Model is capable of modeling multiple types of fixtures, including fixtures with slightly different design standards. For example, currently toilets can be purchased that flush at a rate of 0.8 gallons per flush (gpf), 1.0 gallon per flush or 1.28 gallons per flush. The 1.6 gpf and higher gallons per flush toilets still exist but can no longer be purchased in California. Therefore, they cannot be used for replacement or new installation of a toilet. So, the DSS Model utilizes a fixture replacement table to decide what type of fixture should be installed when a fixture is replaced or a new fixture is installed. The replacement of the fixtures is listed as a percentage, as shown in the following figure. A value of 100% would indicate that all the toilets sold would be of one particular flush volume. A value of 75% means that three out of every four toilets installed would be of that particular flush volume type. The DSS Model contains a pair of replacement tables for each fixture type and customer category combination (i.e., Residential Single Family toilets, Residential Multifamily toilets, Commercial toilets, Residential clothes washing machines, Commercial washing machines, etc.).

In the following example, the DSS Model includes the effects of the Federal Policy Act and AB 715 on each toilet fixture type. This DSS Model feature determines the “saturation” of 1.6 gpf toilets as the Federal Policy Act was in effect from 1992-2014 for 1.6 gpf toilet replacements.

**Figure A-2. Toilet Replacement Percentages by Type of Toilet**

| Replacement Fixture Market Shares | | | | | |
|---|---|---|---|---|---|
| Year | 1.28 gpf HET Residential | 1.6 gpf ULFT Residential | High Use Toilet Residential | <1.0 gpf Toilet Residential | Total |
| 2012 | 75% | 25% | 0% | 0% | 100% |
| 2015 | 100% | 0% | 0% | 0% | 100% |
| 2020 | 90% | 0% | 0% | 10% | 100% |
| 2030 | 65% | 0% | 0% | 35% | 100% |
| 2040 | 50% | 0% | 0% | 50% | 100% |
| | | | | | |
| **New Fixture Market Shares** | | | | | |
| Year | 1.28 gpf HET Residential | 1.6 gpf ULFT Residential | High Use Toilet Residential | <1.0 gpf Toilet Residential | Total |
| 2012 | 100% | 0% | 0% | 0% | 100% |
| 2015 | 100% | 0% | 0% | 0% | 100% |
| 2020 | 90% | 0% | 0% | 10% | 100% |
| 2030 | 65% | 0% | 0% | 35% | 100% |
| 2040 | 50% | 0% | 0% | 50% | 100% |

## A.3 Basis for the Demand Forecast

In the City of Santa Cruz Water Demand Forecast, M.Cubed conducted an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. (M.Cubed, 2015) The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee. Its purpose was to update the Department's existing demand forecast adopted as part of the 2010 UWMP to reflect current information on water usage and to account for effects of current conservation, water rates, and other factors expected to impact the future demand for water. MWM's DSS Model incorporates this econometric analysis by inputting the regression equations and data sets used by M.Cubed and calibrated to ensure consistency between the two demand forecast models.

The City's DSS Model starts with a "baseline" demand forecast, which is not the same forecast as presented by M.Cubed. It differs in that it backs out the earlier estimates for plumbing code savings and the estimated future water saving associated with the City's current water conservation program that were provided by MWM to M.Cubed in 2015 and embedded in that final demand forecast. All other variables, including average water use per account, forecasts of account growth, and economic factors used to forecast water use in the M.Cubed report, were taken directly from that model and used to populate the DSS Model.

The following table compares the primary water demand forecast presented by M.Cubed without the code savings and program savings that were previously generated from the DSS Model analysis completed in October 2014 compared to the updated DSS "baseline" demand completed in February 2016.

**Table A-1. Comparison of M.Cubed Demand Forecast and DSS "Baseline" Forecast**

| Demand (MG) | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **M.Cubed Final Demand Forecast, September 2015** | 3,385 | 3,351 | 3,388 | 3,442 |
| **2014 Estimate of Plumbing Code Savings (prior DSS Model version)** | 65 | 132 | 197 | 235 |
| **2014 Estimate of Conservation Program Savings – Program "A" (prior DSS Model version)** | 110 | 143 | 139 | 134 |
| **M.Cubed Final Demand Forecast without Plumbing Code or Conservation Program Savings** | 3,560 | 3,626 | 3,724 | 3,811 |
| **DSS Model "Baseline" Demand** | 3,560 | 3,636 | 3,743 | 3,838 |
| **Difference, MG** | 0 | 10 | 19 | 27 |
| **Difference, %** | 0.0% | 0.3% | 0.5% | 0.7% |

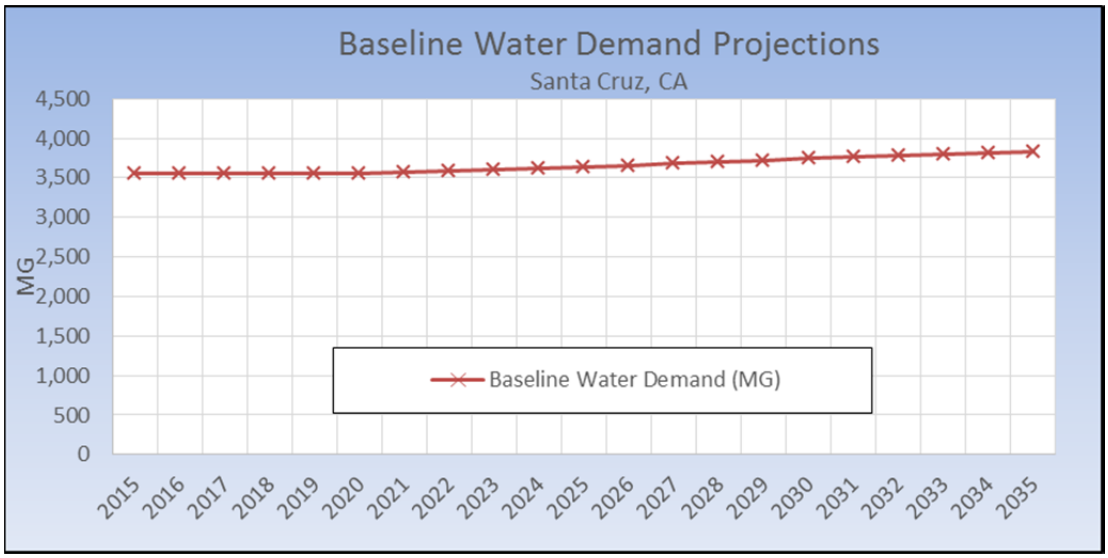
Note: Plumbing code and program savings (M.Cubed, 2015, Attachment 8) were originally based on results from the 2014 DSS Model work by Maddaus Water Management; they were updated with the most recent DSS Model results from February 2016.

As can be seen in the previous table, the two models are in close agreement and in all years differ by less than 1%.

The baseline demand forecast is shown in the following figure. As referenced in the 2015 M.Cubed report, the baseline forecast is predicated on average weather and normal economic conditions and is not expected to match realized demand, especially in the short term. City staff will continue to monitor production and consumption through and following the drought.

The next step involves calculating the effect of passive savings against the "baseline" demand. The results differ from previous estimates of plumbing code savings presented in 2014-15 for two reasons: 1) lower baseline demand and 2) additional passive savings due to recent changes in California codes resulting from 2015 emergency conservation regulations adopted in California, effective December 1, 2015 (after the publication of the M.Cubed report).

**Figure A-3. Baseline Demand Forecast Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

## A.4 Water Reduction Methodology

Each conservation measure targets a particular water use such as indoor single family water use. Targeted water uses are categorized by water user group and by end use. Targeted water user groups include single family residential, multifamily residential, commercial, industrial, and institutional (CII), etc. Measures may apply to more than one water user group. Targeted end uses include indoor and outdoor use. The targeted water use is important to identify because the water savings are generated from reductions in water use for the targeted end use. For example, a residential retrofit conservation measure targets single family and multifamily residential indoor use, and in some cases specifically shower use. When considering the water savings potential generated by a residential retrofit one considers the water saved by installing low-flow showerheads in single family and multifamily homes.

The market penetration goal for a measure is the extent to which the product or service related to the conservation measure occupies the potential market. In essence, the market penetration goal identifies how many fixtures, rebates, surveys, etc. the wholesale customer would have to offer or conduct over a period of time to reach its water savings goal for that conservation measure. This is often expressed in terms of the number of fixtures, rebates, surveys, etc. offered or conducted per year.

The potential for errors in market penetration goal estimates for each measure can be significant because they are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. The potential error can be corrected through re-evaluation of the measure as the implementation of the measure progresses. For example, if the market penetration required to achieve specific water savings turns out to be more or less than predicted, adjustments to the implementation efforts can be made. Larger rebates or additional promotions are often used to increase the market penetration. The process is iterative to reflect actual conditions and helps to ensure that market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

In contrast, market penetration for mandatory ordinances can be more predictable with the greatest potential for error occurring in implementing the ordinance change. For example, requiring dedicated irrigation meters for new accounts through an ordinance can assure an almost 100% market penetration for affected properties.

Water utilities are constantly looking at when a measure reaches saturation. Baseline surveys are the best approach to having the most accurate information on market saturation. This was taken into account when analyzing individual conservation measures where best estimates were made. MWM was not provided with any baseline surveys for this analysis, but discussions were held with the City staff regarding what their best estimates were for saturation for their service area.

## A.5 Perspectives on Benefits and Costs

The determination of the economic feasibility of water conservation programs involves comparing the costs of the programs to the benefits provided. This analysis was performed using the DSS Model developed by MWM. The DSS Model has received the endorsement of the California Urban Water Conservation Council, and calculates cost effectiveness of conservation measure savings at the end-use level; for example, the model determines the amount of water a toilet rebate program saves in daily toilet use for each single family account.

## A.6 Present Value Parameters

Present value analysis using constant FY 2015 dollars and a real discount rate of 2.25% is used to discount costs and benefits to the base year; this is based on a nominal interest rate of 4.5% and an assumed inflation rate of 2.2%. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in programs, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a program may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

Economic analysis can be performed from several different perspectives, based on which party is affected. For planning water use efficiency programs for utilities, the perspectives most commonly used for benefit-cost analyses are the "utility" perspective and the "community" perspective. The Utility Benefit-Cost Analysis is based on the benefits and costs to the water provider. The Community Benefit-Cost Analysis includes the utility benefit and costs together with account owner/customer benefits and costs. These include customer energy and other capital or operating cost benefits plus costs of implementing the measure, beyond what the utility pays.

The utility perspective offers two advantages. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving versus supplying increased quantities of water. Second, revenue shifts are treated as transfer payments, which means program participants will have lower water bills and non-participants will have slightly higher water bills so that the utility's revenue needs continue to be met. Therefore, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. It should be noted that there is a significant difference between the utility's savings from the avoided cost of procurement and delivery of water and the reduction in retail revenue that results from reduced water sales due to water use efficiency. This budget impact occurs slowly, and can be accounted for in water rate planning. Because it is the water provider's role in developing a water use efficiency plan that is vital in this study, the utility perspective was primarily used to evaluate elements of this report.

The community perspective is defined to include the utility and the customer costs and benefits. Costs incurred by customers striving to save water while participating in water use efficiency programs are considered, as well as the benefits received in terms of reduced energy bills (from water heating costs) and wastewater savings, among others. Water bill savings are not a customer benefit in the aggregate for reasons described above. Other factors external to the utility, such as environmental effects, are often difficult to quantify or are not necessarily under the control of the utility. They are therefore frequently excluded from economic analyses, including this one.

The time value of money is explicitly considered. Typically, the costs to save water occur early in the planning period whereas the benefits usually extend to the end of the planning period. A long planning period of 20-30 years is typically used because costs and benefits that occur beyond 2050 years have very little influence on the total present value of the costs and benefits. The value of all future costs and benefits is discounted to the first year in the DSS Model (the base year, which in this case is 2015), at the real interest rate of 2.25%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 4.5%) by the assumed rate of inflation (2.2%). The formula to calculate the real interest rate is: (nominal interest rate – assumed rate of inflation)/ (1 + assumed rate of inflation). Cash flows discounted in this manner are herein referred to as "Present Value" sums.

## A.7 Measure Assumptions Including Unit Costs, Water Savings, and Market Penetrations

Measure assumptions including unit costs, water savings and market penetrations were made for each measure.

- Targeted Water User Group End Use – Water user group (e.g., single family residential) and end use (e.g., indoor or outdoor water use).
- Utility Unit Cost – Cost of rebates, incentives, and contractors hired to implement measures. The assumed dollar values for the measure unit costs were closely reviewed by staff and are found to be adequate for each individual measure. The values in the majority of cases are in the range of what is currently offered by other water utilities in the region.
- Retail Customer Unit Cost – Cost for implementing measures that is paid by retail customers (i.e., the remainder of a measure's cost that is not covered by a utility rebate or incentive).
- Utility Administration and Marketing Cost – The cost to the utility for administering the measure, including consultant contract administration, marketing, and participant tracking. The mark-up is sufficient (in total) to cover conservation staff time and general expenses and overhead.

The unit costs vary according to the type of customer account and implementation method being addressed. For example, a measure might cost a different amount for a residential single family account than a residential multifamily

account, and for a rebate versus an ordinance requirement or a direct installation implementation method. Typically water utilities have found there are increased costs associated with achieving higher market saturation, such as more surveys per year. The DSS Model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

- Annual Utility Cost = Annual market penetration rate x total accounts in category x unit cost per account x (1+administration and marketing markup percentage)
- Annual Customer Cost = Annual number of participants x unit customer cost
- Annual Community Cost = Annual utility cost + annual customer cost

## A.8 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by the City. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. The model was run for 25 years, (each year between 2015 and 2035) to encompass the 10-year conservation planning period of 2015 to 2025. The model provides long range forecasted savings, with a focus on conservation measure implementation period of 10 years. Costs were spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

Lost revenue due to reduced water sales is not included as a cost because the conservation measures evaluated herein generally take effect over a span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations.

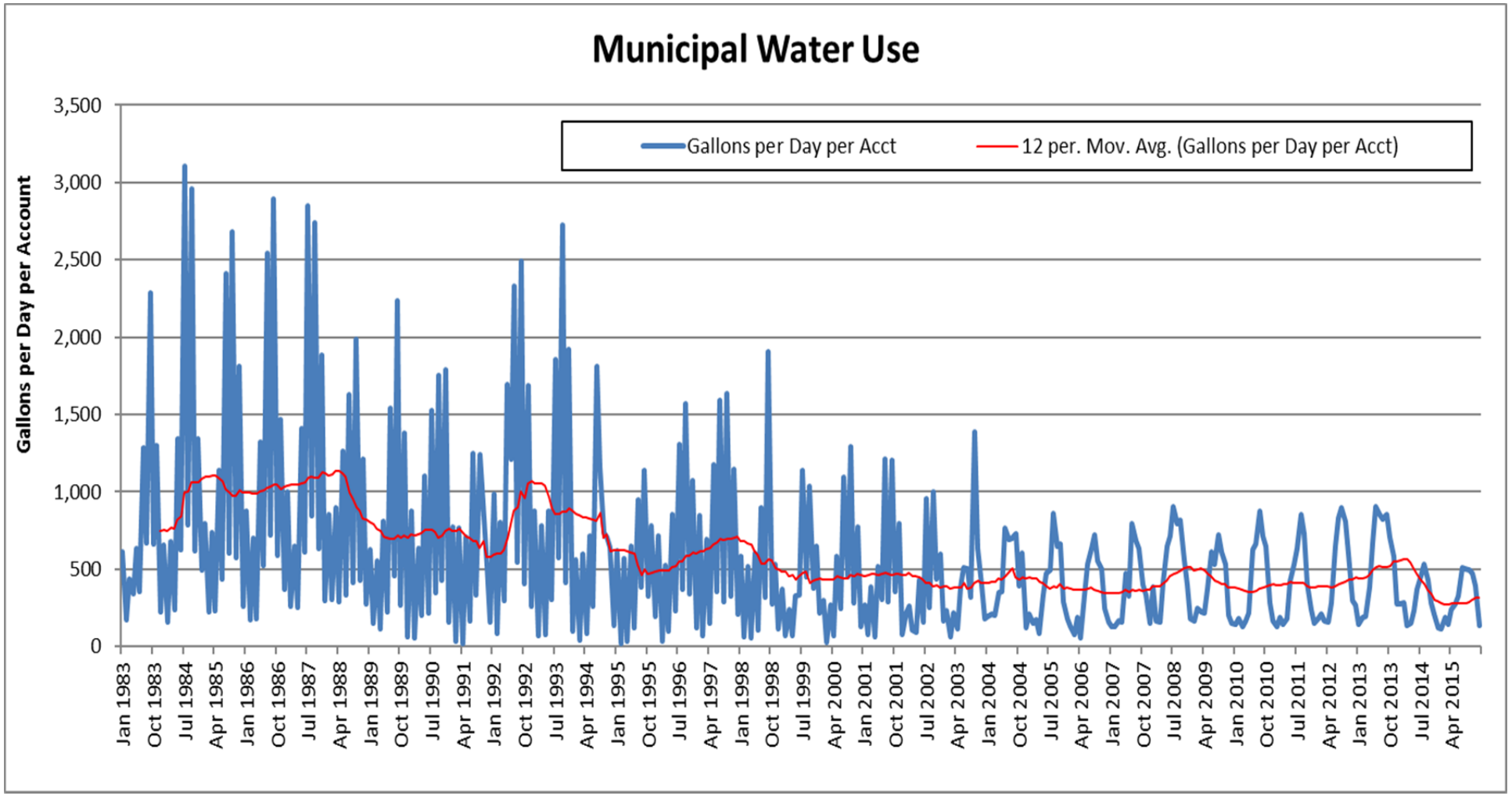
## A.9 Assumptions about Measure Savings

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur three to seven years after the start of implementation, depending upon the implementation schedule. For every conservation activity or replacement with more efficient devices, there is a useful life. The useful life is called the “Measure Life” and is defined to be how long conservation measure stays in place and continues to save water. It is assumed that measures implemented because of codes, standards or ordinances, like toilets for example, would be “permanent” and not revert to an old inefficient level of water use if the device needed to be replaced. However, some measures that are more behavioral based like residential surveys are assumed to need to be repeated on an ongoing basis to retain the water savings (e.g., homeowners move away and new homeowners may have less efficient water using practices around the home). Surveys typically have a measure life on the order of five years.

# APPENDIX B – HISTORICAL MONTHLY WATER USE PER ACCOUNT TYPE

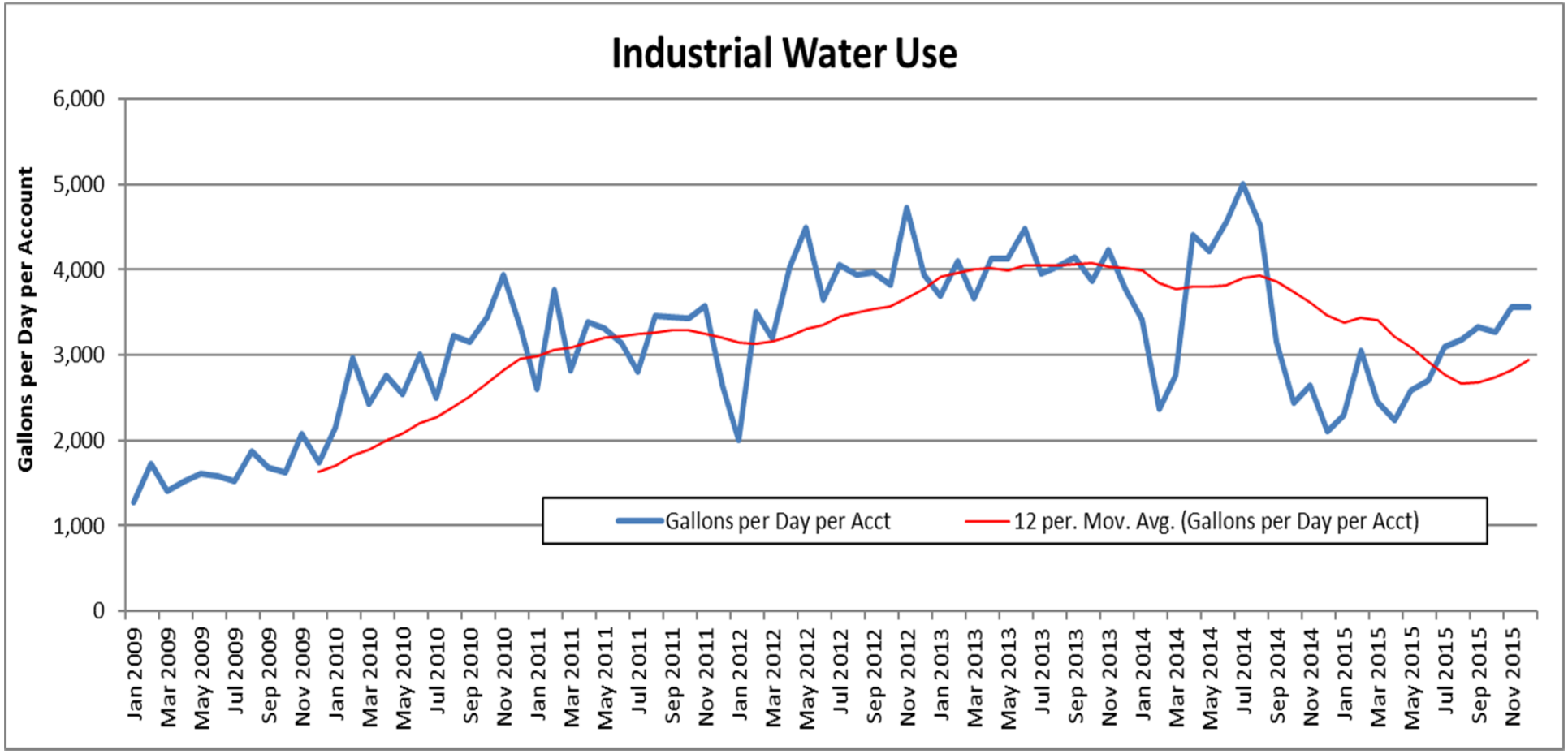
The average monthly usage per account per day for the four primary types of customers in the City are presented in the following figures.

**Figure B-1. Municipal Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

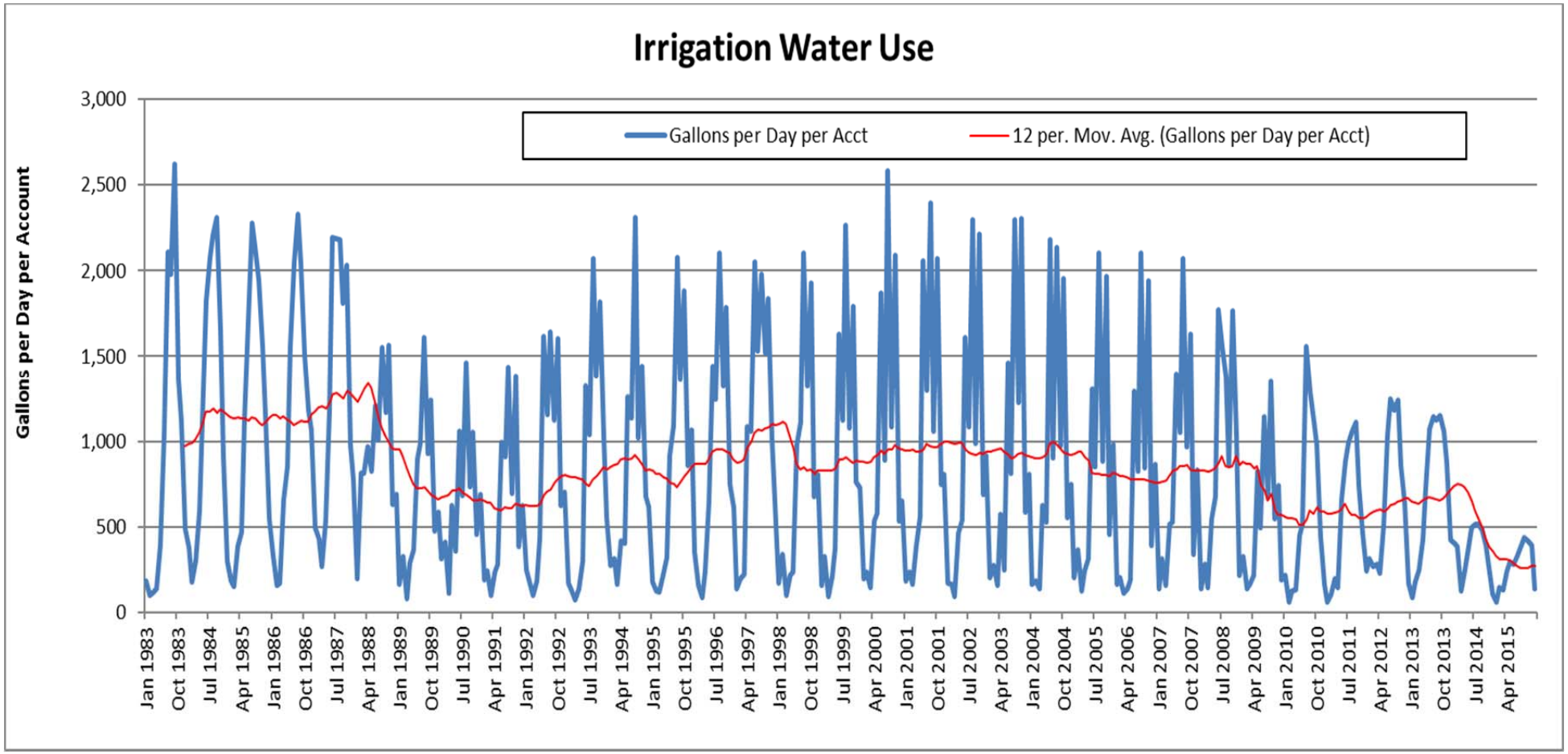
**Figure B-2. Industrial Consumption per Account per Day**




Notes:

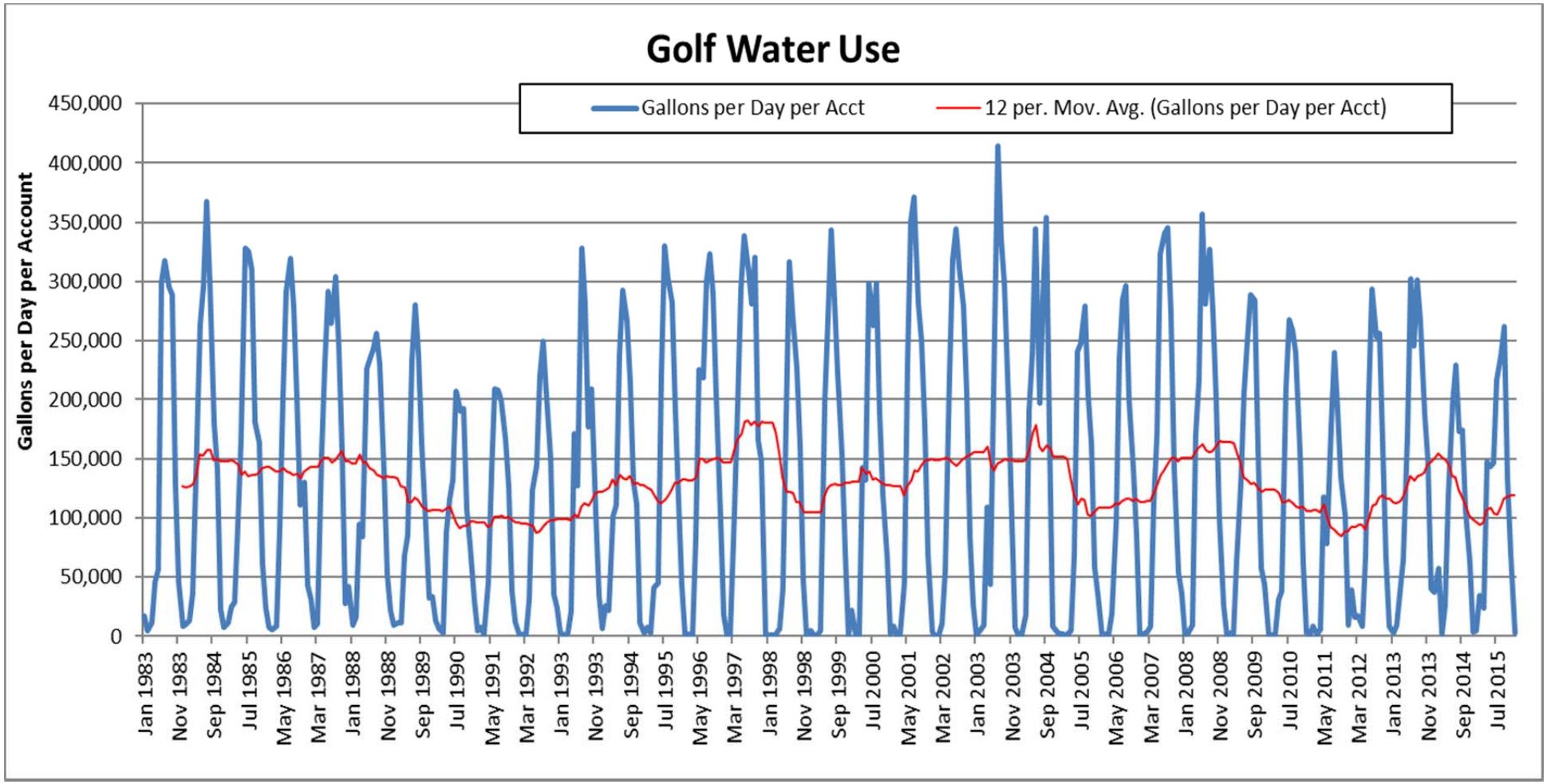
1. Industrial water use was not tracked as a separate customer category until 2009.
2. The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure B-3. Irrigation Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure B-4. Golf Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

# APPENDIX C – DSS MODELING ASSUMPTIONS FOR CONSERVATION MEASURES

**System Water Loss Reduction**

| Overview | |
|---|---|
| Name | System Water Loss Reduction |
| Abbr | 1 |
| Category | Default |
| Measure Type | Water Loss Measure |

| Time Period | |
|---|---|
| First Year | 2015 |

| Backlog Costs | |
|---|---|
| Total Backlog Work Costs | $1,000,000 |
| Years to Complete Backlog | 5 |

| Maintenance Costs | |
|---|---|
| Annual Maintenance Costs | $120,000 |

| Target | |
|---|---|
| Total GPCD Reduction | 0.9 |

**Description**

City of Santa Cruz's water losses are relatively low. This measure would seek to maintain low non-revenue water rates through controlling both apparent and real water losses. This would be annually tracked through the American Water Works Association (AWWA) Water Balance Water System Audit. The City's Distribution Department implements this measure.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.080377 |
| Lifetime Savings - Present Value ($) | |
| Utility | $1,210,408 |
| Community | $1,210,408 |
| Lifetime Costs - Present Value ($) | |
| Utility | $2,418,332 |
| Community | $2,418,332 |
| Benefit to Cost Ratio | |
| Utility | 0.50 |
| Community | 0.50 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $3,923 |

**Comments**

The savings is over the life of the program which is tied to the agency current Non Revenue Water (NRW) percentage which can be found in the GREEN "Non Revenue Water" portion of the DSS Model. "Annual Maintenance Costs" inputs allow for budget estimates for complete program. Additional water savings of "Non-Revenue Water" real water losses may be available when technically feasible. Rule of thumb is minimum system water losses below approximately 6% (as defined as the difference between production and consumption or alternatively as a percent of System Input Volume using AWWA Water System Audit definitions). For NRW below 6% (which can be found in the GREEN "Non Revenue Water" portion of the DSS Model), input "0%" for new real water savings and "$0" in the Backlog Cost section. For NRW above 6%, a GPCD savings input volume can be computed (an estimate of annual savings volume divided by total population). For example a 4.0 GPCD is equivalent to a 2% reduction for the system with a 150 GPCD water use. Additional Water Loss Control Program budget to achieve these water savings is inputted into the "Backlog Cost" section along with the duration of the years to accomplish the estimated reduction. In other words, $250,000 over 5 years would add $50,000 per year to assist with meeting NRW reduction goals.

| Costs | |
|---|---|
| | Utility |
| 2015 | $200,000 |
| 2016 | $200,000 |
| 2017 | $200,000 |
| 2018 | $200,000 |
| 2019 | $200,000 |
| 2020 | $120,000 |
| 2021 | $120,000 |
| 2022 | $120,000 |
| 2023 | $120,000 |
| 2024 | $120,000 |
| 2025 | $120,000 |
| 2026 | $120,000 |
| 2027 | $120,000 |
| 2028 | $120,000 |
| 2029 | $120,000 |
| 2030 | $120,000 |
| 2031 | $120,000 |
| 2032 | $120,000 |
| 2033 | $120,000 |
| 2034 | $120,000 |
| 2035 | $120,000 |

| Targets | |
|---|---|
| | Projected NRW Percent |
| 2015 | 7.3% |
| 2016 | 7.2% |
| 2017 | 7.0% |
| 2018 | 6.8% |
| 2019 | 6.6% |
| 2020 | 6.6% |
| 2021 | 6.6% |
| 2022 | 6.6% |
| 2023 | 6.6% |
| 2024 | 6.6% |
| 2025 | 6.6% |
| 2026 | 6.6% |
| 2027 | 6.6% |
| 2028 | 6.5% |
| 2029 | 6.5% |
| 2030 | 6.5% |
| 2031 | 6.5% |
| 2032 | 6.5% |
| 2033 | 6.5% |
| 2034 | 6.5% |
| 2035 | 6.5% |

| Water Savings | |
|---|---|
| | Total Savings |
| 2015 | 0.016188 |
| 2016 | 0.032660 |
| 2017 | 0.049417 |
| 2018 | 0.066457 |
| 2019 | 0.083782 |
| 2020 | 0.084493 |
| 2021 | 0.085209 |
| 2022 | 0.085926 |
| 2023 | 0.086643 |
| 2024 | 0.087360 |
| 2025 | 0.088077 |
| 2026 | 0.088820 |
| 2027 | 0.089562 |
| 2028 | 0.090305 |
| 2029 | 0.091048 |
| 2030 | 0.091791 |
| 2031 | 0.092539 |
| 2032 | 0.093287 |
| 2033 | 0.094035 |
| 2034 | 0.094783 |
| 2035 | 0.095532 |

**Advanced Metering Infrastructure**

| Overview | |
|---|---|
| Name | Advanced Metering Infrastructure |
| Abbr | 2 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $40.00 | $500.00 | 1 |
| MF | $40.00 | $500.00 | 1 |
| COM | $40.00 | $1,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Install or retrofit system with AMI meters and associated network capable of providing continuous consumption data to Utility offices. Improved identification of system and customer leaks is major conservation benefit. Some of costs of these systems are offset by operational efficiencies and reduced staffing, as regular meter reading and those for opening and closing accounts are accomplished without need for physical or drive-by meter reading. Also enables enhanced billing options and ability to monitor unauthorized usage (such as use/tampering with closed accounts or irrigation if time of day or days per week are regulated). Customer service is improved as staff can quickly access continuous usage records to address customer inquiries. Optional features include online customer access to their usage, which has been shown to improve accountability and reduce water use. Assume seven year change-out would be a reasonable objective based on City's past experience with AMR installation program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☑ | ☑ | ☑ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Basis for the starting value cost estimate is $540 per AMI unit where assumes (a) partial % cost share for the "utility" of estimated AMI (automatic meter infrastructure) retrofit cost of $40 with other water utility departments such as operations; and (b) model input for customer unit cost of $500 to cover the reminder of the total unit cost (assumed paid by rate revenue). Cost estimate includes leak repair for those customer-side leaks found and fixed. Cost estimate does not include service leak repair (assume included in Water Loss Control program).

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.048889 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $683,028 |
| Community | $683,028 |
| Lifetime Costs - Present Value ($) | |
| Utility | $475,949 |
| Community | $5,400,600 |
| Benefit to Cost Ratio | |
| Utility | 1.44 |
| Community | 0.13 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,269 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Internal Leakage | 50.0% |
| MF Internal Leakage | 50.0% |
| COM Internal Leakage | 50.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 3.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $40,977 | $424,451 | $465,428 |
| 2022 | $41,148 | $426,113 | $467,260 |
| 2023 | $41,318 | $427,774 | $469,092 |
| 2024 | $41,489 | $429,436 | $470,924 |
| 2025 | $41,659 | $431,098 | $472,757 |
| 2026 | $41,859 | $433,101 | $474,960 |
| 2027 | $42,058 | $435,104 | $477,163 |
| 2028 | $42,258 | $437,108 | $479,366 |
| 2029 | $42,457 | $439,111 | $481,568 |
| 2030 | $42,657 | $441,115 | $483,771 |
| 2031 | $42,838 | $443,013 | $485,851 |
| 2032 | $43,019 | $444,911 | $487,930 |
| 2033 | $43,200 | $446,809 | $490,009 |
| 2034 | $43,381 | $448,708 | $492,088 |
| 2035 | $43,562 | $450,606 | $494,167 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 586 | 87 | 59 | 732 |
| 2022 | 588 | 88 | 59 | 735 |
| 2023 | 591 | 88 | 59 | 738 |
| 2024 | 593 | 89 | 59 | 741 |
| 2025 | 596 | 89 | 59 | 744 |
| 2026 | 598 | 90 | 59 | 747 |
| 2027 | 600 | 91 | 60 | 751 |
| 2028 | 603 | 92 | 60 | 755 |
| 2029 | 605 | 93 | 60 | 758 |
| 2030 | 608 | 94 | 60 | 762 |
| 2031 | 610 | 94 | 61 | 765 |
| 2032 | 612 | 95 | 61 | 768 |
| 2033 | 615 | 96 | 61 | 771 |
| 2034 | 617 | 96 | 61 | 775 |
| 2035 | 619 | 97 | 62 | 778 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009004 |
| 2022 | 0.017903 |
| 2023 | 0.026695 |
| 2024 | 0.035380 |
| 2025 | 0.043958 |
| 2026 | 0.052397 |
| 2027 | 0.060755 |
| 2028 | 0.069042 |
| 2029 | 0.077267 |
| 2030 | 0.085434 |
| 2031 | 0.093598 |
| 2032 | 0.101719 |
| 2033 | 0.109803 |
| 2034 | 0.117853 |
| 2035 | 0.125872 |

**Large Landscape Budget-Based**

| Overview | |
|---|---|
| Name | Large Landscape Budget-Based W |
| Abbr | 3 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2020 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| IRR | $50.00 | $200.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as the size of the irrigated area and often vary seasonally to reflect weather during the billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). This measure would require rate study and capable billing software. Over time lower budgets to climate appropriate irrigation levels.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | | | | | | | | |
| Showers | | | | | | | | |
| Dishwashers | | | | | | | | |
| Clothes Washers | | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | | | | | | | | |
| Baths | | | | | | | | |
| Other | | | | | | | | |
| Irrigation | | | | | | | ☑ | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | | | | ☑ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | | | | | | | | |

**Comments**

Basis of water savings: Overwatering is about 30 MGY for all participants or about 12%. Education has dropped the use about 15 MGY and price and other measures should do the rest of 15 MGY or about 6% of this end use category.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.030986 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $460,424 |
| Community | $460,424 |
| Lifetime Costs - Present Value ($) | |
| Utility | $46,122 |
| Community | $169,115 |
| Benefit to Cost Ratio | |
| Utility | 9.98 |
| Community | 2.72 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $194 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| IRR Irrigation | 12.0% |
| IRR External Leakage | 0.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 36.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $16,046 | $42,790 | $58,837 |
| 2019 | $16,814 | $44,838 | $61,652 |
| 2020 | $17,582 | $46,885 | $64,467 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Accounts

| | IRR | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 214 | 214 |
| 2019 | 224 | 224 |
| 2020 | 234 | 234 |
| 2021 | 0 | 0 |
| 2022 | 0 | 0 |
| 2023 | 0 | 0 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.013868 |
| 2019 | 0.027587 |
| 2020 | 0.041137 |
| 2021 | 0.040711 |
| 2022 | 0.040289 |
| 2023 | 0.039872 |
| 2024 | 0.039459 |
| 2025 | 0.039051 |
| 2026 | 0.038642 |
| 2027 | 0.038238 |
| 2028 | 0.037838 |
| 2029 | 0.037442 |
| 2030 | 0.037050 |
| 2031 | 0.036663 |
| 2032 | 0.036279 |
| 2033 | 0.035900 |
| 2034 | 0.035524 |
| 2035 | 0.035153 |

**General Public Information**

| Overview | |
|---|---|
| Name | General Public Information |
| Abbr | 4 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 2 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $4.00 | $2.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Comprehensive education and public awareness campaign that would evolve over the years and seek to drive participation in other conservation programs. This measure includes support for the Landscape Water Budget & Water Use Reports and additional overall customer service and administrative support not specific to any particular conservation measure across the Water Department.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | | | | | | | |
| Showers | ☑ | | | | | | | |
| Dishwashers | ☑ | | | | | | | |
| Clothes Washers | ☑ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☑ | | | | | | | |
| Other | ☑ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Cost assumes SF category but impacts all customer classes. Basis of water savings: Assume baseline of 0.5% per year average single family home use. Utility costs are based on staffing support and education materials cost. Have website now.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.015759 |
| Lifetime Savings - Present Value ($) | |
| Utility | $247,012 |
| Community | $247,012 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,007,398 |
| Community | $1,343,197 |
| Benefit to Cost Ratio | |
| Utility | 0.25 |
| Community | 0.18 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $8,334 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 0.5% |
| SF Lavatory Faucets | 0.5% |
| SF Showers | 0.5% |
| SF Dishwashers | 0.5% |
| SF Clothes Washers | 0.5% |
| SF Internal Leakage | 0.5% |
| SF Baths | 0.5% |
| SF Other | 0.5% |
| SF Irrigation | 0.5% |
| SF Pools | 0.5% |
| SF Wash Down | 0.5% |
| SF Car Washing | 0.5% |
| SF External Leakage | 0.5% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 50.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $57,290 | $19,097 | $76,387 |
| 2016 | $57,506 | $19,169 | $76,674 |
| 2017 | $57,721 | $19,240 | $76,962 |
| 2018 | $57,937 | $19,312 | $77,249 |
| 2019 | $58,153 | $19,384 | $77,537 |
| 2020 | $58,368 | $19,456 | $77,824 |
| 2021 | $58,607 | $19,536 | $78,143 |
| 2022 | $58,846 | $19,615 | $78,461 |
| 2023 | $59,085 | $19,695 | $78,779 |
| 2024 | $59,323 | $19,774 | $79,098 |
| 2025 | $59,562 | $19,854 | $79,416 |
| 2026 | $59,806 | $19,935 | $79,741 |
| 2027 | $60,050 | $20,017 | $80,066 |
| 2028 | $60,293 | $20,098 | $80,391 |
| 2029 | $60,537 | $20,179 | $80,716 |
| 2030 | $60,781 | $20,260 | $81,041 |
| 2031 | $61,006 | $20,335 | $81,341 |
| 2032 | $61,231 | $20,410 | $81,642 |
| 2033 | $61,457 | $20,486 | $81,942 |
| 2034 | $61,682 | $20,561 | $82,243 |
| 2035 | $61,907 | $20,636 | $82,543 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 9,548 | 9,548 |
| 2016 | 9,584 | 9,584 |
| 2017 | 9,620 | 9,620 |
| 2018 | 9,656 | 9,656 |
| 2019 | 9,692 | 9,692 |
| 2020 | 9,728 | 9,728 |
| 2021 | 9,768 | 9,768 |
| 2022 | 9,808 | 9,808 |
| 2023 | 9,847 | 9,847 |
| 2024 | 9,887 | 9,887 |
| 2025 | 9,927 | 9,927 |
| 2026 | 9,968 | 9,968 |
| 2027 | 10,008 | 10,008 |
| 2028 | 10,049 | 10,049 |
| 2029 | 10,089 | 10,089 |
| 2030 | 10,130 | 10,130 |
| 2031 | 10,168 | 10,168 |
| 2032 | 10,205 | 10,205 |
| 2033 | 10,243 | 10,243 |
| 2034 | 10,280 | 10,280 |
| 2035 | 10,318 | 10,318 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.008488 |
| 2016 | 0.016847 |
| 2017 | 0.016736 |
| 2018 | 0.016623 |
| 2019 | 0.016507 |
| 2020 | 0.016389 |
| 2021 | 0.016329 |
| 2022 | 0.016271 |
| 2023 | 0.016211 |
| 2024 | 0.016148 |
| 2025 | 0.016084 |
| 2026 | 0.016020 |
| 2027 | 0.015964 |
| 2028 | 0.015914 |
| 2029 | 0.015869 |
| 2030 | 0.015830 |
| 2031 | 0.015797 |
| 2032 | 0.015766 |
| 2033 | 0.015738 |
| 2034 | 0.015714 |
| 2035 | 0.015694 |

**Public Information (Home Water**

| Overview | |
|---|---|
| Name | Public Information (Home Water |
| Abbr | 5 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $31.01 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Detailed Water Billing Reports for Customers with neighborhood use comparisons and suggestions on customer specific conservation actions. Use or pattern after WaterSmart software's program. Special emphasis and contact for high water users. Design to obtain 5% water savings overall.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | | | | | | | |
| Showers | ☑ | | | | | | | |
| Dishwashers | ☑ | | | | | | | |
| Clothes Washers | ☑ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☑ | | | | | | | |
| Other | ☑ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Water savings basis: WaterSmart states about 5% savings, City has lower per capita use which will result in less savings, however resulted to account 5% savings. Assume that targeting to the higher 20% of customer users would be sent a report and 4% will act on the billing report (20% over the 5 years respond). Utility costs are based on WaterSmart Software Program cost. Unit cost is assuming $6.20 per account responding and need to multiply by 5 to get to the 20% of accounts that receive a billing report.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.024235 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $360,158 |
| Community | $902,012 |
| Lifetime Costs - Present Value ($) | |
| Utility | $468,123 |
| Community | $468,123 |
| Benefit to Cost Ratio | |
| Utility | 0.77 |
| Community | 1.93 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $2,518 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 5.0% |
| SF Lavatory Faucets | 5.0% |
| SF Showers | 5.0% |
| SF Dishwashers | 5.0% |
| SF Clothes Washers | 5.0% |
| SF Internal Leakage | 5.0% |
| SF Baths | 5.0% |
| SF Other | 5.0% |
| SF Irrigation | 5.0% |
| SF Pools | 5.0% |
| SF Wash Down | 5.0% |
| SF Car Washing | 5.0% |
| SF External Leakage | 5.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 4.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $32,339 | $0 | $32,339 |
| 2019 | $32,460 | $0 | $32,460 |
| 2020 | $32,580 | $0 | $32,580 |
| 2021 | $32,713 | $0 | $32,713 |
| 2022 | $32,847 | $0 | $32,847 |
| 2023 | $32,980 | $0 | $32,980 |
| 2024 | $33,113 | $0 | $33,113 |
| 2025 | $33,246 | $0 | $33,246 |
| 2026 | $33,382 | $0 | $33,382 |
| 2027 | $33,518 | $0 | $33,518 |
| 2028 | $33,654 | $0 | $33,654 |
| 2029 | $33,791 | $0 | $33,791 |
| 2030 | $33,927 | $0 | $33,927 |
| 2031 | $34,052 | $0 | $34,052 |
| 2032 | $34,178 | $0 | $34,178 |
| 2033 | $34,304 | $0 | $34,304 |
| 2034 | $34,430 | $0 | $34,430 |
| 2035 | $34,555 | $0 | $34,555 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 772 | 772 |
| 2019 | 775 | 775 |
| 2020 | 778 | 778 |
| 2021 | 781 | 781 |
| 2022 | 785 | 785 |
| 2023 | 788 | 788 |
| 2024 | 791 | 791 |
| 2025 | 794 | 794 |
| 2026 | 797 | 797 |
| 2027 | 801 | 801 |
| 2028 | 804 | 804 |
| 2029 | 807 | 807 |
| 2030 | 810 | 810 |
| 2031 | 813 | 813 |
| 2032 | 816 | 816 |
| 2033 | 819 | 819 |
| 2034 | 822 | 822 |
| 2035 | 825 | 825 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.006662 |
| 2019 | 0.013206 |
| 2020 | 0.019630 |
| 2021 | 0.026028 |
| 2022 | 0.032351 |
| 2023 | 0.032227 |
| 2024 | 0.032101 |
| 2025 | 0.031975 |
| 2026 | 0.031847 |
| 2027 | 0.031734 |
| 2028 | 0.031634 |
| 2029 | 0.031547 |
| 2030 | 0.031470 |
| 2031 | 0.031407 |
| 2032 | 0.031351 |
| 2033 | 0.031301 |
| 2034 | 0.031256 |
| 2035 | 0.031216 |

**Residential Leak Assistance**

| Overview | |
|---|---|
| Name | Residential Leak Assistance |
| Abbr | 6 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $0.00 | 1 |
| MF | $500.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Customer leaks can go uncorrected at properties where owners are least able to pay costs of repair. These programs may require that customer leaks be repaired, but either subsidize part of the repair and/or pay the cost with revolving funds that are paid back with water bills over time. May also include an option to replace inefficient plumbing fixtures at low-income residences.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | ☑ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.046894 |
| Lifetime Savings - Present Value ($) | |
| Utility | $700,539 |
| Community | $700,539 |
| Lifetime Costs - Present Value ($) | |
| Utility | $761,305 |
| Community | $761,305 |
| Benefit to Cost Ratio | |
| Utility | 0.92 |
| Community | 0.92 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $2,117 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Internal Leakage | 595.0% |
| MF Internal Leakage | 549.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Comments**

Savings is difference between unrepaired and repaired leaks. Assumes SF accounts that have more than 100 gpd/acct leakage (MF>300 gpd/acct leakage) or more are eligible to participate (the savings percentage is estimate of 595% for SF and 549% for MF) is accounting for the fact that the "average internal leakage" of less than 10% (5.7 gpd) in the "average" home). Assuming that City pays 100% of costs for low income, utility costs are based on city checking with local plumbing contractors. Assuming that low income customers pay 0% and some cost share (like City bill credit on high bills) in the future may be considered for customers not in the PG&E Customer Care Program. For SF accts, up to $300 for leak repair or fixture replacement ($500 for MF accts.). Small faucet or toilet repair, irrigation expert to help with leak repair, or customer side service line leak. GreenPlumbers on retainer from a menu to do an upgrade. Assume $100-200 will be multi-family type repairs per dwelling unit, not per account. Cost will be multiplied by 5 for per account cost (average number of units per account), so $500 per MF acct.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $52,233 | $0 | $52,233 |
| 2019 | $52,505 | $0 | $52,505 |
| 2020 | $52,777 | $0 | $52,777 |
| 2021 | $53,013 | $0 | $53,013 |
| 2022 | $53,248 | $0 | $53,248 |
| 2023 | $53,484 | $0 | $53,484 |
| 2024 | $53,719 | $0 | $53,719 |
| 2025 | $53,955 | $0 | $53,955 |
| 2026 | $54,241 | $0 | $54,241 |
| 2027 | $54,527 | $0 | $54,527 |
| 2028 | $54,813 | $0 | $54,813 |
| 2029 | $55,099 | $0 | $55,099 |
| 2030 | $55,385 | $0 | $55,385 |
| 2031 | $55,632 | $0 | $55,632 |
| 2032 | $55,879 | $0 | $55,879 |
| 2033 | $56,127 | $0 | $56,127 |
| 2034 | $56,374 | $0 | $56,374 |
| 2035 | $56,621 | $0 | $56,621 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 111 |
| 2019 | 97 | 14 | 111 |
| 2020 | 97 | 14 | 112 |
| 2021 | 98 | 15 | 112 |
| 2022 | 98 | 15 | 113 |
| 2023 | 98 | 15 | 113 |
| 2024 | 99 | 15 | 114 |
| 2025 | 99 | 15 | 114 |
| 2026 | 100 | 15 | 115 |
| 2027 | 100 | 15 | 115 |
| 2028 | 100 | 15 | 116 |
| 2029 | 101 | 15 | 116 |
| 2030 | 101 | 16 | 117 |
| 2031 | 102 | 16 | 117 |
| 2032 | 102 | 16 | 118 |
| 2033 | 102 | 16 | 118 |
| 2034 | 103 | 16 | 119 |
| 2035 | 103 | 16 | 119 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.012965 |
| 2019 | 0.025658 |
| 2020 | 0.038078 |
| 2021 | 0.050471 |
| 2022 | 0.062699 |
| 2023 | 0.062475 |
| 2024 | 0.062224 |
| 2025 | 0.061947 |
| 2026 | 0.061614 |
| 2027 | 0.061333 |
| 2028 | 0.061101 |
| 2029 | 0.060913 |
| 2030 | 0.060767 |
| 2031 | 0.060674 |
| 2032 | 0.060587 |
| 2033 | 0.060505 |
| 2034 | 0.060425 |
| 2035 | 0.060348 |

**Single Family Residential Surveys**

| Overview | |
|---|---|
| Name | Single Family Residential Surveys |
| Abbr | 7 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $100.00 | $50.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Outdoor water surveys for existing single family residential customers. Assume survey is triggered for leak forgiveness application (average in 2015 was 700 account applications). Target those with high water use and provide a customized report to owner. May include give-away of efficient shower heads, aerators, toilet devices. Would include a basic outdoor survey (look for leaks, irrigation problems & schedule, plant information, etc.). Personalized outreach to high water users with periodic follow up to maintain savings as long as possible.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Target % considers pushing for more than 100 accounts per year. Utility cost based mainly on internal labor cost (2 hours of labor per survey) and some additional labor for short report. Customer costs based on customer cost to implement recommendations. Water savings based on results from Baseline Study to support conservation potential and CUWCC Cost and Savings Study, 2006.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.007075 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $108,353 |
| Community | $108,353 |
| Lifetime Costs - Present Value ($) | |
| Utility | $419,749 |
| Community | $587,649 |
| Benefit to Cost Ratio | |
| Utility | 0.26 |
| Community | 0.18 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $7,735 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Internal Leakage | 25.0% |
| SF Irrigation | 10.0% |
| SF Pools | 10.0% |
| SF Wash Down | 10.0% |
| SF Car Washing | 10.0% |
| SF External Leakage | 25.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $23,871 | $9,548 | $33,419 |
| 2016 | $23,961 | $9,584 | $33,545 |
| 2017 | $24,051 | $9,620 | $33,671 |
| 2018 | $24,140 | $9,656 | $33,797 |
| 2019 | $24,230 | $9,692 | $33,922 |
| 2020 | $24,320 | $9,728 | $34,048 |
| 2021 | $24,420 | $9,768 | $34,187 |
| 2022 | $24,519 | $9,808 | $34,327 |
| 2023 | $24,619 | $9,847 | $34,466 |
| 2024 | $24,718 | $9,887 | $34,605 |
| 2025 | $24,818 | $9,927 | $34,745 |
| 2026 | $24,919 | $9,968 | $34,887 |
| 2027 | $25,021 | $10,008 | $35,029 |
| 2028 | $25,122 | $10,049 | $35,171 |
| 2029 | $25,224 | $10,089 | $35,313 |
| 2030 | $25,325 | $10,130 | $35,455 |
| 2031 | $25,419 | $10,168 | $35,587 |
| 2032 | $25,513 | $10,205 | $35,718 |
| 2033 | $25,607 | $10,243 | $35,850 |
| 2034 | $25,701 | $10,280 | $35,981 |
| 2035 | $25,795 | $10,318 | $36,113 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 191 | 191 |
| 2016 | 192 | 192 |
| 2017 | 192 | 192 |
| 2018 | 193 | 193 |
| 2019 | 194 | 194 |
| 2020 | 195 | 195 |
| 2021 | 195 | 195 |
| 2022 | 196 | 196 |
| 2023 | 197 | 197 |
| 2024 | 198 | 198 |
| 2025 | 199 | 199 |
| 2026 | 199 | 199 |
| 2027 | 200 | 200 |
| 2028 | 201 | 201 |
| 2029 | 202 | 202 |
| 2030 | 203 | 203 |
| 2031 | 203 | 203 |
| 2032 | 204 | 204 |
| 2033 | 205 | 205 |
| 2034 | 206 | 206 |
| 2035 | 206 | 206 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001659 |
| 2016 | 0.003293 |
| 2017 | 0.004897 |
| 2018 | 0.006473 |
| 2019 | 0.008020 |
| 2020 | 0.007963 |
| 2021 | 0.007933 |
| 2022 | 0.007903 |
| 2023 | 0.007873 |
| 2024 | 0.007842 |
| 2025 | 0.007811 |
| 2026 | 0.007780 |
| 2027 | 0.007753 |
| 2028 | 0.007728 |
| 2029 | 0.007707 |
| 2030 | 0.007688 |
| 2031 | 0.007673 |
| 2032 | 0.007659 |
| 2033 | 0.007647 |
| 2034 | 0.007636 |
| 2035 | 0.007626 |

**Plumbing Fixture Giveaway/Opt**

| Overview | |
|---|---|
| Name | Plumbing Fixture Giveaway/Opt |
| Abbr | 8 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2017 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 25 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $12.00 | $0.00 | 2 |
| MF | $12.00 | $0.00 | 6 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

City would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. Need to coordinate this program with the School Education measure on retrofit kit giveaways to the same customer categories.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | ☑ | | | | | | |
| Showers | ☑ | ☑ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Assumes 2 kits per SF account and 6 kits per MF account. Utility Costs provided by BAWSCA for 1.8 gpm showerhead / 1.5 gpm aerator kit. Customer cost is to repair leaks or other minor costs. Current customer participation based on WCDB Residential retrofit kits measure record (2004-2013). Assume kits save 27.6% (reduced to be conservative).

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.005751 |
| Lifetime Savings - Present Value ($) | |
| Utility | $90,465 |
| Community | $310,044 |
| Lifetime Costs - Present Value ($) | |
| Utility | $65,222 |
| Community | $65,222 |
| Benefit to Cost Ratio | |
| Utility | 1.39 |
| Community | 4.75 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,479 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 6.9% |
| SF Showers | 6.9% |
| MF Lavatory Faucets | 6.9% |
| MF Showers | 6.9% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $22,093 | $0 | $22,093 |
| 2016 | $22,228 | $0 | $22,228 |
| 2017 | $22,364 | $0 | $22,364 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 477 | 68 | 546 |
| 2016 | 479 | 69 | 548 |
| 2017 | 481 | 70 | 551 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.002245 |
| 2016 | 0.004446 |
| 2017 | 0.006600 |
| 2018 | 0.006507 |
| 2019 | 0.006414 |
| 2020 | 0.006322 |
| 2021 | 0.006266 |
| 2022 | 0.006210 |
| 2023 | 0.006154 |
| 2024 | 0.006097 |
| 2025 | 0.006040 |
| 2026 | 0.005976 |
| 2027 | 0.005915 |
| 2028 | 0.005858 |
| 2029 | 0.005804 |
| 2030 | 0.005753 |
| 2031 | 0.005710 |
| 2032 | 0.005668 |
| 2033 | 0.005629 |
| 2034 | 0.005592 |
| 2035 | 0.005556 |

**Residential Ultra High Efficiency**

| Overview | |
|---|---|
| Name | Residential Ultra High Efficiency T |
| Abbr | 9 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2020 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $150.00 | $150.00 | 2 |
| MF | $150.00 | $150.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a rebate or voucher for the installation of an ultra high efficiency toilet (UHET). Toilets flushing less than 1.0 gpf and phase out inclusion of 1.28 gpf (dual flush) technology. Rebate amounts would reflect the incremental purchase cost and have been at least $150 for UHET. Phase out HETs over time to sunset by 2020.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Water savings calculated from fixture models based on flush volume HET vs. 1.6 gpf. Baseline study reports that 90% of toilets are 1.6 gpf. There are not many UHET models right now, but more are entering the market annually.
Consider: implementing a Retrofit on Resale.
Consider: Graduated rebate levels. Use averages in the model. Phase out $50 on HET and focus on $150 on UHET. Tie the HET Time of Sale connected to the 2019 sunset of that ordinance with the sunset of the HET rebate.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.007561 |
| Lifetime Savings - Present Value ($) | |
| Utility | $116,911 |
| Community | $116,911 |
| Lifetime Costs - Present Value ($) | |
| Utility | $308,293 |
| Community | $536,658 |
| Benefit to Cost Ratio | |
| Utility | 0.38 |
| Community | 0.22 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $5,316 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 37.5% |
| MF Toilets | 37.5% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $39,688 | $13,891 | $53,578 |
| 2016 | $39,902 | $13,966 | $53,868 |
| 2017 | $40,116 | $14,041 | $54,157 |
| 2018 | $40,331 | $14,116 | $54,446 |
| 2019 | $40,545 | $14,191 | $54,735 |
| 2020 | $40,759 | $14,266 | $55,025 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 210 | 55 | 265 |
| 2016 | 211 | 55 | 266 |
| 2017 | 212 | 56 | 267 |
| 2018 | 212 | 56 | 269 |
| 2019 | 213 | 57 | 270 |
| 2020 | 214 | 58 | 272 |
| 2021 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001592 |
| 2016 | 0.003154 |
| 2017 | 0.004682 |
| 2018 | 0.006176 |
| 2019 | 0.007637 |
| 2020 | 0.009065 |
| 2021 | 0.008984 |
| 2022 | 0.008904 |
| 2023 | 0.008823 |
| 2024 | 0.008741 |
| 2025 | 0.008660 |
| 2026 | 0.008567 |
| 2027 | 0.008479 |
| 2028 | 0.008397 |
| 2029 | 0.008320 |
| 2030 | 0.008247 |
| 2031 | 0.008184 |
| 2032 | 0.008125 |
| 2033 | 0.008069 |
| 2034 | 0.008015 |
| 2035 | 0.007964 |

**High Efficiency Clothes Washer**

| Overview | |
|---|---|
| Name | High Efficiency Clothes Washer Re |
| Abbr | 10 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2026 |
| Measure Length | 12 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $200.00 | $400.00 | 1 |
| MF | $200.00 | $400.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Provide a rebate for efficient washing machines to single family homes and in-unit condo/apartment complexes that do NOT have common laundry rooms. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology. This program would be similar to the City's current program. Rebate would be modified to increase incentive for the most efficient washers. Consider alternative delivery/financing mechanisms.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☑ | ☑ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Assumes PG&E program is ongoing. Water savings is calculated from fixture models based on washer volume. Allows participants to replace medium efficiency machines with high-efficiency ones. Customer pays incremental purchase and installation costs after rebate amount. Utility cost is based on the City's current rebate value doubled to increase participation.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.077760 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $1,168,045 |
| Community | $4,058,236 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,666,452 |
| Community | $4,047,097 |
| Benefit to Cost Ratio | |
| Utility | 0.70 |
| Community | 1.00 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $2,794 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Clothes Washers | 53.3% |
| MF Clothes Washers | 53.3% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.500% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $109,114 | $43,645 | $152,759 |
| 2016 | $109,633 | $43,853 | $153,486 |
| 2017 | $110,151 | $44,061 | $154,212 |
| 2018 | $110,670 | $44,268 | $154,938 |
| 2019 | $111,189 | $44,476 | $155,665 |
| 2020 | $111,708 | $44,683 | $156,391 |
| 2021 | $112,192 | $44,877 | $157,069 |
| 2022 | $112,676 | $45,070 | $157,747 |
| 2023 | $113,160 | $45,264 | $158,424 |
| 2024 | $113,644 | $45,458 | $159,102 |
| 2025 | $114,128 | $45,651 | $159,780 |
| 2026 | $114,685 | $45,874 | $160,559 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 477 | 68 | 546 |
| 2016 | 479 | 69 | 548 |
| 2017 | 481 | 70 | 551 |
| 2018 | 483 | 71 | 553 |
| 2019 | 485 | 71 | 556 |
| 2020 | 486 | 72 | 559 |
| 2021 | 488 | 73 | 561 |
| 2022 | 490 | 73 | 563 |
| 2023 | 492 | 73 | 566 |
| 2024 | 494 | 74 | 568 |
| 2025 | 496 | 74 | 571 |
| 2026 | 498 | 75 | 573 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.009766 |
| 2016 | 0.019343 |
| 2017 | 0.028708 |
| 2018 | 0.037867 |
| 2019 | 0.046817 |
| 2020 | 0.055560 |
| 2021 | 0.064449 |
| 2022 | 0.073211 |
| 2023 | 0.081845 |
| 2024 | 0.090347 |
| 2025 | 0.098717 |
| 2026 | 0.106819 |
| 2027 | 0.105710 |
| 2028 | 0.104668 |
| 2029 | 0.103686 |
| 2030 | 0.102758 |
| 2031 | 0.101967 |
| 2032 | 0.101217 |
| 2033 | 0.100504 |
| 2034 | 0.099825 |
| 2035 | 0.099177 |

**High Efficiency Clothes Washer - New**

| Overview | |
|---|---|
| Name | High Efficiency Clothes Washer - N |
| Abbr | 11 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $50.00 | $600.00 | 1 |
| MF | $50.00 | $600.00 | 1 |
| COM | $50.00 | $1,200.00 | 10 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Require developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons/load). Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. Verify that the Utility can enforce conditions of water service that may include efficiency standards for washing machines. Pattern after the North Marin Water District Program.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☑ | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Water savings based on new machines selected and paid for by developer (bearing the customer costs). Utility costs based on cost of inspection - City estimates the administrative costs of having a HECW code requirement as part of construction projects would be about $10,000 per year. This is based on 75-100 projects that would need plan review, customer contacts to explain requirements, inspections at the end of all projects, and all necessary interactions with Planning Department through the computer or by other means.

**Results**

| | |
|---|---|
| Average Water Savings (mgd) | |
| 0.012936 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $179,990 |
| Community | $657,587 |
| Lifetime Costs - Present Value ($) | |
| Utility | $135,761 |
| Community | $1,771,938 |
| Benefit to Cost Ratio | |
| Utility | 1.33 |
| Community | 0.37 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,368 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Clothes Washers | 53.3% |
| MF Clothes Washers | 53.3% |
| COM Clothes Washers | 53.3% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $10,035 | $113,944 | $123,979 |
| 2022 | $10,035 | $113,944 | $123,979 |
| 2023 | $10,035 | $113,944 | $123,979 |
| 2024 | $10,035 | $113,944 | $123,979 |
| 2025 | $10,035 | $113,944 | $123,979 |
| 2026 | $12,972 | $155,540 | $168,511 |
| 2027 | $12,972 | $155,540 | $168,511 |
| 2028 | $12,972 | $155,540 | $168,511 |
| 2029 | $12,972 | $155,540 | $168,511 |
| 2030 | $12,972 | $155,540 | $168,511 |
| 2031 | $13,475 | $172,034 | $185,509 |
| 2032 | $13,475 | $172,034 | $185,509 |
| 2033 | $13,475 | $172,034 | $185,509 |
| 2034 | $13,475 | $172,034 | $185,509 |
| 2035 | $13,475 | $172,034 | $185,509 |

**Targets**

View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 80 | 17 | 5 | 101 |
| 2022 | 80 | 17 | 5 | 101 |
| 2023 | 80 | 17 | 5 | 101 |
| 2024 | 80 | 17 | 5 | 101 |
| 2025 | 80 | 17 | 5 | 101 |
| 2026 | 81 | 30 | 7 | 119 |
| 2027 | 81 | 30 | 7 | 119 |
| 2028 | 81 | 30 | 7 | 119 |
| 2029 | 81 | 30 | 7 | 119 |
| 2030 | 81 | 30 | 7 | 119 |
| 2031 | 75 | 23 | 9 | 108 |
| 2032 | 75 | 23 | 9 | 108 |
| 2033 | 75 | 23 | 9 | 108 |
| 2034 | 75 | 23 | 9 | 108 |
| 2035 | 75 | 23 | 9 | 108 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.002097 |
| 2022 | 0.004156 |
| 2023 | 0.006178 |
| 2024 | 0.008162 |
| 2025 | 0.010109 |
| 2026 | 0.012870 |
| 2027 | 0.015576 |
| 2028 | 0.018230 |
| 2029 | 0.020838 |
| 2030 | 0.023402 |
| 2031 | 0.025638 |
| 2032 | 0.027848 |
| 2033 | 0.030033 |
| 2034 | 0.032195 |
| 2035 | 0.034334 |

**Hot Water On Demand - New Development**

| Overview | |
|---|---|
| Name | Hot Water On Demand - New Dev |
| Abbr | 12 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $25.00 | $600.00 | 3 |
| MF | $25.00 | $2,767.72 | 14 |
| COM | $25.00 | $2,940.19 | 15 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Work with developers and permitted remodels (of certain size or type) to equip new homes or buildings with efficient hot water on-demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | | | | | |
| Showers | ☑ | ☑ | ☑ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.004647 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $64,691 |
| Community | $223,009 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $279,776 |
| Community | $15,345,798 |
| **Benefit to Cost Ratio** | |
| Utility | 0.23 |
| Community | 0.01 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $7,849 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 11.6% |
| MF Lavatory Faucets | 11.6% |
| COM Lavatory Faucets | 11.6% |
| SF Showers | 11.6% |
| MF Showers | 11.6% |
| COM Showers | 11.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

**Comments**

Customer costs funded by developer and based on installation costs. Utility cost based on inspection cost. Target about 60 new SF homes per year for a total of 840 new homes inside the city by year 2030. Also an additional 2510 multi-family dwelling units by 2030. The number of fixtures per account is based on the number of bath and kitchen units. For MF accounts it's based on the ratio of dwelling units to accounts and assumes one bath unit and kitchen.

Water savings based on Jim Lutz paper and information from Gary Klein and David Grieshop. See spreadsheet titled "Hot Water On Demand Water Savings Estimate_2013", includes 1750 sq. ft. house, saves 1571 gallons per year or 4.3 gpd/acct and a total of 99.5 gpd per SF home, equates to ~4.3% savings per home. Based on a review of Single Family Home use for City of Santa Cruz customers at 30.6 gpd for faucet and 37.5 gpd for showers per household results in an equivalent savings of 12% on shower and faucet end use. Overall an estimated 7.45 gpd savings or 12% by MWM.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $20,454 | $1,003,809 | $1,024,263 |
| 2022 | $20,454 | $1,003,809 | $1,024,263 |
| 2023 | $20,454 | $1,003,809 | $1,024,263 |
| 2024 | $20,454 | $1,003,809 | $1,024,263 |
| 2025 | $20,454 | $1,003,809 | $1,024,263 |
| 2026 | $28,861 | $1,620,580 | $1,649,441 |
| 2027 | $28,861 | $1,620,580 | $1,649,441 |
| 2028 | $28,861 | $1,620,580 | $1,649,441 |
| 2029 | $28,861 | $1,620,580 | $1,649,441 |
| 2030 | $28,861 | $1,620,580 | $1,649,441 |
| 2031 | $25,673 | $1,430,279 | $1,455,952 |
| 2032 | $25,673 | $1,430,279 | $1,455,952 |
| 2033 | $25,673 | $1,430,279 | $1,455,952 |
| 2034 | $25,673 | $1,430,279 | $1,455,952 |
| 2035 | $25,673 | $1,430,279 | $1,455,952 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 80 | 17 | 5 | 101 |
| 2022 | 80 | 17 | 5 | 101 |
| 2023 | 80 | 17 | 5 | 101 |
| 2024 | 80 | 17 | 5 | 101 |
| 2025 | 80 | 17 | 5 | 101 |
| 2026 | 81 | 30 | 7 | 119 |
| 2027 | 81 | 30 | 7 | 119 |
| 2028 | 81 | 30 | 7 | 119 |
| 2029 | 81 | 30 | 7 | 119 |
| 2030 | 81 | 30 | 7 | 119 |
| 2031 | 75 | 23 | 9 | 108 |
| 2032 | 75 | 23 | 9 | 108 |
| 2033 | 75 | 23 | 9 | 108 |
| 2034 | 75 | 23 | 9 | 108 |
| 2035 | 75 | 23 | 9 | 108 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000764 |
| 2022 | 0.001513 |
| 2023 | 0.002249 |
| 2024 | 0.002972 |
| 2025 | 0.003680 |
| 2026 | 0.004665 |
| 2027 | 0.005630 |
| 2028 | 0.006577 |
| 2029 | 0.007506 |
| 2030 | 0.008420 |
| 2031 | 0.009199 |
| 2032 | 0.009969 |
| 2033 | 0.010730 |
| 2034 | 0.011482 |
| 2035 | 0.012227 |

**Toilet Retrofit at Time of Sale**

| Overview | |
|---|---|
| Name | Toilet Retrofit at Time of Sale |
| Abbr | 13 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2019 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $37.50 | $80.25 | 2 |
| MF | $37.50 | $75.00 | 4 |
| COM | $125.00 | $500.00 | 10 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Work with the real estate industry to require a certificate of compliance be submitted to the Utility that verifies that a plumber has inspected the property and efficient fixtures were either already there or were installed at time of sale (TOS).

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings assumes City's ordinance will sunset when Statewide Retrofit on Resale SB 407 goes active 2017 for residential and 2019 for commercial properties. Savings based on replacing a 3.5 gpf with a 1.28 gpf HET. Utility cost based on inspection costs. Customer costs based on purchase and installation costs. Long term housing turnover is about 2.7% per year. Commercial property turns over less frequently than residential. Fewer than 1 fixture per property is now being replaced under this ordinance. Will upgrade standard to become HET.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.023134 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $359,499 |
| Community | $359,499 |
| Lifetime Costs - Present Value ($) | |
| Utility | $268,930 |
| Community | $832,001 |
| Benefit to Cost Ratio | |
| Utility | 1.34 |
| Community | 0.43 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,516 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 63.0% |
| MF Toilets | 63.0% |
| COM Toilets | 63.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.850% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $55,676 | $116,610 | $172,286 |
| 2016 | $55,947 | $117,158 | $173,105 |
| 2017 | $56,218 | $117,706 | $173,924 |
| 2018 | $56,490 | $118,254 | $174,744 |
| 2019 | $56,761 | $118,802 | $175,563 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 162 | 23 | 16 | 202 |
| 2016 | 163 | 23 | 16 | 203 |
| 2017 | 164 | 24 | 16 | 204 |
| 2018 | 164 | 24 | 16 | 205 |
| 2019 | 165 | 24 | 16 | 206 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.005652 |
| 2016 | 0.011199 |
| 2017 | 0.016633 |
| 2018 | 0.021955 |
| 2019 | 0.027166 |
| 2020 | 0.026803 |
| 2021 | 0.026583 |
| 2022 | 0.026363 |
| 2023 | 0.026143 |
| 2024 | 0.025924 |
| 2025 | 0.025704 |
| 2026 | 0.025458 |
| 2027 | 0.025226 |
| 2028 | 0.025007 |
| 2029 | 0.024799 |
| 2030 | 0.024603 |
| 2031 | 0.024432 |
| 2032 | 0.024269 |
| 2033 | 0.024114 |
| 2034 | 0.023965 |
| 2035 | 0.023823 |

**CII MF Common Laundry Room**

| Overview | |
|---|---|
| Name | CII MF Common Laundry Room Hi |
| Abbr | 14 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2024 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $400.00 | $500.00 | 2 |
| COM | $400.00 | $500.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a $400 rebate for the installation of a high efficiency commercial washer (HEW) in CII and MF common area laundry. Rebate amounts would reflect the incremental purchase cost. Program will be shorter lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation. Currently, eligible for City's program, this is planned as an expanded measure.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☐ | ☐ | | | | | |
| Showers | | ☐ | ☐ | | | | | |
| Dishwashers | | ☐ | ☐ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☐ | ☐ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☐ | ☐ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☐ | ☐ | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Utility costs assume high-efficiency machine that's more expensive than a SF residential one. Customer costs based on installation costs. Engineering estimate of average savings, assume water factor is 25% less for replacement. Want on-site laundries for CII (hotels), spas, UCSC laundry, see page 49 of baseline survey. Start by considering a combination of a mandate and City funded clothes washer program for common laundry rooms that would accelerate retirement of old inefficient equipment for the next 5-10 years when codes will transform market.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| | 0.007058 |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $106,946 |
| Community | $427,131 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $230,548 |
| Community | $444,018 |
| **Benefit to Cost Ratio** | |
| Utility | 0.46 |
| Community | 0.96 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $4,258 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Clothes Washers | 53.3% |
| COM Clothes Washers | 53.3% |

**Targets**

| Target Method | Percentage |
|---|---|
| % of Accts Targeted / yr | 0.350% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $18,306 | $6,407 | $24,713 |
| 2016 | $18,442 | $6,455 | $24,897 |
| 2017 | $18,579 | $6,503 | $25,082 |
| 2018 | $18,716 | $6,550 | $25,266 |
| 2019 | $18,852 | $6,598 | $25,451 |
| 2020 | $18,989 | $6,646 | $25,635 |
| 2021 | $19,063 | $6,672 | $25,735 |
| 2022 | $19,138 | $6,698 | $25,836 |
| 2023 | $19,212 | $6,724 | $25,936 |
| 2024 | $19,286 | $6,750 | $26,036 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 19 | 27 | 46 |
| 2016 | 19 | 27 | 46 |
| 2017 | 20 | 27 | 46 |
| 2018 | 20 | 27 | 47 |
| 2019 | 20 | 27 | 47 |
| 2020 | 20 | 27 | 47 |
| 2021 | 20 | 27 | 48 |
| 2022 | 20 | 27 | 48 |
| 2023 | 21 | 27 | 48 |
| 2024 | 21 | 28 | 48 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000999 |
| 2016 | 0.001978 |
| 2017 | 0.002933 |
| 2018 | 0.003868 |
| 2019 | 0.004781 |
| 2020 | 0.005674 |
| 2021 | 0.006586 |
| 2022 | 0.007487 |
| 2023 | 0.008375 |
| 2024 | 0.009251 |
| 2025 | 0.009170 |
| 2026 | 0.009070 |
| 2027 | 0.008977 |
| 2028 | 0.008888 |
| 2029 | 0.008804 |
| 2030 | 0.008724 |
| 2031 | 0.008656 |
| 2032 | 0.008592 |
| 2033 | 0.008530 |
| 2034 | 0.008470 |
| 2035 | 0.008413 |

**CII Incentives**

| Overview | |
|---|---|
| Name | CII Incentives |
| Abbr | 15 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2026 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $500.00 | $1,500.00 | 1 |
| COM | $500.00 | $1,500.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

After the free water use survey has been completed at site, the Utility will analyze the recommendations on the findings report that is provided and determine if site qualifies for a financial incentive. Financial incentives will be provided after analyzing the cost-benefit ratio of each proposed project. Incentives are tailored to each individual site as each site has varying water savings potentials. Incentives will be granted at the sole discretion of the Utility while funding lasts.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☑ | ☑ | | | | | |
| Showers | | ☑ | ☑ | | | | | |
| Dishwashers | | ☑ | ☑ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☑ | ☑ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☑ | ☑ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☑ | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☑ | ☑ | | | | | |

**Comments**

Water savings based on engineering estimate of average savings for MF CII Facilities receiving an incentive. Assume targeting larger accounts with use above 5,000 gpd or the top 3% (about 200 accounts). Utility costs set-up similar to SNWA and EBMUD. Large accounts have moved down in use - efficiency has happened. Utility costs based on paying for $200 to help replace CII toilet. Currently, running about $22 per 1000 gals per year. Basis for cost sharing. Assume utility cost may triple as more expensive rebates are requested. Customer costs based on labor installation costs. This is a designer rebate or grant program that depends on viable projects documented in survey.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.031363 |
| Lifetime Savings - Present Value ($) | |
| Utility | $449,234 |
| Community | $1,482,337 |
| Lifetime Costs - Present Value ($) | |
| Utility | $128,134 |
| Community | $384,401 |
| Benefit to Cost Ratio | |
| Utility | 3.51 |
| Community | 3.86 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $533 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MF Toilets | 55.6% |
| COM Toilets | 71.4% |
| MF Lavatory Faucets | 55.6% |
| COM Lavatory Faucets | 71.4% |
| MF Showers | 55.6% |
| COM Showers | 71.4% |
| MF Dishwashers | 55.6% |
| COM Dishwashers | 71.4% |
| MF Clothes Washers | 55.6% |
| COM Clothes Washers | 71.4% |
| MF Internal Leakage | 55.6% |
| COM Internal Leakage | 71.4% |
| MF Irrigation | 55.6% |
| COM Irrigation | 71.4% |
| MF External Leakage | 55.6% |
| COM External Leakage | 71.4% |
| Non-Lavatory/Kitchen Fa | 55.6% |
| Non-Lavatory/Kitchen Fa | 71.4% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $25,531 | $51,062 | $76,593 |
| 2022 | $25,631 | $51,261 | $76,892 |
| 2023 | $25,730 | $51,460 | $77,190 |
| 2024 | $25,830 | $51,659 | $77,489 |
| 2025 | $25,929 | $51,858 | $77,787 |
| 2026 | $26,098 | $52,195 | $78,293 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 15 | 10 | 24 |
| 2022 | 15 | 10 | 24 |
| 2023 | 15 | 10 | 24 |
| 2024 | 15 | 10 | 25 |
| 2025 | 15 | 10 | 25 |
| 2026 | 15 | 10 | 25 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009326 |
| 2022 | 0.018534 |
| 2023 | 0.027627 |
| 2024 | 0.036605 |
| 2025 | 0.045468 |
| 2026 | 0.054144 |
| 2027 | 0.053614 |
| 2028 | 0.053111 |
| 2029 | 0.052634 |
| 2030 | 0.052179 |
| 2031 | 0.051791 |
| 2032 | 0.051420 |
| 2033 | 0.051064 |
| 2034 | 0.050722 |
| 2035 | 0.050393 |

**Pre-Rinse Spray Nozzle Installation**

| Overview | |
|---|---|
| Name | Pre-Rinse Spray Nozzle Installatio |
| Abbr | 16 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2016 |
| Measure Length | 2 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $100.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Provide free 1.3 gpm (or lower) spray nozzles and possibly free installation for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door, very cost-effective because saves hot water. Project completed in 2014.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | | ☐ | | | | | |
| Showers | | | ☐ | | | | | |
| Dishwashers | | | ☐ | | | | | |
| Clothes Washers | | | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☑ | | | | | |
| Internal Leakage | | | ☐ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☐ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | | ☐ | | | | | |

**Comments**

Water savings based on back calculation from the City's baseline survey; use 1.3 gpm Fisher. Scaled up end-use savings to allow for more savings on the average account. Only 2 year program. Using 7.2 scaling factor for the "average" CII customer does not have high enough demand for this end use, which therefore is estimated at 360% for this end use for restaurant customers only. Utility costs are based on $50 for valve, $50 for installation including door to distribution. Plan on about 200 sites with up to 300 valves in the service area. Renew every ten years.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.025722 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $405,820 |
| Community | $3,820,600 |
| Lifetime Costs - Present Value ($) | |
| Utility | $30,202 |
| Community | $30,202 |
| Benefit to Cost Ratio | |
| Utility | 13.44 |
| Community | 126.50 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $153 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Kitchen Spray Rins | 360.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 5.710% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $15,236 | $0 | $15,236 |
| 2016 | $15,303 | $0 | $15,303 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 109 | 109 |
| 2016 | 109 | 109 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 0 | 0 |
| 2022 | 0 | 0 |
| 2023 | 0 | 0 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.014123 |
| 2016 | 0.028031 |
| 2017 | 0.027754 |
| 2018 | 0.027485 |
| 2019 | 0.027224 |
| 2020 | 0.026969 |
| 2021 | 0.026818 |
| 2022 | 0.026673 |
| 2023 | 0.026531 |
| 2024 | 0.026395 |
| 2025 | 0.026262 |
| 2026 | 0.026130 |
| 2027 | 0.026002 |
| 2028 | 0.025877 |
| 2029 | 0.025756 |
| 2030 | 0.025638 |
| 2031 | 0.025522 |
| 2032 | 0.025408 |
| 2033 | 0.025298 |
| 2034 | 0.025190 |
| 2035 | 0.025084 |

CII Surveys

| Overview | |
|---|---|
| Name | CII Surveys |
| Abbr | 17 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2026 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $4,000.00 | $500.00 | 1 |
| COM | $4,000.00 | $500.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Offer top water customers from each category a professional water survey that would evaluate ways for the business to save water and money. The surveys would be for large accounts (accounts that use more than 5,000 gallons of water per day or the top 3%) such as hotels, restaurants, stores and schools. Emphasis will be on supporting the top 25 users for each customer category.

**Customer Classes**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☑ | ☑ | | | | | |
| Showers | | ☑ | ☑ | | | | | |
| Dishwashers | | ☑ | ☑ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☑ | ☑ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☑ | ☑ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☑ | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☑ | ☑ | | | | | |

**Comments**

Water savings based on CUWCC Cost and Savings Study (2005) report of potential savings ranging from 11 to 29%, assuming all projects are implemented. Assume 30% potential and 35% compliance, CUWCC Cost and Savings Study, 2005, page 2-66-68. Assume 10% due to survey only, rest of savings comes from participation in an incentive program. Assume shared savings between survey and incentives for overall 20% per facility. Targeting large accounts. Utility costs based on CUWCC Cost and Savings Study (2005) report of cost range from $600 to $8,000. Customer costs based on installation costs. Large CII users are already receiving landscape water use reports and surveys.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| | 0.032952 |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $472,192 |
| Community | $1,475,766 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $1,025,069 |
| Community | $1,110,492 |
| **Benefit to Cost Ratio** | |
| Utility | 0.46 |
| Community | 1.33 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $4,056 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Toilets | 71.4% |
| COM Toilets | 55.6% |
| MF Lavatory Faucets | 71.4% |
| COM Lavatory Faucets | 55.6% |
| MF Showers | 71.4% |
| COM Showers | 55.6% |
| MF Dishwashers | 71.4% |
| COM Dishwashers | 55.6% |
| MF Clothes Washers | 71.4% |
| COM Clothes Washers | 55.6% |
| MF Internal Leakage | 71.4% |
| COM Internal Leakage | 55.6% |
| MF Irrigation | 71.4% |
| COM Irrigation | 55.6% |
| MF External Leakage | 71.4% |
| COM External Leakage | 55.6% |
| Non-Lavatory/Kitchen Fa | 71.4% |
| Non-Lavatory/Kitchen Fa | 55.6% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $204,249 | $17,021 | $221,270 |
| 2022 | $205,045 | $17,087 | $222,132 |
| 2023 | $205,841 | $17,153 | $222,994 |
| 2024 | $206,636 | $17,220 | $223,856 |
| 2025 | $207,432 | $17,286 | $224,718 |
| 2026 | $208,780 | $17,398 | $226,179 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Accounts

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 15 | 10 | 24 |
| 2022 | 15 | 10 | 24 |
| 2023 | 15 | 10 | 24 |
| 2024 | 15 | 10 | 25 |
| 2025 | 15 | 10 | 25 |
| 2026 | 15 | 10 | 25 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009853 |
| 2022 | 0.019574 |
| 2023 | 0.029163 |
| 2024 | 0.038619 |
| 2025 | 0.047944 |
| 2026 | 0.057043 |
| 2027 | 0.056422 |
| 2028 | 0.055836 |
| 2029 | 0.055280 |
| 2030 | 0.054753 |
| 2031 | 0.054310 |
| 2032 | 0.053887 |
| 2033 | 0.053483 |
| 2034 | 0.053095 |
| 2035 | 0.052723 |

**High Efficiency Urinal Program**

| Overview | |
|---|---|
| Name | High Efficiency Urinal Program |
| Abbr | 18 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2018 |
| Measure Length | 4 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $300.00 | $200.00 | 2 |
| MUN | $300.00 | $200.00 | 2 |
| IND | $300.00 | $200.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a rebate or voucher for the installation of high efficiency urinals (HEU). Recent CEC requirements denote flushing as low as 0.125 gpf (1 pint).

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | ☐ | ☐ | | | |
| Urinals | | | ☑ | ☑ | ☑ | | | |
| Lavatory Faucets | | | ☐ | ☐ | ☐ | | | |
| Showers | | | ☐ | ☐ | ☐ | | | |
| Dishwashers | | | ☐ | ☐ | ☐ | | | |
| Clothes Washers | | | ☐ | ☐ | ☐ | | | |
| Process | | | ☐ | | ☐ | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | | | ☐ | ☐ | ☐ | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | ☐ | ☐ | | | |
| Irrigation | | | ☐ | ☐ | ☐ | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | | | ☐ | ☐ | ☐ | | | |

**Comments**

Water savings assumes 50% of urinal replacements use 1 gpf and up, and 50% are 0.5 and .25 gpf urinals being replaced with 0.125 gpf pint urinals. Baseline Survey found lower saturation in restaurants and office buildings. Schools were 100% high efficiency. Utility costs based on fixture cost. Customer costs based on installation costs. Comprehensive City, school, and other government buildings urinal replacement with 0.125 gpf or less. City could potentially fund 100% of costs.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.008515 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $132,704 |
| Community | $132,704 |
| Lifetime Costs - Present Value ($) | |
| Utility | $340,958 |
| Community | $509,333 |
| Benefit to Cost Ratio | |
| Utility | 0.39 |
| Community | 0.26 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $5,220 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Urinals | 80.0% |
| MUN Urinals | 80.0% |
| IND Urinals | 80.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 5.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $64,887 | $22,710 | $87,597 |
| 2016 | $65,143 | $22,800 | $87,943 |
| 2017 | $65,399 | $22,890 | $88,288 |
| 2018 | $65,655 | $22,979 | $88,634 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | COM | MUN | IND | Total |
|---|---|---|---|---|
| 2015 | 191 | 22 | 4 | 216 |
| 2016 | 191 | 22 | 4 | 217 |
| 2017 | 192 | 22 | 4 | 218 |
| 2018 | 193 | 22 | 4 | 219 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.002435 |
| 2016 | 0.004837 |
| 2017 | 0.007206 |
| 2018 | 0.009544 |
| 2019 | 0.009463 |
| 2020 | 0.009385 |
| 2021 | 0.009339 |
| 2022 | 0.009295 |
| 2023 | 0.009253 |
| 2024 | 0.009212 |
| 2025 | 0.009171 |
| 2026 | 0.009132 |
| 2027 | 0.009093 |
| 2028 | 0.009055 |
| 2029 | 0.009018 |
| 2030 | 0.008983 |
| 2031 | 0.008947 |
| 2032 | 0.008913 |
| 2033 | 0.008879 |
| 2034 | 0.008846 |
| 2035 | 0.008814 |

**Public Restroom Faucet Retrofit**

| Overview | |
|---|---|
| Name | Public Restroom Faucet Retrofit - |
| Abbr | 19 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2023 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MUN | $300.00 | $200.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Direct install of high efficiency (0.5 gpm) sensor faucet fixtures in all or selected high-use institutional buildings.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | ☐ | | | | |
| Urinals | | | | ☐ | | | | |
| Lavatory Faucets | | | | ☑ | | | | |
| Showers | | | | ☐ | | | | |
| Dishwashers | | | | ☐ | | | | |
| Clothes Washers | | | | ☐ | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | ☐ | | | | |
| Internal Leakage | | | | ☐ | | | | |
| Baths | | | | | | | | |
| Other | | | | ☐ | | | | |
| Irrigation | | | | ☐ | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | ☐ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | ☐ | | | | |
| tory/Kitchen Faucets | | | | ☐ | | | | |

**Comments**

Water savings based on reduction in flow rate from existing 2 gpm to 0.5 gpm or 75% reduction. Page 51 of Baseline Study. 2.2-1.5 gpm is basis. Measured by WaterWise. Customer costs based on installation costs. Utility costs based on a rebate for full fixture costs. No official limit on total number per site, but assume up to 6 per site. Schools and public beach restrooms.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.000554 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $8,077 |
| Community | $16,588 |
| Lifetime Costs - Present Value ($) | |
| Utility | $99,747 |
| Community | $149,005 |
| Benefit to Cost Ratio | |
| Utility | 0.08 |
| Community | 0.11 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $23,467 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MUN Lavatory Faucets | 75.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 11.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $38,848 | $19,184 | $58,032 |
| 2022 | $38,848 | $19,184 | $58,032 |
| 2023 | $38,848 | $19,184 | $58,032 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MUN | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 24 | 24 |
| 2022 | 24 | 24 |
| 2023 | 24 | 24 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000287 |
| 2022 | 0.000571 |
| 2023 | 0.000852 |
| 2024 | 0.000848 |
| 2025 | 0.000844 |
| 2026 | 0.000841 |
| 2027 | 0.000837 |
| 2028 | 0.000833 |
| 2029 | 0.000829 |
| 2030 | 0.000825 |
| 2031 | 0.000822 |
| 2032 | 0.000818 |
| 2033 | 0.000814 |
| 2034 | 0.000810 |
| 2035 | 0.000807 |

**Public Restroom Faucet Retrofit**

| Overview | |
|---|---|
| Name | Public Restroom Faucet Retrofit - |
| Abbr | 20 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2030 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $300.00 | $100.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Rebate Program for installation of high efficiency (0.5 gpm) sensor faucet fixtures in all or selected high-use commercial buildings.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | | ☑ | | | | | |
| Showers | | | ☐ | | | | | |
| Dishwashers | | | ☐ | | | | | |
| Clothes Washers | | | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | | ☐ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☐ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | | ☐ | | | | | |

**Comments**

Water savings based on reduction in flow rate from existing 2 gpm to 0.5 gpm or 75% reduction. Page 51 of Baseline Study. 2.2-1.5 gpm is basis. Measured by WaterWise. Customer costs based on installation costs. Utility costs based on a rebate for full fixture costs. No official limit on total number per site, but assume up to 6 per site. Large restaurants, spas, etc.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.011851 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $167,271 |
| Community | $386,622 |
| Lifetime Costs - Present Value ($) | |
| Utility | $889,040 |
| Community | $1,108,555 |
| Benefit to Cost Ratio | |
| Utility | 0.19 |
| Community | 0.35 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $9,780 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Lavatory Faucets | 75.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 3.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $110,722 | $27,339 | $138,061 |
| 2022 | $110,986 | $27,404 | $138,390 |
| 2023 | $111,250 | $27,469 | $138,719 |
| 2024 | $111,514 | $27,534 | $139,048 |
| 2025 | $111,778 | $27,599 | $139,377 |
| 2026 | $112,197 | $27,703 | $139,900 |
| 2027 | $112,616 | $27,806 | $140,423 |
| 2028 | $113,035 | $27,910 | $140,945 |
| 2029 | $113,455 | $28,013 | $141,468 |
| 2030 | $113,874 | $28,117 | $141,991 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 68 | 68 |
| 2022 | 69 | 69 |
| 2023 | 69 | 69 |
| 2024 | 69 | 69 |
| 2025 | 69 | 69 |
| 2026 | 69 | 69 |
| 2027 | 70 | 70 |
| 2028 | 70 | 70 |
| 2029 | 70 | 70 |
| 2030 | 70 | 70 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.002451 |
| 2022 | 0.004881 |
| 2023 | 0.007291 |
| 2024 | 0.009683 |
| 2025 | 0.012057 |
| 2026 | 0.014416 |
| 2027 | 0.016762 |
| 2028 | 0.019096 |
| 2029 | 0.021419 |
| 2030 | 0.023731 |
| 2031 | 0.023623 |
| 2032 | 0.023518 |
| 2033 | 0.023415 |
| 2034 | 0.023315 |
| 2035 | 0.023218 |

**School Retrofit**

| Overview | |
|---|---|
| Name | School Retrofit |
| Abbr | 21 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2030 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 27 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MUN | $2,500.00 | $2,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

School retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Expand current City Program, pattern after EBMUD and MWD programs. Promote to schools for cash flow upfront. Review Generation Water program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | ☑ | | | | |
| Urinals | | | | ☑ | | | | |
| Lavatory Faucets | | | | ☑ | | | | |
| Showers | | | | ☑ | | | | |
| Dishwashers | | | | ☐ | | | | |
| Clothes Washers | | | | ☐ | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | ☐ | | | | |
| Internal Leakage | | | | ☑ | | | | |
| Baths | | | | | | | | |
| Other | | | | ☐ | | | | |
| Irrigation | | | | ☑ | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | ☑ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | ☐ | | | | |
| tory/Kitchen Faucets | | | | ☐ | | | | |

**Comments**

Water savings based on doing two schools per year and assuming a reduction in use of 25% below a current use of 3,000 gpd. Costs assume $5,000 split 50:50 between customer and City. Might have to couple with survey of school sites first, and a landscape survey.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.004042 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $56,200 |
| Community | $56,200 |
| Lifetime Costs - Present Value ($) | |
| Utility | $58,362 |
| Community | $101,593 |
| Benefit to Cost Ratio | |
| Utility | 0.96 |
| Community | 0.55 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,883 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MUN Toilets | 88.2% |
| MUN Urinals | 88.2% |
| MUN Lavatory Faucets | 88.2% |
| MUN Showers | 88.2% |
| MUN Internal Leakage | 88.2% |
| MUN Irrigation | 88.2% |
| MUN External Leakage | 88.2% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $7,358 | $5,450 | $12,808 |
| 2022 | $7,358 | $5,450 | $12,808 |
| 2023 | $7,358 | $5,450 | $12,808 |
| 2024 | $7,358 | $5,450 | $12,808 |
| 2025 | $7,358 | $5,450 | $12,808 |
| 2026 | $7,358 | $5,450 | $12,808 |
| 2027 | $7,358 | $5,450 | $12,808 |
| 2028 | $7,358 | $5,450 | $12,808 |
| 2029 | $7,358 | $5,450 | $12,808 |
| 2030 | $7,358 | $5,450 | $12,808 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MUN | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 2 | 2 |
| 2022 | 2 | 2 |
| 2023 | 2 | 2 |
| 2024 | 2 | 2 |
| 2025 | 2 | 2 |
| 2026 | 2 | 2 |
| 2027 | 2 | 2 |
| 2028 | 2 | 2 |
| 2029 | 2 | 2 |
| 2030 | 2 | 2 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000841 |
| 2022 | 0.001675 |
| 2023 | 0.002502 |
| 2024 | 0.003321 |
| 2025 | 0.004132 |
| 2026 | 0.004936 |
| 2027 | 0.005732 |
| 2028 | 0.006521 |
| 2029 | 0.007303 |
| 2030 | 0.008077 |
| 2031 | 0.008041 |
| 2032 | 0.008004 |
| 2033 | 0.007967 |
| 2034 | 0.007931 |
| 2035 | 0.007895 |

**Water Efficient Landscape Ordinance**

## Overview

| | |
|---|---|
| Name | Water Efficient Landscape Ordinance |
| Abbr | 22 |
| Category | Default |
| Measure Type | Standard Measure |

## Time Period

| | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

## Measure Life

| | |
|---|---|
| Permanent | ☐ |
| Years | 27 |
| Repeat | ☐ |

## Fixture Costs

| | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $0.00 | $0.00 | 0 |
| MF | $50.00 | $1,000.00 | 1 |
| COM | $100.00 | $2,500.00 | 1 |
| MUN | $100.00 | $2,500.00 | 1 |
| IND | $100.00 | $2,500.00 | 1 |

## Administration Costs

| | |
|---|---|
| Markup Percentage | 35% |

## Description

Include less irrigation demand for new accounts due to more efficient landscape designs because of City Code (implementation of Statewide Model Landscape Ordinance). Update City Code to keep pace with new state regulations and technology for irrigation controllers and irrigation equipment. Updated MWELO based on changes Dec 1, 2015. City changes are pending as of January 31, 2016.

## Customer Classes

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

## End Uses

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Urinals | | | ☐ | ☐ | ☐ | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Process | | | ☐ | | ☐ | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |

## Comments

Water savings based on native landscaping (Xeriscape) over efficiently irrigated turf grass per City Code Chapter 16.16.
http://www.cityofsantacruz.com
Utility costs based on application and inspection. Customer costs based on Xeriscape replacing turf. Based on ordinance limit of 2,500 square feet. Assumed increased by 10% savings and added in single family homes to new Ordiance.

## Results

| | |
|---|---|
| Average Water Savings (mgd) | |
| 0.010291 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $149,120 |
| Community | $149,120 |
| Lifetime Costs - Present Value ($) | |
| Utility | $47,531 |
| Community | $816,763 |
| Benefit to Cost Ratio | |
| Utility | 3.14 |
| Community | 0.18 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $602 |

## End Use Savings Per Replacement

| | % Savings per Account |
|---|---|
| MF Irrigation | 35.0% |
| COM Irrigation | 35.0% |
| MUN Irrigation | 35.0% |
| IND Irrigation | 35.0% |
| SF Irrigation | 0.0% |

## Targets

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

## Costs

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $3,306 | $53,245 | $56,551 |
| 2016 | $3,306 | $53,245 | $56,551 |
| 2017 | $3,306 | $53,245 | $56,551 |
| 2018 | $3,306 | $53,245 | $56,551 |
| 2019 | $3,306 | $53,245 | $56,551 |
| 2020 | $3,306 | $53,245 | $56,551 |
| 2021 | $1,841 | $29,782 | $31,623 |
| 2022 | $1,841 | $29,782 | $31,623 |
| 2023 | $1,841 | $29,782 | $31,623 |
| 2024 | $1,841 | $29,782 | $31,623 |
| 2025 | $1,841 | $29,782 | $31,623 |
| 2026 | $3,067 | $49,253 | $52,320 |
| 2027 | $3,067 | $49,253 | $52,320 |
| 2028 | $3,067 | $49,253 | $52,320 |
| 2029 | $3,067 | $49,253 | $52,320 |
| 2030 | $3,067 | $49,253 | $52,320 |
| 2031 | $2,853 | $47,046 | $49,899 |
| 2032 | $2,853 | $47,046 | $49,899 |
| 2033 | $2,853 | $47,046 | $49,899 |
| 2034 | $2,853 | $47,046 | $49,899 |
| 2035 | $2,853 | $47,046 | $49,899 |

## Targets

View: Accounts

| | SF | MF | COM | MUN | IND | Total |
|---|---|---|---|---|---|---|
| 2015 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2016 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2017 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2018 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2019 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2020 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2021 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2022 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2023 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2024 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2025 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2026 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2027 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2028 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2029 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2030 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2031 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2032 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2033 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2034 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2035 | 75 | 23 | 9 | 0 | 0 | 108 |

## Water Savings (mgd)

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001258 |
| 2016 | 0.002477 |
| 2017 | 0.003655 |
| 2018 | 0.004795 |
| 2019 | 0.005897 |
| 2020 | 0.006962 |
| 2021 | 0.007582 |
| 2022 | 0.008191 |
| 2023 | 0.008789 |
| 2024 | 0.009376 |
| 2025 | 0.009952 |
| 2026 | 0.010882 |
| 2027 | 0.011797 |
| 2028 | 0.012696 |
| 2029 | 0.013582 |
| 2030 | 0.014454 |
| 2031 | 0.015230 |
| 2032 | 0.015998 |
| 2033 | 0.016759 |
| 2034 | 0.017513 |
| 2035 | 0.018260 |

**Single Family Residential Turf Removal**

| Overview | |
|---|---|
| Name | Single Family Residential Turf Rem |
| Abbr | 23 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $1,000.00 | $2,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide a per-square-foot incentive to remove turf and replace with low-water-use plants or permeable hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed and capped at $500 for single family residence. Increase rebate to $1 per square foot or more and raise maximum to $1,000 or more to increase participation.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Estimated water savings are 19 gallons per square foot. CUWCC Cost and Savings Study (2005) reports up to 39% savings in summer. Assume 50% of landscaping removed and replaced with low water use that uses 50% less water so overall irrigation savings may be on the order of 35% (documented up to maximum of 38%). Note some system efficiency/residual overwatering may still occur. Costs assume $3/per square foot. Net cost to customer is $2/square foot for 1,000 square feet.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.006175 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $88,847 |
| Community | $88,847 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,049,373 |
| Community | $2,728,369 |
| Benefit to Cost Ratio | |
| Utility | 0.08 |
| Community | 0.03 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $22,157 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 35.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.250% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $47,742 | $11,935 | $59,677 |
| 2016 | $47,921 | $11,980 | $59,902 |
| 2017 | $48,101 | $12,025 | $60,126 |
| 2018 | $48,281 | $12,070 | $60,351 |
| 2019 | $48,460 | $12,115 | $60,576 |
| 2020 | $48,640 | $12,160 | $60,800 |
| 2021 | $48,839 | $12,210 | $61,049 |
| 2022 | $49,038 | $12,260 | $61,298 |
| 2023 | $49,237 | $12,309 | $61,546 |
| 2024 | $49,436 | $12,359 | $61,795 |
| 2025 | $49,635 | $12,409 | $62,044 |
| 2026 | $49,838 | $12,460 | $62,298 |
| 2027 | $50,041 | $12,510 | $62,552 |
| 2028 | $50,244 | $12,561 | $62,805 |
| 2029 | $50,447 | $12,612 | $63,059 |
| 2030 | $50,651 | $12,663 | $63,313 |
| 2031 | $50,838 | $12,710 | $63,548 |
| 2032 | $51,026 | $12,757 | $63,783 |
| 2033 | $51,214 | $12,803 | $64,017 |
| 2034 | $51,402 | $12,850 | $64,252 |
| 2035 | $51,589 | $12,897 | $64,487 |

**Targets**

View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 48 | 48 |
| 2016 | 48 | 48 |
| 2017 | 48 | 48 |
| 2018 | 48 | 48 |
| 2019 | 48 | 48 |
| 2020 | 49 | 49 |
| 2021 | 49 | 49 |
| 2022 | 49 | 49 |
| 2023 | 49 | 49 |
| 2024 | 49 | 49 |
| 2025 | 50 | 50 |
| 2026 | 50 | 50 |
| 2027 | 50 | 50 |
| 2028 | 50 | 50 |
| 2029 | 50 | 50 |
| 2030 | 51 | 51 |
| 2031 | 51 | 51 |
| 2032 | 51 | 51 |
| 2033 | 51 | 51 |
| 2034 | 51 | 51 |
| 2035 | 52 | 52 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000612 |
| 2016 | 0.001214 |
| 2017 | 0.001806 |
| 2018 | 0.002387 |
| 2019 | 0.002957 |
| 2020 | 0.003517 |
| 2021 | 0.004080 |
| 2022 | 0.004636 |
| 2023 | 0.005185 |
| 2024 | 0.005728 |
| 2025 | 0.006263 |
| 2026 | 0.006791 |
| 2027 | 0.007316 |
| 2028 | 0.007838 |
| 2029 | 0.008357 |
| 2030 | 0.008875 |
| 2031 | 0.009392 |
| 2032 | 0.009908 |
| 2033 | 0.010423 |
| 2034 | 0.010936 |
| 2035 | 0.011449 |

**Multifamily Residential/CII Turf Removal**

| Overview | |
|---|---|
| Name | Multifamily Residential/CII Turf Removal |
| Abbr | 24 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

**Fixture Costs**

| | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $2,000.00 | $8,000.00 | 1 |
| COM | $5,000.00 | $10,000.00 | 1 |
| MUN | $5,000.00 | $10,000.00 | 1 |
| IRR | $5,000.00 | $10,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide a per-square-foot incentive to remove turf and replace with low-water-use plants or hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed and capped at $2,500 for multi-family or commercial residences. Increase rebate to $1 per square foot or more and raise maximum amount to $5,000 or more to increase participation.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☑ | ☑ | ☑ | ☐ | ☐ | ☑ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | | ☐ | ☐ | ☐ | | | | |
| Showers | | ☐ | ☐ | ☐ | | | | |
| Dishwashers | | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | | ☐ | ☐ | ☐ | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | | ☐ | ☐ | ☐ | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | ☐ | | | | |
| Irrigation | | ☑ | ☑ | ☑ | | | ☑ | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☐ | ☐ | ☐ | | | ☐ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | | | | |
| tory/Kitchen Faucets | | ☐ | ☐ | ☐ | | | | |

**Comments**

Estimated water savings are 19 gallons per square foot from high water use plants (turf grass) at Plant Factor (PF) 0.8 compared to low water use plants at PF of 0.4. Evapotranspiration (ETo) for Santa Cruz is relatively low at 36 inches per year. Assume 50% square footage is replaced. Costs assume $3/per square foot. Net cost to customer is $2/square foot for 1,000 square feet.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.003519 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $50,616 |
| Community | $50,616 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $868,786 |
| Community | $2,661,845 |
| **Benefit to Cost Ratio** | |
| Utility | 0.06 |
| Community | 0.02 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $32,186 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Irrigation | 35.0% |
| COM Irrigation | 35.0% |
| MUN Irrigation | 5.0% |
| IRR Irrigation | 5.0% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.200% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $37,233 | $9,308 | $46,541 |
| 2016 | $37,729 | $9,432 | $47,162 |
| 2017 | $38,226 | $9,556 | $47,782 |
| 2018 | $38,722 | $9,681 | $48,403 |
| 2019 | $39,219 | $9,805 | $49,023 |
| 2020 | $39,715 | $9,929 | $49,644 |
| 2021 | $39,975 | $9,994 | $49,968 |
| 2022 | $40,234 | $10,059 | $50,293 |
| 2023 | $40,494 | $10,123 | $50,617 |
| 2024 | $40,753 | $10,188 | $50,941 |
| 2025 | $41,012 | $10,253 | $51,266 |
| 2026 | $41,451 | $10,363 | $51,814 |
| 2027 | $41,890 | $10,472 | $52,362 |
| 2028 | $42,328 | $10,582 | $52,910 |
| 2029 | $42,767 | $10,692 | $53,459 |
| 2030 | $43,205 | $10,801 | $54,007 |
| 2031 | $43,604 | $10,901 | $54,506 |
| 2032 | $44,003 | $11,001 | $55,004 |
| 2033 | $44,402 | $11,101 | $55,503 |
| 2034 | $44,801 | $11,200 | $56,002 |
| 2035 | $45,200 | $11,300 | $56,501 |

**Targets**

View: Accounts

| | MF | COM | MUN | IRR | Total |
|---|---|---|---|---|---|
| 2015 | 5 | 4 | 0 | 1 | 11 |
| 2016 | 6 | 4 | 0 | 1 | 11 |
| 2017 | 6 | 4 | 0 | 1 | 11 |
| 2018 | 6 | 4 | 0 | 1 | 11 |
| 2019 | 6 | 4 | 0 | 1 | 11 |
| 2020 | 6 | 4 | 0 | 1 | 11 |
| 2021 | 6 | 4 | 0 | 1 | 11 |
| 2022 | 6 | 4 | 0 | 1 | 12 |
| 2023 | 6 | 4 | 0 | 1 | 12 |
| 2024 | 6 | 4 | 0 | 1 | 12 |
| 2025 | 6 | 4 | 0 | 1 | 12 |
| 2026 | 6 | 4 | 0 | 1 | 12 |
| 2027 | 6 | 4 | 0 | 2 | 12 |
| 2028 | 6 | 4 | 0 | 2 | 12 |
| 2029 | 6 | 4 | 0 | 2 | 12 |
| 2030 | 6 | 4 | 0 | 2 | 12 |
| 2031 | 6 | 4 | 0 | 2 | 12 |
| 2032 | 6 | 4 | 0 | 2 | 13 |
| 2033 | 6 | 4 | 0 | 2 | 13 |
| 2034 | 6 | 4 | 0 | 2 | 13 |
| 2035 | 6 | 4 | 0 | 2 | 13 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000347 |
| 2016 | 0.000689 |
| 2017 | 0.001023 |
| 2018 | 0.001350 |
| 2019 | 0.001672 |
| 2020 | 0.001986 |
| 2021 | 0.002309 |
| 2022 | 0.002629 |
| 2023 | 0.002945 |
| 2024 | 0.003258 |
| 2025 | 0.003568 |
| 2026 | 0.003869 |
| 2027 | 0.004170 |
| 2028 | 0.004469 |
| 2029 | 0.004766 |
| 2030 | 0.005063 |
| 2031 | 0.005362 |
| 2032 | 0.005661 |
| 2033 | 0.005958 |
| 2034 | 0.006255 |
| 2035 | 0.006551 |

**Expand Large Landscape Survey/Water**

| Overview | |
|---|---|
| Name | Expand Large Landscape Survey/V |
| Abbr | 25 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 10 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| IRR | $1,500.00 | $1,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Outdoor water audits offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. Tied to the Water Budget Program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | | | | | | | | |
| Showers | | | | | | | | |
| Dishwashers | | | | | | | | |
| Clothes Washers | | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | | | | | | | | |
| Baths | | | | | | | | |
| Other | | | | | | | | |
| Irrigation | | | | | | | ☑ | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | | | | ☐ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | | | | | | | | |

**Comments**

1 acre and above get offered survey and water budget due to ordinance. Option to do it on their own. Water savings based on relatively cool climate and not much turf irrigation. See notes on water budget based billing. Utility costs based on $1400 per audit per contract. Customer costs assume customer makes some changes to system to try and meet budget. 10-15 audits per year on 250 participating accounts.

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.003167 |
| Lifetime Savings - Present Value ($) | |
| Utility | $45,029 |
| Community | $45,029 |
| Lifetime Costs - Present Value ($) | |
| Utility | $508,859 |
| Community | $859,797 |
| Benefit to Cost Ratio | |
| Utility | 0.09 |
| Community | 0.05 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $20,948 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| IRR Irrigation | 6.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.200% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $28,438 | $19,612 | $48,050 |
| 2019 | $29,798 | $20,551 | $50,349 |
| 2020 | $31,159 | $21,489 | $52,648 |
| 2021 | $31,848 | $21,964 | $53,813 |
| 2022 | $32,538 | $22,440 | $54,977 |
| 2023 | $33,227 | $22,915 | $56,142 |
| 2024 | $33,916 | $23,390 | $57,306 |
| 2025 | $34,605 | $23,866 | $58,471 |
| 2026 | $35,773 | $24,671 | $60,444 |
| 2027 | $36,941 | $25,477 | $62,418 |
| 2028 | $38,109 | $26,282 | $64,391 |
| 2029 | $39,277 | $27,087 | $66,364 |
| 2030 | $40,445 | $27,893 | $68,337 |
| 2031 | $41,459 | $28,593 | $70,052 |
| 2032 | $42,474 | $29,292 | $71,766 |
| 2033 | $43,489 | $29,992 | $73,481 |
| 2034 | $44,503 | $30,692 | $75,195 |
| 2035 | $45,518 | $31,392 | $76,910 |

**Targets** — View: Accounts

| | IRR | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 13 | 13 |
| 2019 | 14 | 14 |
| 2020 | 14 | 14 |
| 2021 | 15 | 15 |
| 2022 | 15 | 15 |
| 2023 | 15 | 15 |
| 2024 | 16 | 16 |
| 2025 | 16 | 16 |
| 2026 | 16 | 16 |
| 2027 | 17 | 17 |
| 2028 | 18 | 18 |
| 2029 | 18 | 18 |
| 2030 | 19 | 19 |
| 2031 | 19 | 19 |
| 2032 | 20 | 20 |
| 2033 | 20 | 20 |
| 2034 | 20 | 20 |
| 2035 | 21 | 21 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000466 |
| 2019 | 0.000927 |
| 2020 | 0.001383 |
| 2021 | 0.001856 |
| 2022 | 0.002329 |
| 2023 | 0.002803 |
| 2024 | 0.003278 |
| 2025 | 0.003752 |
| 2026 | 0.004232 |
| 2027 | 0.004719 |
| 2028 | 0.004807 |
| 2029 | 0.004890 |
| 2030 | 0.004969 |
| 2031 | 0.005049 |
| 2032 | 0.005132 |
| 2033 | 0.005217 |
| 2034 | 0.005304 |
| 2035 | 0.005392 |

**Sprinkler Nozzle Rebates**

| Overview | |
|---|---|
| Name | Sprinkler Nozzle Rebates |
| Abbr | 26 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 20 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $6.00 | $4.00 | 25 |
| MF | $6.00 | $4.00 | 50 |
| COM | $6.00 | $4.00 | 100 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide rebates to replace standard spray sprinkler nozzles with rotating nozzles that have lower application rates. Nozzles cost about $6 each. Consider online application processing through options like www.freesprinklernozzles.com.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☑ | ☑ | ☑ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings assume improvement in distribution uniformity saves 10% of irrigation. Reference CUWCC Potential Best Management Practice Report on Rotating Nozzles. Utility costs assume cost is $6/nozzle with rebate amount of $2 per nozzle with the following nozzles distributed: SF = 25; MF = 50; COM = 100. Customer pays the remainder of the device cost plus installation. No nozzle minimum.

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.004259 |
| Lifetime Savings - Present Value ($) | |
| Utility | $59,780 |
| Community | $59,780 |
| Lifetime Costs - Present Value ($) | |
| Utility | $445,715 |
| Community | $683,430 |
| Benefit to Cost Ratio | |
| Utility | 0.13 |
| Community | 0.09 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $13,643 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 10.0% |
| MF Irrigation | 10.0% |
| COM Irrigation | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $30,638 | $16,340 | $46,978 |
| 2019 | $30,797 | $16,425 | $47,222 |
| 2020 | $30,956 | $16,510 | $47,466 |
| 2021 | $31,080 | $16,576 | $47,656 |
| 2022 | $31,205 | $16,642 | $47,847 |
| 2023 | $31,329 | $16,709 | $48,038 |
| 2024 | $31,453 | $16,775 | $48,228 |
| 2025 | $31,578 | $16,841 | $48,419 |
| 2026 | $31,738 | $16,927 | $48,665 |
| 2027 | $31,898 | $17,013 | $48,911 |
| 2028 | $32,059 | $17,098 | $49,157 |
| 2029 | $32,219 | $17,184 | $49,403 |
| 2030 | $32,380 | $17,269 | $49,649 |
| 2031 | $32,529 | $17,349 | $49,878 |
| 2032 | $32,678 | $17,428 | $50,106 |
| 2033 | $32,827 | $17,508 | $50,335 |
| 2034 | $32,977 | $17,587 | $50,564 |
| 2035 | $33,126 | $17,667 | $50,793 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 10 | 120 |
| 2019 | 97 | 14 | 10 | 121 |
| 2020 | 97 | 14 | 10 | 121 |
| 2021 | 98 | 15 | 10 | 122 |
| 2022 | 98 | 15 | 10 | 122 |
| 2023 | 98 | 15 | 10 | 123 |
| 2024 | 99 | 15 | 10 | 123 |
| 2025 | 99 | 15 | 10 | 124 |
| 2026 | 100 | 15 | 10 | 125 |
| 2027 | 100 | 15 | 10 | 125 |
| 2028 | 100 | 15 | 10 | 126 |
| 2029 | 101 | 15 | 10 | 126 |
| 2030 | 101 | 16 | 10 | 127 |
| 2031 | 102 | 16 | 10 | 127 |
| 2032 | 102 | 16 | 10 | 128 |
| 2033 | 102 | 16 | 10 | 129 |
| 2034 | 103 | 16 | 10 | 129 |
| 2035 | 103 | 16 | 10 | 130 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000560 |
| 2019 | 0.001110 |
| 2020 | 0.001649 |
| 2021 | 0.002187 |
| 2022 | 0.002719 |
| 2023 | 0.003244 |
| 2024 | 0.003762 |
| 2025 | 0.004274 |
| 2026 | 0.004777 |
| 2027 | 0.005277 |
| 2028 | 0.005772 |
| 2029 | 0.006265 |
| 2030 | 0.006755 |
| 2031 | 0.007245 |
| 2032 | 0.007733 |
| 2033 | 0.008220 |
| 2034 | 0.008705 |
| 2035 | 0.009188 |

**Gray Water Retrofit**

| Overview | |
|---|---|
| Name | Gray Water Retrofit |
| Abbr | 27 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $175.00 | $300.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Provide a workshop to support a Gray Water Challenge similar to 2013 event that was modeled after Sonoma County program. Offer rebate to assist covering certain percentage of the cost to single family homeowners per year to install gray water systems. Package from local hardware stores containing the primary components would be supported by City rebate.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Water savings assume single fixture type system used to replace a portion of garden watering on new or existing homes. System costs ~$450 and City pays ~ 1/3. Customer pays for installation. In the summer washing machine use of ~25 gpd would cover about 25% or summer use (2x annual average). Based on continuation of our 2013 Gray Water Challenge.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.000353 |
| Lifetime Savings - Present Value ($) | |
| Utility | $5,077 |
| Community | $5,077 |
| Lifetime Costs - Present Value ($) | |
| Utility | $42,605 |
| Community | $92,974 |
| Benefit to Cost Ratio | |
| Utility | 0.12 |
| Community | 0.05 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $15,742 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.050% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $2,423 | $2,865 | $5,287 |
| 2016 | $2,432 | $2,875 | $5,307 |
| 2017 | $2,441 | $2,886 | $5,327 |
| 2018 | $2,450 | $2,897 | $5,347 |
| 2019 | $2,459 | $2,908 | $5,367 |
| 2020 | $2,468 | $2,918 | $5,387 |
| 2021 | $2,479 | $2,930 | $5,409 |
| 2022 | $2,489 | $2,942 | $5,431 |
| 2023 | $2,499 | $2,954 | $5,453 |
| 2024 | $2,509 | $2,966 | $5,475 |
| 2025 | $2,519 | $2,978 | $5,497 |
| 2026 | $2,529 | $2,990 | $5,520 |
| 2027 | $2,540 | $3,002 | $5,542 |
| 2028 | $2,550 | $3,015 | $5,565 |
| 2029 | $2,560 | $3,027 | $5,587 |
| 2030 | $2,571 | $3,039 | $5,610 |
| 2031 | $2,580 | $3,050 | $5,630 |
| 2032 | $2,590 | $3,062 | $5,651 |
| 2033 | $2,599 | $3,073 | $5,672 |
| 2034 | $2,609 | $3,084 | $5,693 |
| 2035 | $2,618 | $3,095 | $5,714 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 10 | 10 |
| 2016 | 10 | 10 |
| 2017 | 10 | 10 |
| 2018 | 10 | 10 |
| 2019 | 10 | 10 |
| 2020 | 10 | 10 |
| 2021 | 10 | 10 |
| 2022 | 10 | 10 |
| 2023 | 10 | 10 |
| 2024 | 10 | 10 |
| 2025 | 10 | 10 |
| 2026 | 10 | 10 |
| 2027 | 10 | 10 |
| 2028 | 10 | 10 |
| 2029 | 10 | 10 |
| 2030 | 10 | 10 |
| 2031 | 10 | 10 |
| 2032 | 10 | 10 |
| 2033 | 10 | 10 |
| 2034 | 10 | 10 |
| 2035 | 10 | 10 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000035 |
| 2016 | 0.000069 |
| 2017 | 0.000103 |
| 2018 | 0.000136 |
| 2019 | 0.000169 |
| 2020 | 0.000201 |
| 2021 | 0.000233 |
| 2022 | 0.000265 |
| 2023 | 0.000296 |
| 2024 | 0.000327 |
| 2025 | 0.000358 |
| 2026 | 0.000388 |
| 2027 | 0.000418 |
| 2028 | 0.000448 |
| 2029 | 0.000478 |
| 2030 | 0.000507 |
| 2031 | 0.000537 |
| 2032 | 0.000566 |
| 2033 | 0.000596 |
| 2034 | 0.000625 |
| 2035 | 0.000654 |

**Residential Rain Barrels**

| Overview | |
|---|---|
| Name | Residential Rain Barrels |
| Abbr | 28 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 20 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $30.00 | $50.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentive for installation of rain barrels. This could involve rebates or bulk purchase and giveaways of barrels, plus workshops on proper installation and use of captured rain water for landscape irrigation. Pattern after Honolulu Board of Water Supply program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.005271 |
| Lifetime Savings - Present Value ($) | |
| Utility | $75,892 |
| Community | $75,892 |
| Lifetime Costs - Present Value ($) | |
| Utility | $188,887 |
| Community | $440,737 |
| Benefit to Cost Ratio | |
| Utility | 0.40 |
| Community | 0.17 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $4,672 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 5.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.500% |
| Only Effects New Accts | ☐ |

**Comments**

Water savings assumes 4 effective fills per year for 20 years. 20 year useful life. 1.5% actual water savings from barrel and 3.5% from behavioral change. City pays for the difference plus shipping. Customer has to install.
If the rain barrel model were available for purchase locally, the City would probably stop selling them and offer a rebate instead due to storage and delivery challenges. We could also add a rebate anyway so people have more choice in models and sizes. Assume a 50 percent subsidy. Currently sell subsidized rain barrels to customers. May want to expand types. Probill Hardware now carries the bushman line. Education and promotion program. 3-4 effective fills. Discount starts at $100 per barrel.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $10,742 | $14,323 | $25,064 |
| 2016 | $10,782 | $14,376 | $25,159 |
| 2017 | $10,823 | $14,430 | $25,253 |
| 2018 | $10,863 | $14,484 | $25,347 |
| 2019 | $10,904 | $14,538 | $25,442 |
| 2020 | $10,944 | $14,592 | $25,536 |
| 2021 | $10,989 | $14,652 | $25,641 |
| 2022 | $11,034 | $14,711 | $25,745 |
| 2023 | $11,078 | $14,771 | $25,849 |
| 2024 | $11,123 | $14,831 | $25,954 |
| 2025 | $11,168 | $14,891 | $26,058 |
| 2026 | $11,214 | $14,951 | $26,165 |
| 2027 | $11,259 | $15,012 | $26,272 |
| 2028 | $11,305 | $15,073 | $26,378 |
| 2029 | $11,351 | $15,134 | $26,485 |
| 2030 | $11,396 | $15,195 | $26,592 |
| 2031 | $11,439 | $15,251 | $26,690 |
| 2032 | $11,481 | $15,308 | $26,789 |
| 2033 | $11,523 | $15,364 | $26,887 |
| 2034 | $11,565 | $15,420 | $26,986 |
| 2035 | $11,608 | $15,477 | $27,084 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 286 | 286 |
| 2016 | 288 | 288 |
| 2017 | 289 | 289 |
| 2018 | 290 | 290 |
| 2019 | 291 | 291 |
| 2020 | 292 | 292 |
| 2021 | 293 | 293 |
| 2022 | 294 | 294 |
| 2023 | 295 | 295 |
| 2024 | 297 | 297 |
| 2025 | 298 | 298 |
| 2026 | 299 | 299 |
| 2027 | 300 | 300 |
| 2028 | 301 | 301 |
| 2029 | 303 | 303 |
| 2030 | 304 | 304 |
| 2031 | 305 | 305 |
| 2032 | 306 | 306 |
| 2033 | 307 | 307 |
| 2034 | 308 | 308 |
| 2035 | 310 | 310 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000524 |
| 2016 | 0.001041 |
| 2017 | 0.001548 |
| 2018 | 0.002046 |
| 2019 | 0.002535 |
| 2020 | 0.003014 |
| 2021 | 0.003497 |
| 2022 | 0.003974 |
| 2023 | 0.004445 |
| 2024 | 0.004909 |
| 2025 | 0.005368 |
| 2026 | 0.005821 |
| 2027 | 0.006271 |
| 2028 | 0.006718 |
| 2029 | 0.007164 |
| 2030 | 0.007607 |
| 2031 | 0.008051 |
| 2032 | 0.008493 |
| 2033 | 0.008934 |
| 2034 | 0.009374 |
| 2035 | 0.009364 |

Climate Appropriate Landscaping

| Overview | |
|---|---|
| Name | Climate Appropriate Landscaping and Rainw |
| Abbr | 29 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $1,000.00 | $1,500.00 | 1 |
| MF | $2,000.00 | $2,500.00 | 1 |
| COM | $5,000.00 | $10,000.00 | 1 |
| MUN | $5,000.00 | $10,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for installation of climate appropriate landscaping and rainwater infiltration. This measure will provide rebates for HOAs, businesses, and institutions that increase their outdoor water use efficiency by replacing qualifying high water use landscape and/or upgrading to qualifying high efficiency irrigation equipment or climate appropriate landscape. To qualify, sites must participate in a pre-inspection prior to beginning their project or purchasing materials for which they would like to receive rebates. Single family homes, multifamily and business properties with qualifying irrigated landscape (i.e., irrigated turf or functional swimming pool) can receive rebates for replacing high water use landscape, such as irrigated turf grass, with a minimum of 50% plant coverage consisting of low water using plants from the Approved Plant List.

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":

- Increase turf conversion rebate
- Require conversion of spray to drip for shrub irrigation
- Discourage runoff through rainwater infiltration features
- Support local initiatives for climate-appropriate landscaping
- Target landscaping narrower than 10 ft - no spray irrigation and/or next to hardscapes

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.012210 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $175,704 |
| Community | $175,704 |
| Lifetime Costs - Present Value ($) | |
| Utility | $3,111,311 |
| Community | $7,115,560 |
| Benefit to Cost Ratio | |
| Utility | 0.06 |
| Community | 0.02 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $33,221 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 25.0% |
| MF Irrigation | 25.0% |
| COM Irrigation | 25.0% |
| MUN Irrigation | 25.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.400% |
| Only Effects New Accts | ☐ |

**Comments**

Drought tolerant plants require little dry season irrigation. Native plants require no irrigation or fertilizer, and provide habitat for native insects and birds. Rainwater infiltration features such as swales or rain gardens capture water runoff from roofs and paved surfaces. Enhanced infiltration increases soil porosity, which provides moisture to trees and landscape plants during dry periods, reducing stress on trees during droughts. In some areas, rainwater that infiltrates the landscape recharges aquifers, adding to our water supply. For example, Kennedy/Jenks estimates that water infiltration modifications could add 300-500 acre feet per year to the aquifer beneath Scotts Valley. In areas with less permeable clay soils, rainwater infiltration slows runoff into local creeks, reducing stormwater erosion and increasing creek flows during dry months, enhancing biodiversity. Paving can be done with permeable materials and/or in conjunction with infiltration swales. Examine the implementation of these systems at schools as part of the Drought Response Outreach for Schools State program.

References:

Irrigation:
http://cuwcc.org/Portals/0/Document%20Library/Resources/Publications/Potential%20BMP%20Reports/2014%20Drip%20Irrigation%20PBMP.pdf
http://www.rainbird.com/documents/drip/LandscapedripConversionGuide.pdf

Infiltration: See Infiltration documents in the Infiltration folder on our Google Drive.

Water Transfers Santa Cruz County:
http://scceh.com/Home/Programs/WaterResources/IntegratedRegionalWaterManagement.aspx

Drought Response Outreach for Schools: http://ca.gov/drought/news/story-97.html

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $175,841 | $226,796 | $402,637 |
| 2016 | $176,730 | $227,884 | $404,615 |
| 2017 | $177,620 | $228,972 | $406,592 |
| 2018 | $178,510 | $230,060 | $408,570 |
| 2019 | $179,399 | $231,148 | $410,547 |
| 2020 | $180,289 | $232,236 | $412,525 |
| 2021 | $180,975 | $233,072 | $414,048 |
| 2022 | $181,662 | $233,908 | $415,570 |
| 2023 | $182,348 | $234,744 | $417,092 |
| 2024 | $183,035 | $235,580 | $418,615 |
| 2025 | $183,721 | $236,416 | $420,137 |
| 2026 | $184,614 | $237,501 | $422,114 |
| 2027 | $185,506 | $238,585 | $424,092 |
| 2028 | $186,399 | $239,670 | $426,069 |
| 2029 | $187,291 | $240,755 | $428,046 |
| 2030 | $188,184 | $241,839 | $430,023 |
| 2031 | $189,027 | $242,898 | $431,925 |
| 2032 | $189,869 | $243,958 | $433,827 |
| 2033 | $190,712 | $245,017 | $435,729 |
| 2034 | $191,555 | $246,076 | $437,632 |
| 2035 | $192,398 | $247,136 | $439,534 |

**Targets**

View: Accounts

| | SF | MF | COM | MUN | Total |
|---|---|---|---|---|---|
| 2015 | 76 | 11 | 8 | 1 | 96 |
| 2016 | 77 | 11 | 8 | 1 | 96 |
| 2017 | 77 | 11 | 8 | 1 | 97 |
| 2018 | 77 | 11 | 8 | 1 | 97 |
| 2019 | 78 | 11 | 8 | 1 | 98 |
| 2020 | 78 | 12 | 8 | 1 | 98 |
| 2021 | 78 | 12 | 8 | 1 | 98 |
| 2022 | 78 | 12 | 8 | 1 | 99 |
| 2023 | 79 | 12 | 8 | 1 | 99 |
| 2024 | 79 | 12 | 8 | 1 | 100 |
| 2025 | 79 | 12 | 8 | 1 | 100 |
| 2026 | 80 | 12 | 8 | 1 | 101 |
| 2027 | 80 | 12 | 8 | 1 | 101 |
| 2028 | 80 | 12 | 8 | 1 | 101 |
| 2029 | 81 | 12 | 8 | 1 | 102 |
| 2030 | 81 | 12 | 8 | 1 | 102 |
| 2031 | 81 | 13 | 8 | 1 | 103 |
| 2032 | 82 | 13 | 8 | 1 | 103 |
| 2033 | 82 | 13 | 8 | 1 | 104 |
| 2034 | 82 | 13 | 8 | 1 | 104 |
| 2035 | 83 | 13 | 8 | 1 | 105 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001214 |
| 2016 | 0.002408 |
| 2017 | 0.003577 |
| 2018 | 0.004725 |
| 2019 | 0.005849 |
| 2020 | 0.006951 |
| 2021 | 0.008067 |
| 2022 | 0.009170 |
| 2023 | 0.010259 |
| 2024 | 0.011335 |
| 2025 | 0.012397 |
| 2026 | 0.013439 |
| 2027 | 0.014474 |
| 2028 | 0.015503 |
| 2029 | 0.016527 |
| 2030 | 0.017545 |
| 2031 | 0.018566 |
| 2032 | 0.019584 |
| 2033 | 0.020598 |
| 2034 | 0.021609 |
| 2035 | 0.022617 |

**Single Family Multifamily Dishwasher**

| Overview | |
|---|---|
| Name | Single Family Multifamily Dishwas |
| Abbr | 31 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2022 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $50.00 | $350.00 | 1 |
| MF | $50.00 | $350.00 | 6 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for installation of water efficient dishwashers (Residential WF of 6.25 or less). Assume Department of Energy continues to regulate dishwashers to require state of the art technolgy, using less water over time.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☑ | ☑ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.000452 |
| Lifetime Savings - Present Value ($) | |
| Utility | $6,772 |
| Community | $42,119 |
| Lifetime Costs - Present Value ($) | |
| Utility | $102,692 |
| Community | $677,766 |
| Benefit to Cost Ratio | |
| Utility | 0.07 |
| Community | 0.06 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $29,602 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Dishwashers | 15.0% |
| MF Dishwashers | 15.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Comments**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Dishwashers have seen similar technological advances as clothes washers with some machines now offering 2.5 GPL. The old standard of 10-15 GPL has been updated to 5.5 GPL for an Energy Star certified product.
https://www.energystar.gov/products/certified-products/detail/dishwashers
Units cost between $500-$1000. Customer costs include installation.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $22,652 | $126,849 | $149,501 |
| 2019 | $22,816 | $127,771 | $150,587 |
| 2020 | $22,981 | $128,693 | $151,673 |
| 2021 | $23,095 | $129,333 | $152,428 |
| 2022 | $23,209 | $129,973 | $153,182 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 193 | 28 | 221 |
| 2019 | 194 | 29 | 222 |
| 2020 | 195 | 29 | 223 |
| 2021 | 195 | 29 | 224 |
| 2022 | 196 | 29 | 225 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000129 |
| 2019 | 0.000255 |
| 2020 | 0.000378 |
| 2021 | 0.000501 |
| 2022 | 0.000623 |
| 2023 | 0.000617 |
| 2024 | 0.000612 |
| 2025 | 0.000606 |
| 2026 | 0.000600 |
| 2027 | 0.000594 |
| 2028 | 0.000589 |
| 2029 | 0.000583 |
| 2030 | 0.000578 |
| 2031 | 0.000574 |
| 2032 | 0.000570 |
| 2033 | 0.000567 |
| 2034 | 0.000563 |
| 2035 | 0.000559 |

**Hot Water Recirculation Systems**

| Overview | |
|---|---|
| Name | Hot Water Recirculation Systems |
| Abbr | 32 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2022 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 25 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $700.00 | 1 |
| MF | $300.00 | $700.00 | 5 |
| COM | $300.00 | $700.00 | 5 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for the installation of a hot water recirculation system. Having hot water discharge promptly is important for energy and water use efficiency. A hot water recirculating system enables the cold water in the hot water pipes to be continually returned to the water heater and reheated before the hot water faucet is turned on. Rebates are available to the following water customer groups:
- single family dwellings, including townhomes and mobile homes
- apartment complexes
- commercial institutions
- commercially zoned businesses or institutions
• Maximum rebates allowable:
a) $300 per single family account
b) $3,000 per commercial, industrial or institutional account, such as laundromats and apartments, per year
• Some installations may be selected for a random inspection. At reasonable times and with reasonable notice, you agree to allow the City of Santa Cruz to inspect the system at the installation address for up to one year after purchase.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | | | | | |
| Showers | ☑ | ☑ | ☑ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Hot Water Demand Recirculation Systems are a tool that helps address the water loss we all Experience while waiting for hot water-for showers, hand washing and dishwashing. The simpler sytems are installed into existing plumbing and act by returning the cooled water back through the cold water line at the push of a button-even from the warmth of your bed. For a shower the wait can waste 2 gallons or more of water.
http://www.osti.gov/scitech/biblio/885864

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.003045 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $45,599 |
| Community | $161,188 |
| Lifetime Costs - Present Value ($) | |
| Utility | $365,578 |
| Community | $1,047,989 |
| Benefit to Cost Ratio | |
| Utility | 0.12 |
| Community | 0.15 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $15,650 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 11.6% |
| MF Lavatory Faucets | 11.6% |
| COM Lavatory Faucets | 11.6% |
| SF Showers | 11.6% |
| MF Showers | 11.6% |
| COM Showers | 11.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $80,770 | $150,770 | $231,539 |
| 2019 | $81,283 | $151,728 | $233,010 |
| 2020 | $81,796 | $152,685 | $234,481 |
| 2021 | $82,150 | $153,347 | $235,497 |
| 2022 | $82,504 | $154,008 | $236,512 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 10 | 120 |
| 2019 | 97 | 14 | 10 | 121 |
| 2020 | 97 | 14 | 10 | 121 |
| 2021 | 98 | 15 | 10 | 122 |
| 2022 | 98 | 15 | 10 | 122 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000865 |
| 2019 | 0.001712 |
| 2020 | 0.002541 |
| 2021 | 0.003369 |
| 2022 | 0.004186 |
| 2023 | 0.004151 |
| 2024 | 0.004115 |
| 2025 | 0.004079 |
| 2026 | 0.004039 |
| 2027 | 0.004001 |
| 2028 | 0.003965 |
| 2029 | 0.003931 |
| 2030 | 0.003899 |
| 2031 | 0.003871 |
| 2032 | 0.003845 |
| 2033 | 0.003819 |
| 2034 | 0.003795 |
| 2035 | 0.003772 |

**Rewarding Businesses For Adopting**

| Overview | |
|---|---|
| Name | Rewarding Businesses For Adoptin |
| Abbr | 33 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2020 |
| Last Year | 2035 |
| Measure Length | 16 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $500.00 | $5,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Offer commercial customers who employ best practices increased supply reliability and lower price. For a business, the imposition of rationing during severe drought years hits the bottom line. This proposal suggests that the City's Water Shortage Contingency Plan be modified so that businesses who adopt best practices such as efficient plumbing fixtures, hotel laundry recycling, and climate-appropriate landscaping, would incur a lower level of curtailment in a severe drought. For example, in a Stage 4 drought, with a system-wide goal of 35% curtailment, the current plan is to ration businesses to 87% of their normal year water use. Under our recommendation, businesses adopting best practices would be expected to cut back to 95% of normal use. These businesses could also be rewarded with a lower rate for their water use. Target is to reach 20% of the accounts (400).

As with residential clothes washers, the City could facilitate the financing of landscape retrofits, hotel laundry recycling, compressed air pre-wash stations, etc.

References:

http://www.aquarecycle.com/WastewaterRecycle_8-13-14.pdf

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☑ | | | | | |
| Urinals | | | ☑ | | | | | |
| Lavatory Faucets | | | ☑ | | | | | |
| Showers | | | ☑ | | | | | |
| Dishwashers | | | ☑ | | | | | |
| Clothes Washers | | | ☑ | | | | | |
| Process | | | ☑ | | | | | |
| Kitchen Spray Rinse | | | ☑ | | | | | |
| Internal Leakage | | | ☑ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☑ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☑ | | | | | |
| tory/Kitchen Faucets | | | ☑ | | | | | |

**Comments**

Rewarding Businesses for Adopting Best Practices. Two ideas were set forth here by the working group. One involves granting relief to businesses that adopt best practices in future periods of water curtailment. This concept has already been instituted in the City's Water Shortage Contingency Plan and associated water shortage regulations and restrictions, beginning in Stage 4, through the granting of an exception. The Municipal Code allows for the Director to provide an exception under the following circumstances: A business customer has already implemented environmental sustainability measures that have reduced water consumption to the maximum extent feasible. As used in this subsection the term "environmental sustainability measures" refers to installation of high efficiency plumbing fixtures, devices, equipment, and appliances, recycled water systems, and landscaping consisting exclusively of low-water-using plant materials using drip or similar high efficiency, nonspray irrigation systems, or to buildings that are designed, built, and continuously operated according to Leadership in Energy and Environmental Design (LEED) certification standards.

The second idea involves the City facilitating/financing various promoting water efficiency improvements, such as hotel laundry recycling, as a way to reduce peak water use by reducing indoor usage in visitor serving facilities. This idea is consistent with both the Commercial Incentives measure proposed in the Conservation Plan, as well as with past programs the City has offered its commercial customers (LightWash and Smart Rebates programs) in the past.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.004095 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $57,463 |
| Community | $208,065 |
| Lifetime Costs - Present Value ($) | |
| Utility | $189,426 |
| Community | $1,704,833 |
| Benefit to Cost Ratio | |
| Utility | 0.30 |
| Community | 0.12 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $6,030 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Toilets | 5.0% |
| COM Urinals | 5.0% |
| COM Lavatory Faucets | 3.0% |
| COM Showers | 3.0% |
| COM Dishwashers | 3.0% |
| COM Clothes Washers | 3.0% |
| COM Process | 3.0% |
| COM Kitchen Spray Rins | 5.0% |
| COM Internal Leakage | 3.0% |
| COM Irrigation | 3.0% |
| COM External Leakage | 3.0% |
| COM Cooling | 3.0% |
| Non-Lavatory/Kitchen Fa | 3.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.250% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $15,220 | $121,757 | $136,977 |
| 2021 | $15,256 | $122,048 | $137,304 |
| 2022 | $15,292 | $122,339 | $137,632 |
| 2023 | $15,329 | $122,630 | $137,959 |
| 2024 | $15,365 | $122,921 | $138,286 |
| 2025 | $15,401 | $123,212 | $138,613 |
| 2026 | $15,459 | $123,674 | $139,133 |
| 2027 | $15,517 | $124,136 | $139,653 |
| 2028 | $15,575 | $124,598 | $140,173 |
| 2029 | $15,633 | $125,060 | $140,693 |
| 2030 | $15,690 | $125,522 | $141,212 |
| 2031 | $15,764 | $126,111 | $141,875 |
| 2032 | $15,837 | $126,700 | $142,537 |
| 2033 | $15,911 | $127,289 | $143,200 |
| 2034 | $15,985 | $127,878 | $143,862 |
| 2035 | $16,058 | $128,466 | $144,525 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 24 | 24 |
| 2021 | 24 | 24 |
| 2022 | 24 | 24 |
| 2023 | 25 | 25 |
| 2024 | 25 | 25 |
| 2025 | 25 | 25 |
| 2026 | 25 | 25 |
| 2027 | 25 | 25 |
| 2028 | 25 | 25 |
| 2029 | 25 | 25 |
| 2030 | 25 | 25 |
| 2031 | 25 | 25 |
| 2032 | 25 | 25 |
| 2033 | 25 | 25 |
| 2034 | 26 | 26 |
| 2035 | 26 | 26 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000655 |
| 2021 | 0.001305 |
| 2022 | 0.001949 |
| 2023 | 0.002588 |
| 2024 | 0.003222 |
| 2025 | 0.003851 |
| 2026 | 0.004477 |
| 2027 | 0.005099 |
| 2028 | 0.005718 |
| 2029 | 0.006334 |
| 2030 | 0.006947 |
| 2031 | 0.007558 |
| 2032 | 0.008167 |
| 2033 | 0.008774 |
| 2034 | 0.009379 |
| 2035 | 0.009983 |

**Additional Building Code Requirements**

| Overview | |
|---|---|
| Name | Additional Building Code Requirements for New Develc |
| Abbr | 34 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $100.00 | $500.00 | 1 |
| MF | $100.00 | $1,000.00 | 1 |
| COM | $200.00 | $5,000.00 | 1 |
| MUN | $200.00 | $5,000.00 | 1 |
| IND | $200.00 | $5,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

**NEW CALGREEN INCLUDED, FUTURE CALGREEN UPDATES 2017, 2021.**
**Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":**
**Convene a working group of planners, builders, conservation groups, and Water Dept personnel to evaluate possible additions to current codes and fee structures that would encourage water conservation. Some examples include:**
**a. Requiring high efficiency washers in new development**
**b. Require hot water on demand/structured plumbing in new development**
**Currently there is a spurt of innovation in water efficiency. A working group could evaluate innovative measures for cost effectiveness and recommend them for inclusion in local code. Some possible measures:**
**a) Require .25 gal/flush urinals in new development.**
**b) Require efficient dishwashers in new development.**
**c) Require plumbing for gray water in new development.**
**d) Ordinance requiring fixture replacement in existing buildings (e.g. toilets).**
**e) Require efficient dish wash sprayers in restaurants.**
**f) Require replacement of all toilets using more than 1.6 gallons per flush in existing buildings.**
**g) Require low-flush urinals in existing buildings.**
**h) Require highest efficiency toilets & faucets in new construction & retrofit upon sale.**
**i) Require weather-based controllers in new landscapes.**

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Urinals | | | ☑ | ☑ | ☑ | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Showers | ☑ | ☑ | ☑ | ☑ | ☐ | | | |
| Dishwashers | ☑ | ☑ | ☑ | ☑ | ☐ | | | |
| Clothes Washers | ☑ | ☑ | ☑ | ☐ | ☐ | | | |
| Process | | | ☐ | ☐ | | | | |
| Kitchen Spray Rinse | | | ☑ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Pools | ☑ | ☑ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |

**Comments**

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.000000 |
| Lifetime Savings - Present Value ($) | |
| Utility | $0 |
| Community | $0 |
| Lifetime Costs - Present Value ($) | |
| Utility | $0 |
| Community | $0 |
| Benefit to Cost Ratio | |
| Utility | 0.00 |
| Community | 0.00 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $0 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 10.0% |
| MF Toilets | 10.0% |
| COM Toilets | 10.0% |
| MUN Toilets | 10.0% |
| IND Toilets | 10.0% |
| COM Urinals | 10.0% |
| MUN Urinals | 10.0% |
| IND Urinals | 10.0% |
| SF Lavatory Faucets | 10.0% |
| MF Lavatory Faucets | 10.0% |
| COM Lavatory Faucets | 10.0% |
| MUN Lavatory Faucets | 10.0% |
| IND Lavatory Faucets | 10.0% |
| SF Showers | 10.0% |
| MF Showers | 10.0% |
| COM Showers | 10.0% |
| MUN Showers | 10.0% |
| SF Dishwashers | 10.0% |
| MF Dishwashers | 10.0% |
| COM Dishwashers | 10.0% |
| MUN Dishwashers | 10.0% |
| SF Clothes Washers | 10.0% |
| MF Clothes Washers | 10.0% |
| COM Clothes Washers | 10.0% |
| OM Kitchen Spray Rins | 10.0% |
| SF Irrigation | 10.0% |
| MF Irrigation | 10.0% |
| COM Irrigation | 10.0% |
| MUN Irrigation | 10.0% |
| IND Irrigation | 10.0% |
| SF Pools | 10.0% |
| MF Pools | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.000% |
| Only Effects New Accts | ☑ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | MUN | IND | Total |
|---|---|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000000 |
| 2022 | 0.000000 |
| 2023 | 0.000000 |
| 2024 | 0.000000 |
| 2025 | 0.000000 |
| 2026 | 0.000000 |
| 2027 | 0.000000 |
| 2028 | 0.000000 |
| 2029 | 0.000000 |
| 2030 | 0.000000 |
| 2031 | 0.000000 |
| 2032 | 0.000000 |
| 2033 | 0.000000 |
| 2034 | 0.000000 |
| 2035 | 0.000000 |


| Overview | |
|---|---|
| Name | Innovation Incubator Program |
| Abbr | 35 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $0.00 | 1 |
| MF | $300.00 | $0.00 | 1 |
| COM | $300.00 | $0.00 | 1 |
| MUN | $300.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":
Establish an Innovation Incubator Program. Santa Cruz can continue its leadership in water stewardship by creating a program that: supports innovations in:
• Supports innovative new technologies, customer financing programs, and customer outreach programs
• Supports pilot projects to facilitate popular adoption of: rainwater for toilets & washers composting toilets in institutional buildings onsite recycling of graywater rainwater irrigated lawns promotion of native plant landscapes onsite recycling of graywater
Modest grants would be offered to local businesses and/or collaboration with state and national organizations like California Urban Water Conservation Council, California Water Foundation, California Urban Water Agencies, University of California (Santa Cruz or Davis), Alliance for Water Efficiency, Water Research Foundation, US Bureau of Reclamation or other coalitions of utilities or research focused organizations.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | | | | |
| Process | | | ☑ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☑ | ☑ | ☑ | ☑ | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☑ | ☑ | ☑ | ☑ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☑ | ☑ | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | | | | |

**Comments**

The Innovation Incubator Program identifies and supports entrepreneurs in their development and distribution of innovative learning technologies related to water use efficiency. The program will provide mentorship for products and companies in their efforts to improve water use efficiency and education through the use of software, digital content and related technologies. The Innovation Incubator Program finalists will be selected from an applicant pool based on key selection criteria, including:
•Ability to positively impact end users of the product
•Ability to succeed in the water use efficiency tech market
•Level of originality and innovation

The Innovation Incubator Program is a 12-month program of activities, master classes and coaching sessions, mentoring support, and business-to-business meetings that will facilitate and accelerate the market entry of technologies addressing water management challenges.
The Program will aim to ensure more efficient and effective practices across the water industry and across water-using sectors.

Innovators taking part in the Innovation Incubator Program will have access to a range of benefits that will support them with the successful market entry of their technology.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.001148 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $15,845 |
| Community | $43,706 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,071,611 |
| Community | $1,071,611 |
| Benefit to Cost Ratio | |
| Utility | 0.01 |
| Community | 0.04 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $121,679 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Process | 1.0% |
| SF Internal Leakage | 1.0% |
| MF Internal Leakage | 1.0% |
| COM Internal Leakage | 1.0% |
| MUN Internal Leakage | 1.0% |
| SF Irrigation | 1.0% |
| MF Irrigation | 1.0% |
| COM Irrigation | 1.0% |
| MUN Irrigation | 1.0% |
| SF External Leakage | 1.0% |
| MF External Leakage | 1.0% |
| COM External Leakage | 1.0% |
| MUN External Leakage | 1.0% |
| COM Cooling | 1.0% |
| MUN Cooling | 1.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $92,284 | $0 | $92,284 |
| 2022 | $92,665 | $0 | $92,665 |
| 2023 | $93,045 | $0 | $93,045 |
| 2024 | $93,426 | $0 | $93,426 |
| 2025 | $93,806 | $0 | $93,806 |
| 2026 | $94,252 | $0 | $94,252 |
| 2027 | $94,697 | $0 | $94,697 |
| 2028 | $95,143 | $0 | $95,143 |
| 2029 | $95,588 | $0 | $95,588 |
| 2030 | $96,034 | $0 | $96,034 |
| 2031 | $96,437 | $0 | $96,437 |
| 2032 | $96,841 | $0 | $96,841 |
| 2033 | $97,245 | $0 | $97,245 |
| 2034 | $97,649 | $0 | $97,649 |
| 2035 | $98,053 | $0 | $98,053 |

**Targets**

View: Accounts

| | SF | MF | COM | MUN | Total |
|---|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 195 | 29 | 20 | 2 | 246 |
| 2022 | 196 | 29 | 20 | 2 | 247 |
| 2023 | 197 | 29 | 20 | 2 | 248 |
| 2024 | 198 | 30 | 20 | 2 | 249 |
| 2025 | 199 | 30 | 20 | 2 | 250 |
| 2026 | 199 | 30 | 20 | 2 | 251 |
| 2027 | 200 | 30 | 20 | 2 | 253 |
| 2028 | 201 | 31 | 20 | 2 | 254 |
| 2029 | 202 | 31 | 20 | 2 | 255 |
| 2030 | 203 | 31 | 20 | 2 | 256 |
| 2031 | 203 | 31 | 20 | 2 | 257 |
| 2032 | 204 | 32 | 20 | 2 | 258 |
| 2033 | 205 | 32 | 20 | 2 | 259 |
| 2034 | 206 | 32 | 20 | 2 | 260 |
| 2035 | 206 | 32 | 21 | 2 | 261 |

**Water Savings (mgd)**

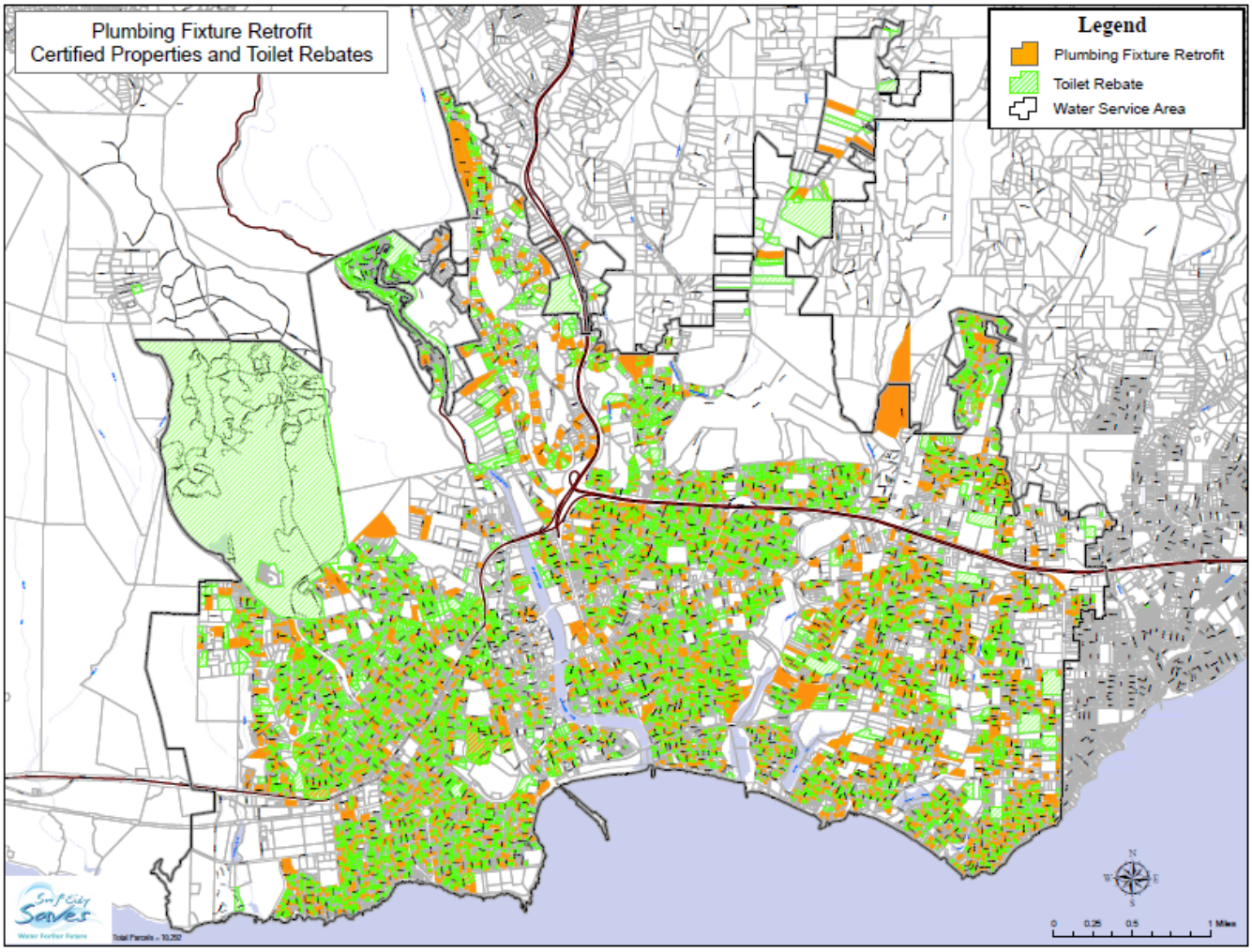
| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000211 |
| 2022 | 0.000419 |
| 2023 | 0.000625 |
| 2024 | 0.000829 |
| 2025 | 0.001030 |
| 2026 | 0.001229 |
| 2027 | 0.001426 |
| 2028 | 0.001621 |
| 2029 | 0.001815 |
| 2030 | 0.002007 |
| 2031 | 0.002199 |
| 2032 | 0.002390 |
| 2033 | 0.002581 |
| 2034 | 0.002770 |
| 2035 | 0.002959 |

# APPENDIX D – WATER USE EFFICIENCY MEASURE IMPLEMENTATION MAPS

The City has created maps to illustrate their efforts for their water use efficiency measure.

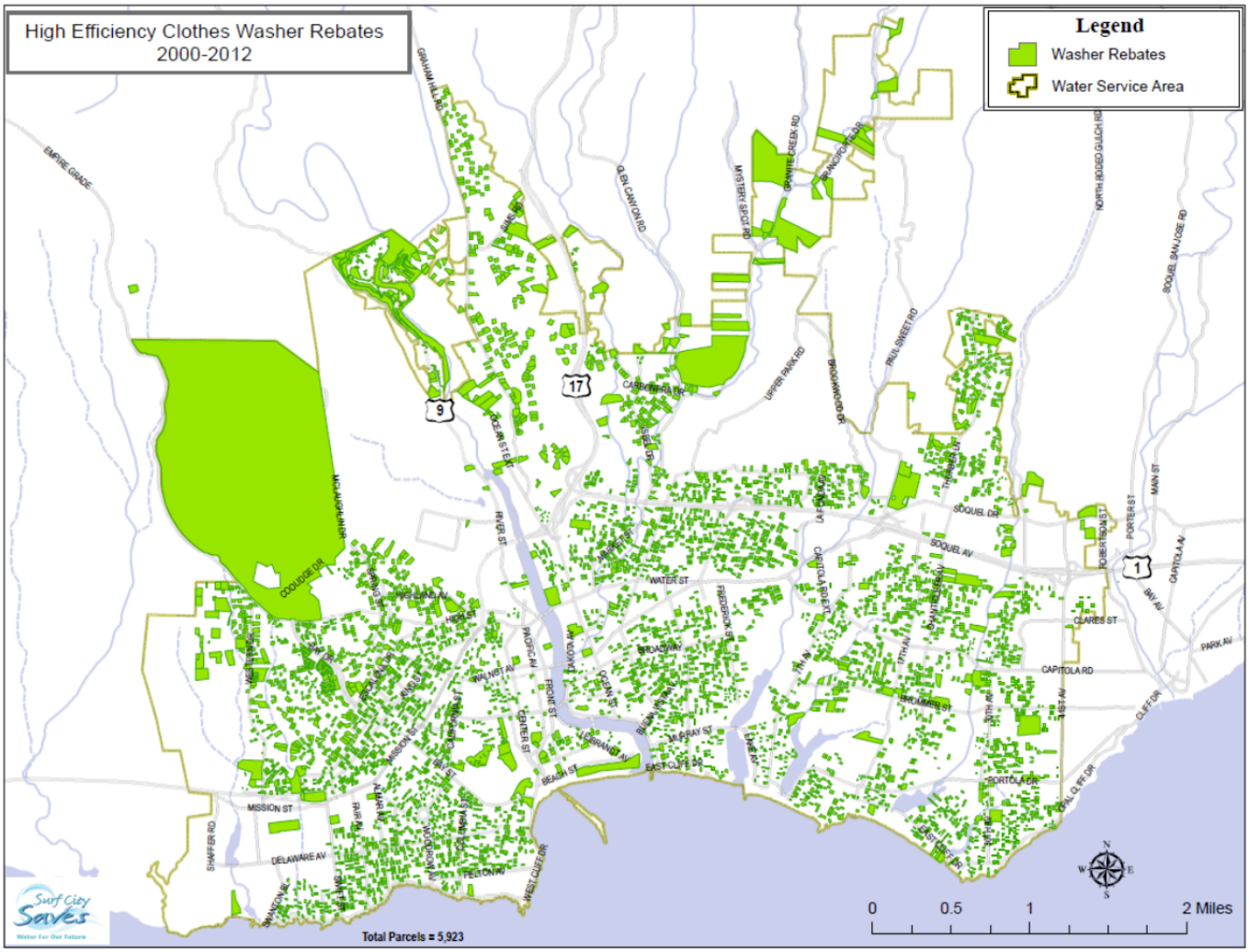
The following figure indicates the City's properties that have participated in a toilet rebate program or have been certified as complying with plumbing fixture retrofit regulations.

**Figure D-1. Plumbing Fixture Retrofit Certified Properties and Toilet Rebates**




The following figure presents an example of one map for all the properties that participated in their high efficiency clothes washer rebate incentive programs between 2000 and 2012. This map was created using Geographical Information System (GIS) mapping software and the database of customers that participated in the program.

**Figure D-2. Map of Incentives for High Efficiency Clothes Washers (Domestic and Commercial)**



CUWCC BMP Retail Coverage Report 2014

*Foundational Best Managemant Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

ON TRACK

**6270 City of Santa Cruz Water Department**

| | | |
|---|---|---|
| **1. Conservation Coordinator provided with necessary resources to implement BMPs?** | Name: | Toby Goddard |
| | Title: | Administrative Services Manager |
| | Email: | tgoddard@cityofsantacruz.com |

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No


CUWCC BMP Retail Coverage Report 2014

*Foundational Best Managemant Practices for Urban Water Efficiency*

BMP 1.1 Operation Practices ON TRACK

| | |
|---|---|
| Exemption | No |

Comments:

The City of Santa Cruz declared a Stage 3 Water Shortage Emergency effective May 1, 2014 and instituted water rationing for all residential and irrigation accounts, drought regulations for CII accounts, and outdoor water restrictions for all users.

# CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control — NOT ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2014 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 66 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 227 | 119438.04 | 244565 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

The City of Santa Cruz has contracted with Water Systems Optimization, Inc to conduct a water loss control project. The contract is for FY16, but the test period to be validated is 2014. See comment in 2013 re: AWWA OEI data not uploading properly

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

**ON TRACK**

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |

Date: 12/16/2013

Uploaded file name:

| | |
|---|---|
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

The City instituted water rationing in 2014 in response to a water shortage emergency and migrated all its customers to monthly billing effective April 2014. Previously most outside City accounts were billed bimonthly.

NOT ON TRACK

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

6270 City of Santa Cruz Water Department

Implementation (Water Rate Structure) ON TRACK

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 4097421.24 | 4674757.04 |
| Multi-Family | Uniform | Yes | 3615070.34 | 1333880.79 |
| Commercial | Uniform | Yes | 3178492.82 | 1131061.45 |
| Industrial | Uniform | Yes | 1178030.78 | 168046.78 |
| Institutional | Uniform | Yes | 183173.76 | 168907.53 |
| Dedicated Irrigation | Uniform | Yes | 853359.46 | 338205.43 |
| Agricultural | Uniform | Yes | 35224.07 | 37459.42 |
| Other | Uniform | Yes | 33070.92 | 12069.64 |
| | | | **13173843.39** | **7864388.08** |

**Calculate: V / (V + M)** **63 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

Agency Provide Sewer Service: Yes NOT ON TRACK

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: The City of Santa Cruz is using Option 3 for BMP 1.4. Coverage calculator does not seem to work; City earned 39 points in its matrix score.

# CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 24 |
| Website | 100 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 100 |
| **Total** | **234** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 50 |
| News releases | 24 |
| Newspaper contacts | 100 |
| **Total** | **174** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 3 Water Shortage Emergency and associated water restrictions |
| Water Supply Advisory Committee |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

**BMP 2.1 Public Outreach** ON TRACK

| | | |
|---|---|---|
| In addition to Water Conservation, there was considerable public outreach about future water supply. The City created a citizen's Water Supply Advisory Committee which met twice a month during 2014. | | |
| At Least As effective As | No | |
| | | |
| Exemption | No | 0 |

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs — ON TRACK

6270 City of Santa Cruz Water Department — Retail

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

12 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

## CUWCC BMP Coverage Report 2014

6270 City of Santa Cruz Water Department

**Baseline GPCD:** 123.83

GPCD in 2014 75.8

**GPCD Target for 2018:** 101.50

**Biennial GPCD Compliance Table** **ON TRACK**

| | | Target | | Highest Acceptable Bound | |
|---|---|---|---|---|---|
| Year | Report | % Base | GPCD | % Base | GPCD |
| 2010 | 1 | 96.4% | 119.40 | 100% | 123.80 |
| 2012 | 2 | 92.8% | 114.90 | 96.4% | 119.40 |
| 2014 | 3 | 89.2% | 110.50 | 92.8% | 114.90 |
| 2016 | 4 | 85.6% | 106.00 | 89.2% | 110.50 |
| 2018 | 5 | 82.0% | 101.50 | 82.0% | 101.50 |

CUWCC BMP Retail Coverage Report 2013

*Foundational Best Management Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

ON TRACK

**6270 City of Santa Cruz Water Department**

**1. Conservation Coordinator provided with necessary resources to implement BMPs?**

Name: Toby Goddard

Title: Water Conservation Manager

Email: tgoddard@cityofsantacruz.com

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No

CUWCC BMP Retail Coverage Report 2013

*Foundational Best Managemant Practices for Urban Water Efficiency*

BMP 1.1 Operation Practices ON TRACK

**Exemption** No

**Comments:**

The City of Santa Cruz declared a Stage 1 Water Shortage Alert effective May 1, 2013 and insitituted water restrictions throughout the year. Two temporary staff were hired to patrol the service area leading to 731 water waste enforcement actions.

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control — NOT ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2013 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 65 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 267 | 100884 | 320768 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

To CUWCC Staff: Please note that the operational efficiency indicators from the AWWA water audit software did not automatically populate the BMP database after uploading and saving. We tried converting format from .xlsx to .xls. We are using V5.0

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |
| Date: 12/16/2013 | |
| Uploaded file name: | |
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

1) The City bills all inside City and some large outside City customers on a monthly basis; outside City customers are billed bi-monthly. 2) Recent analysis of CII accounts shows 940 accounts with no outdoor water use, and 737 with mixed use.

NOT ON TRACK

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

**6270 City of Santa Cruz Water Department**

ON TRACK

Implementation (Water Rate Structure)

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 5918548.95 | 4472338.86 |
| Multi-Family | Uniform | Yes | 4107973.04 | 1268495.67 |
| Commercial | Uniform | Yes | 3379123.99 | 1074308.13 |
| Industrial | Uniform | Yes | 1320577.7 | 164488.08 |
| Institutional | Uniform | Yes | 313841.02 | 165728.5 |
| Dedicated Irrigation | Uniform | Yes | 1423156.26 | 325452.27 |
| Agricultural | Uniform | Yes | 39245.11 | 35365.59 |
| Other | Uniform | Yes | 36483.72 | 12810.98 |
| | | | **16538949.79** | **7518988.08** |

**Calculate: V / (V + M)** **69 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

NOT ON TRACK

Agency Provide Sewer Service: Yes

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: We are using Option 3 for BMP 1.4. Coverage calculator does not seem to work; the City earned 37 points in our matrix score.

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

ON TRACK

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 4 |
| Website | 12 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 6 |
| **Total** | **32** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 12 |
| News releases | 12 |
| Newspaper contacts | 24 |
| **Total** | **48** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 1 Water Shortage Alert and associated water restrictions |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

**BMP 2.1 Public Outreach** ON TRACK

| |
|---|
| In addition to Water Conservation, there was considerable public outreach about future water supply. In late 2013, the City created a citizen's Water Supply Advisory Committee. The Water Department also hired its first Community Relations Specialist |

| | | |
|---|---|---|
| **At Least As effective As** | No | |
| | | |
| **Exemption** | No | 0 |

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

15 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of the Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

# APPENDIX F – POTENTIAL WATER CONSERVATION MEASURES SCREENING PROCESS AND RESULTS

At its April 1, 2013 meeting, the City's Water Commission reviewed 1) the comprehensive list of existing and possible new water conservation measures prepared by MWM, and 2) the criteria proposed to rank and screen the measures down to a more manageable number for further modeling and analysis. In doing so, the Commission requested staff make more effort to solicit public ideas and input in the planning process.

In response to this request, City staff prepared and published display ads in the Santa Cruz Sentinel on both April 5, 2013 and April 12, 2013. A total of 63 suggestions were submitted by 22 individuals by the April 15, 2013 cutoff date. These community ideas for future water conservation programs are summarized in Figure F-1.

City staff and the consultant reviewed these 63 suggestions April 18, 2013. Many were considered to be sufficiently covered in the existing measure description, thus no change was needed. For others, conservation measure descriptions were modified, or a new line was added with the suggested measure incorporated. Finally, there were a handful of comments that either didn't fit into any particular demand management category or dealt with the subject of alternative water supplies, which is beyond the scope of this project.

On April 24, 2013 water conservation staff and the consultant performed the measure screening process. To make the ratings more understandable, consistent, and transparent, staff developed various qualitative/quantitative definitions for each of the numbers associated with the following six criteria:

1. Water Savings Potential (Service Area Match)
2. Sustainable Water Savings – emphasis on savings lifetime/reliability
3. Quantifiable Water Savings
4. Widespread Community & Social Acceptance (Technology/Market Maturity)
5. Feasibility of Implementation/Secondary Impacts – emphasis on ability to achieve objectives
6. Additional Service Area Benefits (GHG, Stormwater)

In some cases, ratings were obvious and straightforward. In others, it triggered deliberation and discussion involving different viewpoints, resulting in a score that fairly represented the consensus of the group.

The outcome of this process is shown in Table F-1. Essentially, the rating process resulted in the following four categories:

Group 1: The 23 top-rated measures that are recommended to be modeled for further analysis. Some of these measures have multiple components and therefore consist of more than one line-item.

Group 2: Measures that are considered important elements of a comprehensive water conservation program that were passed but will not be modeled. These include:

- Public education
- Water waste prohibition
- Landscape water conservation in new development
- Research

Group 3: The lower rated measures that are not recommended for modeling.

Group 4: Measures that were individually left unrated but potentially will be included in the design the measure included as part of the following measures to be modeled:

- Water loss control program
- Future public education initiatives
- Independent water rate study

The Water Commission was encouraged to review and comment on the screening outcome and consider including another 4-5 items from Group 3 to be modeled for further analysis. The project budget provided for a total of 30 measures to be analyzed in detail for costs and benefits. Though additional measures were not planned to be added after the modeling phase had started, many measures were modified, cut and/or added.

The following figure presents a compiled list of the community's ideas for future conservation programs.

**Figure F-1. Community Ideas for Future Water Conservation Programs**

| Program Type | Suggestion | Already Included in the Potential Measures List? |
|---|---|---|
| Water Loss | Collect annual flushing water into tanks and use as reclaimed water. | Item 3C |
| Water Loss | Include an estimate of future water lost to leakage when considering a program for replacing distribution system pipes. | Item 3B |
| Adv. Meter Infrastruct. | Allow customers to monitor their own water consumption via the computer. | Item 5A |
| Water Rates | Charge more for water usage. | Items 6A-B |
| Water Rates | Develop a formula for tying the price of water to population. | |
| Water Rates | Drastically reduce the 'Ready to Serve' charge while increasing the per unit water charge in a revenue neutral manner. | |
| Water Rates | Eliminate the 'Ready to Serve' charge, increase the per unit water charge in a revenue neutral manner, and charge a nominal fee when usage does not register as a billable water unit. | |
| Water Rates | Develop a separate billing category for individually metered apartments and multi-family residences. | |
| Water Rates | Charge more for water used to irrigate golf courses. | Item 6C |
| Water Rates | Increase the rates between tiers. | Item 6A |
| Water Rates | Study and implement a new and improved tiered rate structure that significantly encourages water conservation. | Items 6A-C |
| Indoor Plumb. Fixtures | Install pressure regulators on properties with high pressure. | Item 9D |
| Indoor Plumb. Fixtures | Require businesses to install 1.28gpf toilets and waterless urinals. | Items 15B, 18 |
| Indoor Plumb. Fixtures | Promote composting toilets. | Item 48A |
| Indoor Plumb. Fixtures | Make installation showerheads with shutoffs, ulfts, and waterless urinals mandatory in all hotels and motels. | Items 12A, 13, 15A, 17, 18 |
| Indoor Plumb. Fixtures | Require waterless urinals as part of the building code. | |
| Hot Water on Demand | Promote hot water recirculation pumps. | |
| Hot Water on Demand | Study water savings for hot water on demand pumps and potentially fund program using developer funded offsets. | Items 20A-B |
| Clothes Washers | Buy everyone a High Efficiency Clothes Washer. | |
| Clothes Washers | Offer an immediate "no interest" loan for every household in the service area to purchase a high efficiency clothes washer. | |
| Irrigation/ Washers | Increase incentives to save water e.g. lawn removal, water catchment, and water/energy efficient clothes washers. | Items 21A-B, 26-31, 35A-35B |
| Irrigation | Give rebates to customers who plant drought-resistant and native plants. | Item 26 |
| Irrigation | Ban sprinkler systems. | |
| Irrigation | Increase the turf replacement rebate from $0.50/sq ft to $1.00/sq ft with an upper limit of $1,000. | 27A |
| Irrigation | Develop water conservation programs for agricultural customers focusing on irrigation practices. | |
| Irrigation | New home and business construction should include drought resistant landscaping and permeable paving. | Item 32 |
| Irrigation | Provide funding for drought tolerant landscaping | Items 26, 27A-B |
| Rainwater Catchment | Establish large rain water collection tanks. | |
| Rainwater Catchment | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Item 35B |
| Rainwater Catchment | Install rainwater catchment systems and use water for flushing toilets. | |
| Rainwater/Graywater | Revise local building code to facilitate use of rainwater and graywater, e.g. rainwater to toilet. | Items 36B, D |
| Graywater | Offer incentives for graywater installation. | Items 36A,C, D |
| Graywater | Plumb for reuseable grey water to be available outdoors or for toilets. | Items 36A-D |
| Graywater | Require golf courses use to use graywater. | |
| Graywater | Every new and existing home should catch and use graywater to water the yard. | Items 36A-C |
| Public Education | Publish a weekly report of the service area's water consumption. | |
| Public Education | Develop a public awareness campaign focusing on total water consumption. | Item 47D |
| Public Education | Publish water consumption data by neighborhood and by large users. | Item 47D |

The following table presents the City's measure screening results.

**Table F-1. Measure Screening Results**

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| **Group 1 - Top Rated Measures Planned to be Modeled** | | | | | | | | | | | | | | | |
| 1A | Clothes Washers | Residential Washer Rebate | SF, MF Indoor | Provide a rebate for efficient washing machines to single family homes and apartment complexes that have common laundry rooms. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology. This program would be similar the City's current program. Current rebate $100. Rebate could be modified to increase incentive for the most efficient washers *up to full replacement cost*. | 5 | 3.5 | 5 | 5 | 5 | 2 | 25.5 | Yes | Yes | 19) Buy everyone a High Efficiency Clothes Washer. 20) Offer an immediate "no interest" loan for every household in the service area to purchase a high efficiency clothes washer. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 1B | Clothes Washers | High Efficiency Washer Rebate | CII Indoor | Provide a $400 rebate for the installation of a high efficiency commercial washer (HEW). Rebate amounts would reflect the incremental purchase cost. Program will be shorter lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation. | 4 | 3.5 | 5 | 5 | 5 | 2 | 24.5 | Yes | Yes | Buy everyone a High Efficiency Clothes Washer. | Uses per machine is higher than residential, less accounts |
| 2 | Clothes Washers | Require High Efficiency Clothes Washers in New Developme nt | New SF Indoor | Require developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons/load), Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. Verify that the Utility can enforce conditions of water service that may include efficiency | 4 | 3.5 | 5 | 5 | 3 | 2 | 22.5 | Yes | No | | Requires changing local codes |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | standards for washing machines. Pattern after the North Marin Water District Program. | | | | | | | | | | | |
| 3 | Water Loss | Water Loss Control Program | System | City of Santa Cruz's water losses are relatively low. This measure would seek to maintain low non-revenue water rates through controlling both apparent and real water losses. This would be annual tracked through the AWWA Water Balance Water System Audit. | 4 | 4 | 5 | 5 | 3 | 1 | 22 | Yes | No | | |
| 4 | Indoor Plumbing Fixtures | Ultra High Efficiency Toilet (UHET) Rebates | SF MF | Provide a rebate or voucher for the installation of an ultra high efficiency toilet (UHET). (Toilets flushing 1.0 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $150. | 4 | 5 | 4 | 3 | 5 | 0 | 21 | Yes | No | | Modify UHET Program <1.0 gpf toilets |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 5 | Hot Water on Demand | Provide a Rebate for Hot Water on Demand Pump Systems | SF Indoor | Provide a rebate to equip homes with efficient hot water on demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to reduce hot water waiting times by having an on-demand pump on a recirculation line. Can be installed on kitchen sink or master bath, wherever hot water waiting times are more than 1/2 minute. Requires an electrical outlet under the sink, which is not common on older home bathrooms but is on kitchen sinks. | 4 | 2 | 3 | 5 | 5 | 2 | 21 | Yes | No | 17) Promote hot water recircu-lation pumps. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 6 | Irrigation | Outdoor Water Audit | Large Irrigation Customers - Outdoor Only | Outdoor water audits offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multi-family residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. Tied to the Water Budget Program. | 4 | 1 | 4 | 5 | 5 | 2 | 21 | Yes | No | | Measureable on Waterfluence |
| 7A | Irrigation | Landscape Conversion or Turf Removal | SF | Provide a per square foot incentive for to remove turf and replace with low water use plants or permeable hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed, and capped at an upper limit of $500 for single family residence. *Consider higher rebate amount.* | 4 | 2.5 | 4 | 5 | 4 | 1 | 20.5 | Yes | Yes | Increase incentives to save water e.g. lawn removal, water catchment, and water/ energy efficient clothes washers. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 7B | Irrigation | Landscape Conversion or Turf Removal | MF CII | Provide a per square foot incentive for to remove turf and replace with low water use plants or hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed, and capped at an upper limit of $2,500 for multi-family or commercial residence. | 3 | 3 | 4 | 5 | 4 | 1 | 20 | Yes | Yes | | |
| 8A | Advanced Meter Infrastruct ure (AMI) | Targeted AMI to Irrigation or Large User Accounts | ALL | Require that larger or irrigation customers install such AMI meters as described above and possibly purchase means of viewing daily consumption by landscape/property managers, or business either through the Internet (if available) or separate device. The AMI system would, on demand, indicate to the customer and Utility where and how their water is used, | 2 | 4 | 4 | 4 | 4 | 2 | 20 | Yes | Yes | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | facilitating water use reduction and prompt leak identification. This would require Utility to install an AMI system. | | | | | | | | | | | |
| 8B | Advanced Meter Infrastruct ure (AMI) | Install AMI System-wide | ALL | Retrofit system with AMI meters and associated network capable of providing continuous consumption data to Utility offices. Improved identification of system and customer leaks is major conservation benefit. Some of costs of these systems are offset by operational efficiencies and reduced staffing, as regular meter reading and those for opening and closing accounts are accomplished without need for physical or drive-by meter reading. Also enables enhanced billing options and ability to monitor | 4 | 4 | 3 | 4 | 2 | 2 | 19 | Yes | Yes | Allow customers to monitor their own water consump-tion via the computer. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | unauthorized usage (such as use/tampering with closed accounts or irrigation if time of day or days per week are regulated). Customer service is improved as staff can quickly access continuous usage records to address customer inquiries. Optional features include online customer access to their usage, which has been shown to improve accountability and reduce water use. A ten-year change-out would be a reasonable objective. | | | | | | | | | | | |
| 9 | Indoor Plumbing Fixtures | Real Customer Water Loss Reduction - Leak Repair and Plumbing Emergency Assistance | SFR, MFR | Customer leaks can go uncorrected at properties where owners are least able to pay costs of repair. These programs may require that customer leaks be repaired, but either subsidize part of the repair and/or pay the cost with revolving | 4 | 2 | 4 | 5 | 4 | 1 | 20 | Yes | No | | Social justice benefits to low income households |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | funds that are paid back with water bills over time. May also include an option to replace inefficient plumbing fixtures at low-income residences. | | | | | | | | | | | |
| 10A | Indoor Plumbing Fixtures | High Efficiency Faucet Aerator/ Shower-head Giveaway | SF MF | Utility would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. | 2 | 3 | 4 | 4 | 5 | 2 | 20 | Yes | Yes | | Giveaway, don't know if installed |
| 10B | Indoor Plumbing Fixtures | High Efficiency Faucet Aerator/ Shower-head Giveaway | CII | Utility would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. | 1 | 3 | 4 | 4 | 5 | 2 | 19 | Yes | Yes | | Hotel opportunities ? |
| 11 | Indoor Plumbing Fixtures | Toilet Retrofit at Time of Sale | ALL | Work with real estate industry to require a certificate of compliance be submitted to Utility that verifies a plumber has inspected property and efficient fixtures were either already there or were installed at time of sale. | 2 | 5 | 4 | 4 | 5 | 0 | 20 | Yes | No | | Saturated and 1.6 gpf would get an exemption |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 12 | Irrigation | Outdoor Water Surveys | SF MF | Outdoor water surveys offered for existing customers. Normally those with high water use are targeted and provided a customized report on how to save water. Can be combined with indoor surveys or focused on certain customer classes. All single family and multi-family residential would be eligible for free landscape water surveys upon request. | 4 | 1 | 3 | 5 | 5 | 2 | 20 | Yes | No | | Customer service, water quality runoff benefits |
| 13A | CII Equip-ment | Customized Top Users Incentive Program | CII Indoor/ Outdoor | After the free water use survey has been completed at site, the Utility will analyze the recommendations on the findings report that is provided and determine if site qualifies for a financial incentive. Financial incentives will be provided after analyzing the cost benefit ratio of each proposed project. Incentives are tailored | 3 | 4 | 4 | 4 | 4 | 1 | 20 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | to each individual site as each site has varying water savings potentials. Incentives will be granted at the sole discretion of the Utility while funding lasts. | | | | | | | | | | | |
| 13B | CII Equip-ment | Promote Restaurant Spray Nozzles | CII Indoor | Provide free 1.3 gpm (or lower) spray nozzles and possibly free installation for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door, very cost-effective because saves hot water. | 4 | 4 | 5 | 4 | 4 | 2 | 23 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 14 | CII Equip-ment | CII Surveys and Top Water Users Program (Top customers from each customer category) | CII Indoor/ Outdoor | Top water customers from each category would be offered a professional water survey that would evaluate ways for the business to save water and money. The surveys would be for large accounts (such as, accounts that use more than 5,000 gallons of water per day) such as hotels, restaurants, stores and schools. Emphasis will be on supporting the top 25 users for each customer category. | 3 | 2 | 3 | 3 | 4 | 1 | 16 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| 15 | Water Rates | Water Budget Based Billing | Dedicated Meters – Outdoor Use is primary focus | Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as the size of the irrigated area and often vary seasonally to reflect weather during the billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Could combine this measure with Measures 6A -6C. This measure would require rate study and capable billing software. | 2 | 4 | 4 | 4 | 4 | 1 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 16 | Indoor Plumbing Fixtures | Single Family Water Surveys | SF Indoor | Indoor water surveys for existing single family residential customers. Target those with high water use and provide a customized report to owner. May include give-away of efficient shower heads, aerators, toilet devices. Usually combined with outdoor surveys (See Irrigation Measures). | 3 | 1 | 3 | 5 | 5 | 2 | 19 | Yes | No | | Important customer service benefits |
| 17 | Indoor Plumbing Fixtures | Pressure Reduction | ALL | Provide incentive to install pressure regulating valve on existing properties with pressure exceeding 80 psi. | 2 | 5 | 3 | 5 | 3 | 1 | 19 | Yes | | 11) Install pressure regulators on properties with high pressure. | |
| 18 | Indoor Plumbing Fixtures | High Efficiency Urinal Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency urinals. WaterSense standard is .5 gpf or less, though models flushing as low as 0.125 gpf (1 pint) are available and function well, so could be specified. Rebate | 3 | 4 | 4 | 5 | 3 | 0 | 19 | Yes | No | | Unsure about capability to retrofit existing CII Buildings |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | amounts would reflect the incremental purchase cost and have been about $300. | | | | | | | | | | | |
| 19 | Indoor Plumbing Fixtures | Install High Efficiency Toilets, Shower-heads, and Faucet Aerators in Residential Buildings | SF, MF | Utility would subsidize installation cost of a new HET purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. *Example: the Niagara City Smart Program* | 4 | 4 | 4 | 2 | 4 | 1 | 19 | Yes | No | | |
| 20 | Indoor Plumbing Fixtures | Install sensor-activated faucets | CII Indoor | Consider direct install program, rebates or grants for installation of high efficiency sensor faucet fixtures in all or selected high-use commercial or institutional buildings. | 2 | 3 | 2 | 5 | 5 | 2 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| 21 | Hot Water on Demand | Require Hot Water on Demand/ Structured Plumbing in New Develop-ments | SF Indoor | Work with developers to equip new homes or buildings with efficient hot water on demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line. | 2 | 2 | 3 | 5 | 5 | 2 | 19 | Yes | No | | |
| 22 | CII Equip-ment | School Building Retrofit | CII Indoor/ Outdoor | School retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Expand current City Program, pattern after EBMUD program. | 2 | 4 | 4 | 5 | 4 | 0 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 23A | Irrigation | Financial Incentives for Irrigation and Landscape Upgrades | ALL | For SF, MF, CII, and IRR customers with landscape, provide a Smart Landscape Rebate Program with rebates for substantive landscape retrofits or installation of water efficient upgrades; Rebates contribute towards the purchase and installation of water-wise plants, compost, mulch and selected types of irrigation equipment upgrades. Rebate for residential accounts and up to 50% more for commercial customers. | 4 | 2.5 | 3 | 5 | 3 | 1 | 18.5 | Yes | Yes | | |
| 23B | Irrigation | Rotating Sprinkler Nozzle Rebates | ALL Outdoor | Provide rebates to replace standard spray sprinkler nozzles with rotating nozzles that have lower application rates. Nozzles cost about $6 and rebates have been on the order of $4 with a minimum purchase of about 20 nozzles. | 4 | 3 | 5 | 5 | 4 | 1 | 22 | Yes | Yes | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 24 | Irrigation | Shade Tree Program | ALL | Provide incentives and information to promote shade tree planting as a water conservation measure. Potential for Water-Energy Partnership. | 2 | 5 | 2 | 5 | 5 | 1 | 20 | Yes | Yes | | |
| 25 | Rainwater Catchmen t | Provide Rain Barrel Incentive | SFR Outdoor | Provide incentive for installation of rain barrels. This could involve rebates or bulk purchase and giveaways of barrels plus workshops on proper installation and use of captured rain water for landscape irrigation. Pattern after Honolulu Board of Water Supply program. | 2 | 3 | 2 | 5 | 4 | 1 | 17 | Yes | Yes | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Current Program |
| 26 | Irrigation | Weather-Based Irrigation Controller Rebates | ALL | Provide a per station rebate (typically $25 per station) up to a 50% cost-share for the purchase of a weather based irrigation controller. These controllers have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least | 3 | 2 | 3 | 2 | 3 | 1 | 14 | No | | | Retrofitted existing homes only |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | weekly. Requires local irrigation contractors who are competent with these products, so may require sponsoring a training program in association with this measure. | | | | | | | | | | | |
| 27 | Irrigation | Require Rain Sensors | Outdoor ALL or Selected | Require installation of rain sensor shut-off devices when installing new irrigation systems. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |
| 28 | Rainwater Catch-ment | Provide Incentive for Large Rainwater Catchment Systems | MFR CII IRR Outdoor | Provide incentive for installation of large rainwater catchment systems. This could involve rebates, grants and other cost share methods. Might require simultaneous installation of water efficient landscaping to assure that amount of water collected is capable of lasting into peak irrigation season. | 1 | 3 | 2 | 3 | 3 | 1 | 13 | No | | | |
| 29 | Gray water | Gray water Retrofit SF | SF Outdoor | Provide a rebate to assist a certain percentage of single family homeowners per year to install gray water systems. | 3 | 2 | 1 | 3 | 3 | 0 | 12 | No | | Offer incentives for graywater installation. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 30 | Indoor Plumbing Fixtures | High Efficiency Toilet (HET) Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency toilet (HET). (Toilets flushing 1.28 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $200. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | CII difficult to motivate the change |
| 31 | Indoor Plumbing Fixtures | Plumber Initiated High Efficiency Toilet and/ or Urinal Retrofit Program | CII | Utility would subsidize installation cost of a new HET/ urinals purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. Pattern after Sonoma County program. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | Mixed response from CII Customers, Practical obstacles of direct install type program |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| **Group 2 - Measures Intended for Plan, not to be Modeled** | | | | | | | | | | | | | | | |
| | Public Education | ALL | ALL | Comprehensive education and public awareness campaign that would evolve over the years and seek to drive participation in other conservation programs. | | | | | | | 0 | Yes | Yes | | |
| | Other | Prohibit Once through Cooling, Non-Recycling Fountains, Water Wasting Fixtures and Practices | CII | Prohibit certain obvious wastes of water in new and existing facilities, such as those listed. Consider requiring retrofits of existing situations, allowing reasonable time for compliance. | | | | | | | 0 | Yes | Yes | | Not ranked. Included. |
| | Other Outdoor | Prohibit Water Waste and Practices | All Outdoor | Adopt or modify ordinance that prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner. | 4 | 1 | 1 | 5 | 5 | 1 | 17 | No | | | Required, stormwater benefits |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| City Code | Irrigation | Water Conserving Landscape and Irrigation Codes | ALL | Develop and enforce Water Efficient Landscape Design Standards. Standards specify that development projects subject to design review be landscaped according to climate appropriate principals, with appropriate turf ratios, plant selection, efficient irrigation systems and smart irrigation controllers. There are many examples that have demonstrated significant water savings. The ordinance could require certification of landscape professionals. | 1 | 4 | 3 | 4 | 4 | 1 | 17 | Yes | Yes | New home and business construc-tion should include drought resistant landscaping and permeable paving. | Current Code |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| City Code | Irrigation | Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Develop-ment | ALL | Require developers for all properties of greater than four residential units and all commercial development to install the weather based irrigation controllers. Some utilities offer rebates for rain sensors. For example, see Cal Green building code that requires this on all new buildings with an irrigation system. Like line 28, may require landscaper training. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | Current Ordinance for City |
| City Code | Irrigation | Require Irrigation Designers/ Installers be Certified – possibly by Irrigation Association or CA Landscape Contractors Association | CII Outdoor | Require design/ installation of irrigation systems by trained/certified contractors. Certification might be through the CLCA, Irrigation Association (IA) and/or specialized training provided by utility. Model after Cary North Carolina's program. | 1 | 4 | 2 | 4 | 4 | 1 | 16 | Yes | Yes | | Current Code |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Other | Research | ALL | *Support the potential Best Management Practices, including hot water recirculation pumps, and other emerging technologies or approaches to conservation. End Use analysis, savings evaluations, continued monitor Baseline Study and AWWA studies and CUWCC support.* | | | | | | | 0 | | | 18) Study water savings for hot water on demand pumps and potentially fund program using developer funded offsets. | Not ranked. Include in plan |
| **Group 3 - Measures Not Selected for Plan or to be Modeled** | | | | | | | | | | | | | | | |
| | Indoor Plumbing Fixtures | Multi-Family Water Surveys | MF Indoor | Indoor water surveys for existing multifamily residential customers (2 units or more). Target those with high water use and provided a customized report to owner. Usually combined with outdoor surveys (see Irrigation Measures) and sometimes with single family surveys. | 2 | 3 | 2 | 5 | 5 | 1 | 18 | No | Consider Including | | Economy of scale – many customers when property manager, and facility maintenance. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | Indoor Plumbing Fixtures | High Efficiency Toilet (HET) Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency toilet (HET). Toilets flushing 1.28 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $200. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | CII difficult to motivate the change |
| | Indoor Plumbing Fixtures | Plumber Initiated High Efficiency Toilet and/ or Urinal Retrofit Program | CII | Utility would subsidize installation cost of a new HET/urinals purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. Pattern after Sonoma County program. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | Mixed response from CII Customers, Practical obstacles of direct install type program |
| | Indoor Plumbing Fixtures | Install High Efficiency Fixtures in Governmen t Buildings | CII Indoor | Provide rebates or grants to install high efficiency faucets, toilets, urinals and showerheads in local and state government facilities. | 2 | 5 | 4 | 4 | 3 | 0 | 18 | No | Consider Including | | Consider county jail, use Otay WD example (William Granger) |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | Install High Efficiency Toilets, Urinals, and Showerheads in Commercial Buildings | CII Indoor | Consider direct install program-type for installation of high efficiency fixtures in all or selected commercial or institutional buildings. Replacements would include high efficiency toilets, showerhead, and waterless or high efficiency urinals. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | Require businesses to install 1.28gpf toilets and waterless urinals. | Same as 13A – could be more turn-key with City Smart Program. Schools? |
| | Dish-washers | Efficient Dishwasher Rebates | SF Indoor | Provide a rebate to encourage homeowner to purchase an efficient dishwasher (meeting certain water efficiency standards, such as a limit on the gallons/load) when replacing an existing dishwasher. | 2 | 3 | 2 | 5 | 5 | 1 | 18 | No | Consider Including | | Baseline study shows relatively modern machines in service area |
| | Irrigation | Artificial Turf Sports Fields | IRR Outdoor | Provide a rebate (up to $10,000) as a cost share for customer wishing to install artificial grass on sports fields, parks, or golf courses. | 2 | 3 | 4 | 3 | 5 | 1 | 18 | No | Consider Including | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | Sub-metering | MF Submeter Incentive | Existing MF Indoor | Provide a rebate (per unit) to assist MF building owners installing submeters on each existing individual apartment or condominium unit. | 3 | 4 | 4 | 4 | 1 | 1 | 17 | No | | | |
| | Indoor Plumbing Fixtures | Install High Efficiency Fixtures in Low Income Housing | SFR/MFR | Direct install type toilet replacement program in in low income housing operated a government agency/ housing authority. | 1 | 5 | 4 | 4 | 3 | 0 | 17 | No | | | |
| | CII Equip-ment | CII Rebates to Replace Inefficient Equipment | Existing Customers CII | Expand on the City's program to provide rebates for a standard list of water efficient equipment. Included: x-ray machines, icemakers, air-cooled ice machines, steamers, washers, spray valves, efficient dishwashers, replace once through cooling, and add conductivity controller on cooling towers. Pattern after San Diego County Water Authority or Seattle Water Department programs. | 2 | 3 | 3 | 4 | 4 | 1 | 17 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | CII Equip-ment | Hotels/Mot els Retrofit w/Financial Assistance | CII Indoor | Following a free water audit offer motels a rebate for equipment identified that would save water. Or provide a rebate schedule for certain efficient equipment such as air-cooled ice machines that motels could apply for without an audit. Pattern after San Antonio, Texas program. | 2 | 3 | 3 | 4 | 4 | 1 | 17 | No | | | |
| | Sub-metering | Mobile Home Park Sub-metering | MF Indoor | Require or provide a partial cost rebate to meter all remaining mobile home parks that are currently master metered but not separately metered, pattern after Santa Clara Valley Water District program. | 1 | 4 | 4 | 4 | 3 | 0 | 16 | No | | | Most already accomplished this. |
| | Sub-metering | Require Multifamily Sub-metering for New Developme nts | New MF Indoor | Require the submetering of individual units in new multi-family, condos, townhouses, and mobile-home parks. | 1 | 4 | 4 | 4 | 2 | 1 | 16 | No | | | Require Code Change |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | Require Fixture Replacement by a Deadline | ALL | Utility would pass an ordinance that requires certain targeted sectors of businesses to bring fixtures up to efficient standard by a fixed date at their own expense. | 2 | 4 | 5 | 2 | 2 | 1 | 16 | No | | | Look to sectors |
| | Irrigation | Landscape irrigation restricted to designated days and times | ALL Outdoor | Specify specific irrigation schedules, including which days and times watering is allowed. Would help with load balancing system demands with planning for water areas can water on what days. Consider water waste enforcement approach. For an example see the Southern Nevada Water Authority program. http://www.snwa.com/consv/restrictions_landscape.html | 4 | 2 | 4 | 3 | 2 | 1 | 16 | No | | | Requires local codes |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | Require <0.25 gal/flush urinals in new develop-ment | CII (New Develop-ment) | Require that new building be fitted with 0.25 gpf (or one pint) *or less* urinals rather than the current standard of 0.5 gal/flush models. | 1 | 4 | 4 | 4 | 2 | 0 | 15 | No | | Require businesses to install 1.28gpf toilets and waterless urinals. 16) Require waterless urinals as part of the building code. | |
| | Dishwash ers | Require Efficient Dish-washers in New Develop-ment | SF Indoor | Require developers to install an efficient dishwasher (meeting certain water efficiency standards, such as gallons/load). | 1 | 3 | 2 | 5 | 3 | 1 | 15 | No | | | Requires changing local codes |
| | CII Equip-ment | Water Savings Performanc e Program | CII Indoor | Water Districts such as the East Bay Municipal Utility District and Metropolitan Water District of Southern California provide about $0.50 per 748 gallons (1 billing unit) saved to sites within the City's service area. Incentive is based on the potential for savings over 5 years. | 2 | 3 | 3 | 2 | 4 | 1 | 15 | No | | | Switch to non-potable supply? |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | Eligible project costs include labor, hardware and up to 1 year of water management fees. | | | | | | | | | | | |
| | Other | Low Impact New and Remodeled Developme nt | ALL | City would require developers of new/remodeled sites to follow Low Impact Development concepts/standards/Be st Management Practices for stormwater and water conservation benefits. Encourage or require use of bio-retention facilities, rain water cisterns, graywater plumbing, etc. | 1 | 4 | 1 | 4 | 4 | 1 | 15 | No | | | Public Works Dept. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Advanced Meter Infrastruct ure (AMI) | Install AMI New Develop-ment Only | ALL | Require that new customers install such AMI meters as described above and possibly purchase means of viewing daily consumption inside their home/business either through the Internet (if available) or separate device. The AMI system would, on demand, indicate to the customer and Utility where and how their water is used, facilitating water use reduction and prompt leak identification. This would require Utility to install an AMI system. | 1 | 4 | 3 | 4 | 0 | 2 | 14 | No | | | |
| | Sub-metering | MF Submeter Incentive | New MF Indoor | Provide a rebate (per unit) to assist MF building owners installing submeters on each new individual apartment unit. | 1 | 4 | 4 | 4 | 0 | 1 | 14 | No | | | Already required unless space is not available. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | High Efficiency Toilet and/ or Urinal Bulk Purchase Program | ALL | Utility would buy HETs or urinals in bulk and give them away or sell them at a discounted price for customers who want to replace a 3.5 gallon/flush toilet or >1 gal/flush urinal. | 3 | 4 | 4 | 2 | 1 | 0 | 14 | No | | | |
| | Irrigation | Weather-Based Irrigation Controller Rebates | ALL | Provide a per station rebate (typically $25 per station) up to a 50% cost-share for the purchase of a weather based irrigation controller. These controllers have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly. Requires local irrigation contractors who are competent with these products, so may require sponsoring a training program in association with this measure. | 3 | 2 | 3 | 2 | 3 | 1 | 14 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| | Irrigation | Rebate or Free Rain Sensors | Outdoor ALL or Selected | Provide a rebate or free rain sensor shut-off device for existing irrigation controllers. These cancel scheduled sprinkling when sufficient rain has been received. This measure is most effective in areas with intermittent rain in peak watering seasons. | 2 | 2 | 2 | 4 | 3 | 1 | 14 | No | | | |
| | Rainwater Catch-ment | Require Rain Barrel | SFR Outdoor | *All new homes would need a rainwater catchment* | 1 | 3 | 2 | 4 | 3 | 1 | 14 | No | | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Explain - plumbed for non-potable (or potable use) use for irrigation. Code change required |
| | CII Equip-ment | Require Plan Review for new CII | CII Indoor / Outdoor | Require plan reviews for water use efficiency for all new business customers. | 1 | 3 | 2 | 4 | 4 | 0 | 14 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | CII Equip-ment | Focused Water Audits for Hotels/ Motels | CII Indoor/ Outdoor | Proved free water audits to hotels and motels. Standardize on the types of services offered to reduce costs. Included would be bathrooms, kitchens, ice machines, laundry, landscaping, and irrigation systems and schedules. | 1 | 1 | 3 | 4 | 4 | 1 | 14 | No | | | |
| | CII Equip-ment | Hotels/Mot els Retrofit | CII Indoor | *Require schedule for certain efficient plumbing fixtures be replaced by a deadline.* | 2 | 3 | 4 | 2 | 2 | 1 | 14 | No | | Make installation showerhea ds with shutoffs, ULFT's, and waterless urinals mandatory in all hotels and motels. | |
| | Irrigation | Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Develop-ment | ALL | Require developers for all properties of greater than four residential units and all commercial development to install the weather based irrigation controllers. Some utilities offer rebates for rain sensors. For example, | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | see Cal Green building code that requires this on all new buildings with an irrigation system. Like line 28, may require landscaper training. | | | | | | | | | | | |
| | Irrigation | Require Rain Sensors | Outdoor ALL or Selected | Require installation of rain sensor shut-off devices when installing new irrigation systems. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |
| | Rainwater Catch-ment | Provide Incentive for Large Rainwater Catchment Systems | MFR CII IRR Outdoor | Provide incentive for installation of large rainwater catchment systems. This could involve rebates, grants and other cost share methods. Might require simultaneous installation of water efficient landscaping to assure that amount of water collected is capable of lasting into the peak irrigation season. | 1 | 3 | 2 | 3 | 3 | 1 | 13 | No | | | |
| | Gray water | Gray water Retrofit SF | SF Outdoor | Provide a rebate to assist a certain percentage of single family homeowners per year to install gray water systems. | 3 | 2 | 1 | 3 | 3 | 0 | 12 | No | | Offer incentives for graywater installation. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | Other Outdoor | Require or Rebate Swimming Pool Covers | ALL Outdoor | Provide a rebate through pool equipment supply stores for purchase of a swimming pool cover. | 1 | 2 | 1 | 3 | 4 | 0 | 11 | No | | | |
| | Other | Regulations | ALL | *Ban Sprinkler Systems* | 5 | 0 | 3 | 1 | 0 | 1 | 10 | No | | | |
| | Indoor Plumbing Fixtures | Garbage Disposal | SF Indoor | Encourage 1% of single family homeowners per year to remove garbage disposals. Could provide a rebate. | 2 | 2 | 1 | 1 | 3 | 0 | 9 | No | | | |
| | Rainwater Catchmen t | Promote Rain Barrel | SFR Outdoor/In door | *Promote with an incentive rainwater catchment for toilet flushing.* | 1 | 3 | 2 | 2 | 1 | 0 | 9 | No | | Install rainwater catchment systems and use water for flushing toilets. | |
| | Gray water | Require Plumbing for Gray Water in New SF Develop-ment | SF Outdoor | Require builders of single family homes to provide plumbing for and/or install a gray water system in new homes. | 1 | 2 | 1 | 3 | 2 | 0 | 9 | No | | Revise local building code to facilitate use of rainwater and graywater, e.g. rainwater to toilet. Plumb for | Requires Code Change and enforcement |

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| | | | | | | | | | | | | | | reusable grey water to be available outdoors or for toilets. | |
| | Gray Water | SF Toilet Reuse | SFR, MFR | *Recycle lavatory sink water for toilet flushing, such as Aqus System* | 1 | 2 | 1 | 3 | 2 | 0 | 9 | No | | Every new and existing home should catch and use graywater to water the yard. | |
| | Indoor Plumbing Fixtures | Compost-ing Toilet Promotions | Residential | *Promote composting toilets.* | 3 | 2 | 2 | 1 | 0 | 0 | 8 | No | | 14) Promote composting toilets. | Change of law |
| | Gray water | Rebate for Gray Water Systems in New CII Develop-ment | CII Outdoor | Provide a rebate for gray water systems in new CII development, in accordance with existing codes. *Consider graywater for golf courses.* | 0 | 2 | 1 | 3 | 2 | 0 | 8 | No | | Require golf courses use to use graywater. | Domestic use in hotels only |

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| | Other | Agricultural | ALL | *Develop water conservation programs for agricultural customers focusing on irrigation practices.* | 1 | 2 | 1 | 3 | 0 | 1 | 8 | No | | | Most north coast agriculture customers do not use City water. Water Department operational benefits on raw water transmission line. |
| | CII Equip-ment | Rebates for Submeters on Cooling Towers | CII Indoor | Offer a rebate to buildings that install submeters to measure the make-up and bleed-off water of the facility cooling towers. Provide educational brochures and a phone contact of a knowledgeable person to provide conservation information. | See WD comment | | | | | | 0 | No | | | Only applies to one site. Not ranked |

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| | CII Equipmen t | Rebates for Conduc-tivity Controllers on Cooling Towers | CII Indoor | Offer a rebate ($900-$1,200 dependent on type) to buildings that install conductivity controllers to reduce bleed-off water of the facility cooling towers. Provide educational brochures and a phone contact of a knowledgeable person to provide conservation information. | See WD comment | | | | | | 0 | No | | | UC completed this. One more site eligible. |
| | CII Equipmen t | Cooling Tower Regulations | CII Indoor | Prohibit discharge of cooling tower blow down unless the TDS of the water is at least a certain level (that would ensure 5-10 cycles of concentration). Pattern regulations after the State of Arizona. | See WD comment | | | | | | 0 | No | | | Not applicable |
| | CII Equipmen t | Dry Vacuum Pump | CII Indoor | Provide a rebate to assist CII with installation of dry vacuum pumps. (Possibly combine into Measure #40B CII Inefficient Equipment) | See WD comment | | | | | | 0 | No | | | Not ranked. Few sites. |

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| | Other | Encourage "Life Cycle Analysis" Mentality of Sustain-ability and Reliability | ALL | Encourage customers to "save water" instead of "sell water". This is a suggested fundamental business model change that would focus on infrastructure delay or prevention by focusing on lowering production. Key would be to get customers to believe in this idea and message as well as management and directors. This is a paradigm shift to the importance of the entire "life cycle" cost of water including review and inclusion of the energy and Green House Gas components associated with each and every gallon of water use. | See WD comment | | | | | | 0 | | | | Education program. Cultural philosophy of efficient water use. Add more into energy education of water use, for example. |
| **Group 4 - Unrated Measures May Be Included in Group 1 Measures Design when Modeled** | | | | | | | | | | | | | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
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| *Included in above Water Loss Measure* | Water Loss | Conduct Annual System Water Use Audit | System | Maintain a thorough annual accounting of water production, sales by customer class and quantity of water produced but not sold (non-revenue water). In conjunction with system accounting, include audits that identify and quantify known legitimate uses of non-revenue water in order to determine remaining unaccounted for water losses. Goal would be to lower Infrastructure Leakage Index (ILI) and non-revenue water every year by a pre-determined amount based on cost-effectiveness. These programs typically pay for themselves based on savings in operational costs (and saved rate revenue can be directed more to system repairs/replacement and other costs). | | | | | | | 0 | No | | | |

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| | Water Loss | Apparent Loss Reduction - Billing System | System | Continuously analyze billing data for system errors and under-registering meters. Identify and quickly notify customers of apparent leaks. | | | | | | | 0 | No | | | |
| | Water Loss | Apparent Loss Reduction - Meter Testing | System | Address meter testing and repair/ replacement to insure more accurate meter reads and revenue collection. Actions could include meter calibration and accelerated meter replacement. | | | | | | | 0 | No | | | |
| | Water Loss | Real Water Loss Reduction - Leak Repair | System | Measure covers efforts to find and repair leaks in the distribution system to reduce real water loss. More aggressive actions could include installation of data loggers and proactive leak detection. Leak repairs would be handled by existing crews at no extra cost. Specific goals and methods to be developed by Utility. | | | | | | | 0 | No | | | |

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| | | | | May include accelerated main and service line replacement. | | | | | | | | | | | |
| | Water Loss | Real Water Loss Reduction | System | Capture water from water main flushing and hydrant flow testing for reuse | | | | | | | | | | Collect annual flushing water into tanks and use as reclaimed water. | |
| | Water Loss | Real Water Loss Reduction – Reduce Backgroun d Losses with Main Replace-ment | System | Enhanced real loss reduction may include more ambitious main replacement and active leak detection. | | | | | | | 0 | No | | Include an estimate of future water lost to leakage when considering a program for replacing distribution system pipes. | |

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| | Water Loss – Pressure Regula-tion | Distribution System Pressure Regulation | System | Install additional pressure regulators in portions of distribution system to maintain pressure within limits so accounts do not receive excessive pressure. There is a high correlation between high water usage and high pressure, due to higher leakage, atomization of sprinklers and ease of using excessive water. | | | | | | | 0 | No | | | |

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| *To be included in Public Educa-tion Measure above* | Public Education | Conservati on Print Media | ALL | Use a range of printed materials to raise awareness of conservation measures available to customers, including incentive programs offered by Utility. This can include newsletters, bill stuffers, brochures (self-developed or purchased), working with local newspapers, signage at retailers, signs on public buses. Regional participation and development can help assure consistent message. Such programs would continue indefinitely. *"Develop the public awareness campaign to focus on total water consumption." "Display water conservation banners." "Educate customers on water conservation measures." "Change culture of water use through advertising and publicity."* | | | | | | | 0 | Yes | | | |

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| | Public Education | Electronic Conserva-tion Options/ Web Site/ Social Media | ALL | Provide variety of conservation information on city or utility web site, distribution of "videos." Also consider social media options such as cell phone apps, Facebook, interactive kiosk with view screen, etc. *Publish a weekly report of the service area's water use. Educate customers on water conservation measures.* | | | | | | | 0 | | | | |
| | Public Education | Speakers Bureau/ Event Participa-tion | ALL | Conduct presentations at various venues, from radio and TV to service organizations and focused groups. Have booths at relevant community events. Participate in parades, etc. *"Disseminate education materials, and give talks and tours promoting drought tolerant landscaping."* | | | | | | | 0 | | | | |

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| | Public Education | Media Campaign: such as the "Use Only What You Need" or "Beat the Peak" | ALL | *Suggest a general "Use Only What You Need" message like Denver Water's program or a "Beat the Peak" message media campaign like Cary, North Carolina or Tucson Arizona: aahttp://cms3.tucsonaz.gov/water/beatthepeak. Also considered a program with focused action like: "Take Control of your Controller" Campaign for a focused social media based campaign as a media campaign. Consider determining appropriate usage and media campaign message with marketing study/focus groups. Develop the public awareness campaign to focus on total water consumption.* | | | | | | | *0* | | | | |

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| | Public Education | Billing Report Educational Tool | ALL | *Example: Water Smart Software with online and print billing consumptions to customers.* Public Comment: *"Publish water consumption data by neighborhood and by large users." "Use WaterSmart Software or similar program to help customers understand and reduce their water demand."* | | | | | | | 0 | Yes - stand alone | | | |
| | Public Education | *Ambassa-dor Program* | *SFR, MFR* | *Have water ambassadors within neighborhoods to promote awareness. Could be staff by volunteers or student interns. Pattern after Town of Cary, North Carolina or Regional Water Authority in Sacramento, CA. "Have a water patrol of students inform neighborhoods about water conservation and promote water wise landscapes."* | | | | | | | | Yes | | | |

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| | Public Education | Recogni-tion Programs for Water Savings by Residences & Apartments Program | SFR Outdoor | Sponsor an annual awards program for residences and multi-family properties that significantly reduce water use. They would receive a plaque/ recognition. This could include innovative customers that install compost toilets, gray-water, bio-swales and rainwater cisterns in an effort to maximize practical home water use efficiency. *"Praise people with xeriscapes. Make them public heroes for others to emulate."* | | | | | | | 0 | | | | |
| | Public Education | Recogni-tion Programs for Water Savings by Businesses | CII Indoor/ Outdoor | Sponsor an annual awards program for businesses that significantly reduce water use. They would receive a plaque/recognition. | | | | | | | 0 | | | | |

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| | Public Education: Irrigation Focus | Outdoor Residential Focused Public Awareness Informa-tion Program | SF Outdoor Only | Programs could continue efforts including poster contests, speakers to community groups, conservation hotline, website, video loan, radio and television time, demonstration gardens and printed educational material such as bill inserts, etc. Could also consider increasing current Utility efforts possibly adding social media such as cell phone apps, Facebook, interactive kiosk with view screen, etc. Program would continue indefinitely. *"Promote the removal of front lawns as they are more ornamental in general than a back lawn."* | | | | | | | 0 | Yes | | | |

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| | Public Education: Irrigation Focus | Efficient Outdoor Use Education and Training Programs | SF/MF/CII Outdoor | Utility would offer, organize and sponsor a series of educational workshops or other means for educating homeowners, landscapers and contractors in efficient landscaping and irrigation principals. Utilize guest speakers, native demonstration gardens, incentives, such as a nursery plant coupon. *"Support consistent and long term educational workshops and events." "For customers wishing to retain a lawn, promote the use of eco-friendly, high drought tolerant, low maintenance turf."* | | | | | | | 0 | | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | Public Education: Irrigation Focus | Train Landscape Mainte-nance Workers (Green Gardener Program) | ALL Outdoor | Utility would sponsor bilingual training for managers and workers in landscape maintenance methods that will save irrigation water. Model after Green Gardener Program. Santa Barbara County Water Agency example: http://www.greengardener.org/. With some of these programs, names of businesses that have obtained training are included in Utility publications and/or Web sites (as an incentive to participate). *"Provide the Qualified Water Efficient Landscaper (QWEL) course to landscapers."* | | | | | | | 0 | | | | |
| | Public Education: Irrigation Focus | Networking with Landscap-ing Industry | ALL Outdoor | Meet with and become members in "Green Industry" organizations; partner with projects and outreach material development. Outreach to nurseries | | | | | | | 0 | | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | for information distribution, provide "water wise plant" signage, etc. | | | | | | | | | | | |
| | Public Education: Irrigation Focus | Landscape Water Calculator | ALL | Develop Landscape Watering Calculator and Watering Index, and actively market these. Consider cell phone app with Watering Index, following up in person with large landscape customers on a frequent basis to encourage use of Watering Index. | | | | | | | 0 | | | | |
| | Public Education: Irrigation Focus | Climate appropri-ate (Water Efficient) Demonstra tion Gardens | ALL | Donate or acquire a portion of public or private land to create a demonstration garden displaying living examples of low water-using gardens and landscaping. The Utility would provide signs and brochures to educate those people visiting the garden. | | | | | | | 0 | | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Public Education | Promote Green Buildings | ALL | Assign Staff a position to work with local Green Building associations, developers, designers, vendors to promote incorporating water efficiency into building design. Possibly work with other partner utilities or agencies energy/wastewater/ stormwater. Co-sponsor award program. | | | | | | | 0 | Not WC Mea-sure | | | |
| | Public Education | Schools Education Programs | ALL | Work with local school districts to develop classroom programs that they would embrace. Consider poster contests, etc. Some programs would require dedicated utility staff to assist & present. | | | | | | | 0 | Yes | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| *Model-ing will be comple-ted at conclu-sion of Future Rate Study* | Water Rates | Rate Structure Evaluation | ALL | Rates must meet Utility costs, but some features can improve customer accountability by better imposing cost impacts for high water usage. Conservation oriented rate structures in California generally collect less than 30% of water revenue through base charges. Tiered rate structures are the most popular form of conservation rates, and can be very effective provided there are sufficient tiers (3 to 4 is recommended), and price differences between tiers is sufficient and tiers are placed at usage levels that appropriately reflect low, medium and high usage levels for the Utility. This measure would also require a rate study. *Consider "drastically* | | | | | | | 0 | No | | 6) Drastically reduce the 'Ready to Serve' charge while increasing the per unit water charge in a revenue neutral manner. 7) Eliminate the 'Ready to Serve' charge, increase the per unit water charge in a revenue neutral manner, and charge a nominal fee when usage does not register as a billable water unit. | |

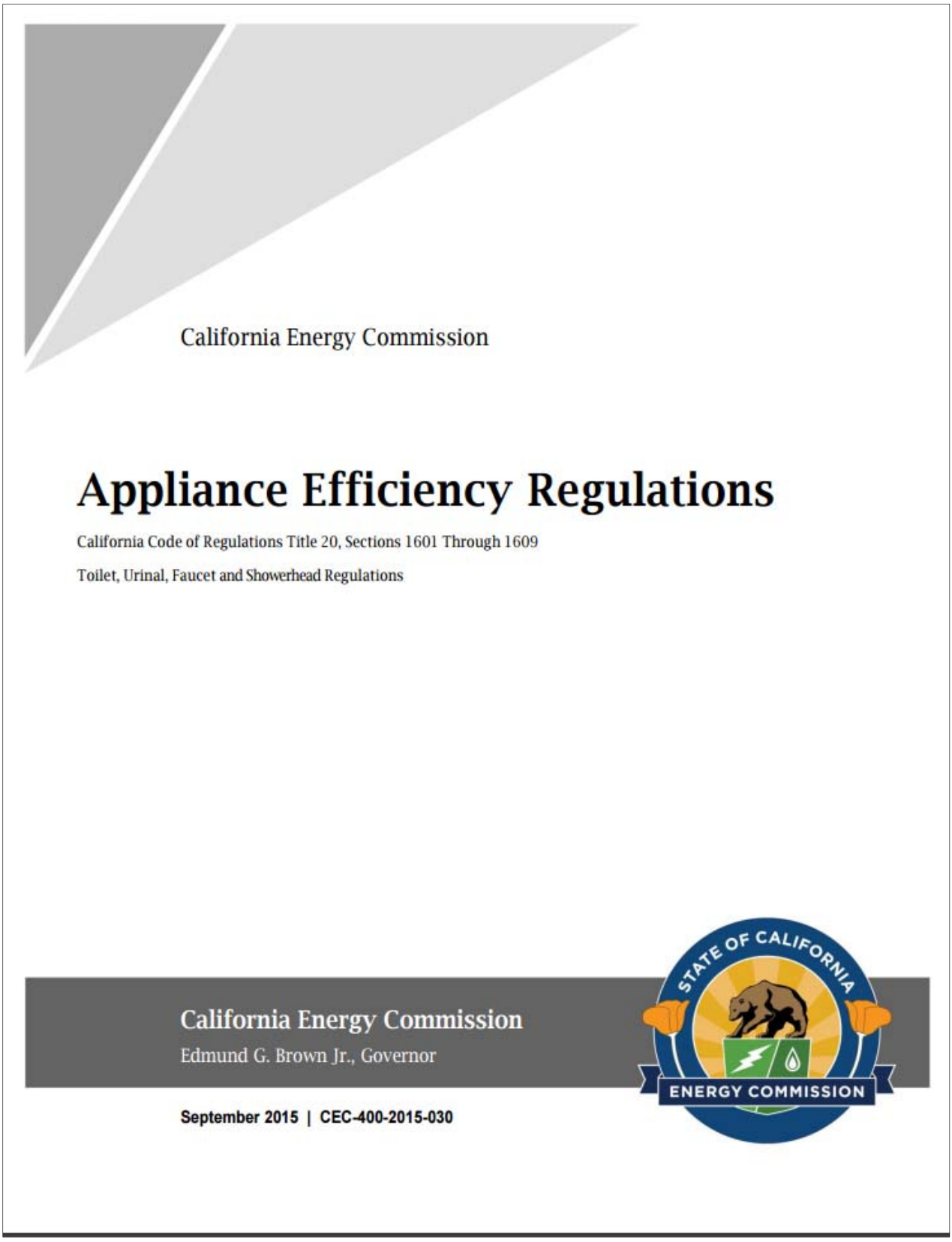
| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | *reducing" the base charge.* | | | | | | | | | | | |
| | Water Rates | Modifica-tion to or Implemen-tation of Tiered Rate Conserva-tion Pricing | Multi-Family CII Outdoor is Primary Focus | Consider revising City's tiered rates or seasonal pricing for other customer classes. Some utilities utilize percentages of average winter usage as the basis for individualized summer tiers. Multi-Family Residential tiers could be based on number of housing units served by meters. This | | | | | | | 0 | No | | 4) Charge more for water usage. 8) Develop a separate billing category for individually metered apartments and multi-family | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | measure would require a rate study and advanced billing system capabilities. *Consider developing a separate billing category for individually metered apartments and multi-family residences.* | | | | | | | | | | residences. 9) Increase the rates between tiers. 10) Study and implement a new and improved tiered rate structure that significantly encourages water conserva-tion. | |
| | Water Rates | Establish Separate Pricing Structure for Irrigation Accounts | All large irrigation | Implementing conservation-oriented pricing for dedicated irrigation customers would encourage more efficient irrigation practices. This is best combined with Measures 7B and 8. Would require a rate study. *Consider charging more for water used to irrigate golf courses.* | | | | | | | 0 | No | | Charge more for water used to irrigate golf courses. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Water Rates | Water Budget Based Billing | ALL | Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as size of the irrigated area and often vary seasonally to reflect weather during billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Could combine this measure with Measures 6A - 6C. This measure would require rate study and capable billing software. | 4 | 4 | 4 | 4 | 3 | 2 | 21 | Yes | No | Develop a formula for tying the price of water to population. | Major modification or New Billing System required |

Notes: I – Indoor Use; L – Landscape Demand; I, L – Both Indoor and Sprinkling Demand; O – Other.

# APPENDIX G – CALIFORNIA ENERGY COMMISSION APPLIANCE EFFICIENCY REGULATIONS



California Energy Commission

# Appliance Efficiency Regulations

California Code of Regulations Title 20, Sections 1601 Through 1609

Toilet, Urinal, Faucet and Showerhead Regulations

California Energy Commission

Edmund G. Brown Jr., Governor

September 2015 | CEC-400-2015-030

# California Energy Commission

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# Amendments to Appliance Efficiency Regulations

## Section 1601. Scope.

...

This Article applies to the following types of new appliances, if they are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles, or other mobile equipment. Unless otherwise specified, each provision applies only to units manufactured on or after the effective date of the provision.

...

(h) Plumbing fittings, which are showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, and commercial pre-rinse spray valves.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1602. Definitions.

...

(h) Plumbing Fittings.

...

"Plumbing fitting" means a device that controls and guides the flow of water in a supply system. Examples include showerhead, lavatory faucet, kitchen faucet, metering faucet, lavatory replacement aerator, kitchen replacement aerator, wash fountain, commercial pre-rinse spray valve, public lavatory faucet, or tub spout diverter.

"Public lavatory faucet" means a fitting intended to be installed in non-residential bathrooms that are exposed to walk-in traffic.

"Showerhead" means a device through which water is discharged for a shower bath and includes a body sprayer and handheld showerhead but does not include a safety showerhead.

"Water use" means the quantity of water flowing through a showerhead or faucet, at point of use, as determined using the test method in Section 1604(h).

...

(i) Plumbing Fixtures.

"Dual-flush effective flush volume" means the average flush volume of two reduced flushes and one full flush.

"Dual-flush water closet" is a water closet incorporating a feature that allows the user to flush the water closet with either a reduced or a full volume of water.

"Plumbing fixture" means an exchangeable device, which connects to a plumbing system to deliver and drain away water and waste. A plumbing fixture includes a water closet or a urinal.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

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## Section 1604. Test Methods for Specific Appliances.

...

(h) Plumbing Fittings.

(1) The test method for commercial pre-rinse spray valves is 10 C.F.R. Sections 431.263 and 431.264.

(2) The test methods for showerheads are:

(A) **Maximum flow rate test.** The test method for determining maximum flow rate of a showerhead is 10 C.F.R. Section 430.23(t) (Appendix S to Subpart B of Part 430).

(B) **Minimum flow rate test.** The test method for determining minimum flow rate of a showerhead is ASME A112.18.1-2012 / CSA B125.1-2012, Section 5.12.

(C) **Showerheads with multiple nozzles.** Showerheads with multiple nozzles shall be tested with all nozzles in use at the same time.

(3) The test method for other plumbing fittings is 10 C.F.R. Section 430.23(s) (Appendix S to Subpart B of part 430).

(4) Showerhead-tub spout diverter combinations shall have both the showerhead and tub spout diverter tested individually.

...

(i) Plumbing Fixtures.

The test methods for plumbing fixtures are:

(1) **Water Closets.** The test method for testing gallons per flush of water closets is 10 C.F.R. Section 430.23 (u) (Appendix T to Subpart B of part 430). See Section 1604(i)(3) for the required waste extraction test.

(2) **Urinals.** The test method for testing gallons per flush of urinals is 10 C.F.R. Section 430.23(v) (Appendix T to Subpart B of part 430).

(3) Waste Extraction Test (Section 7.10) of ASME A112.19.2/CSA B45.1-2013.

The following documents are incorporated by reference in Section 1604.

...

The American Society of Mechanical Engineers (ASME)

| | |
|---|---|
| ASME A112.19.2/CSA B45.1-2013 | Ceramic Plumbing Fixtures |
| ASME A112.18.1-2012/CSA B125.1-2012 | Plumbing Supply Fittings |

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Copies available from:

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001-800-843-2763 (Mexico)
973-882-1170 (outside North America)
Email: CustomerCare@asme.org

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

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## Section 1605.1. Federal and State Standards for Federally-Regulated Appliances.

...

(h) Plumbing Fittings.

(1) **Metering Faucets and Wash Fountains.** The flow rate of wash fountains and metering faucets shall be not greater than the applicable values shown in Table H-1.

**Table H-1: Standards for Plumbing Fittings**

| Appliance | Maximum Flow Rate |
|---|---|
| Wash fountains | $2.2 \times \frac{rim\ space\ (inches)}{20}\ gpm\ at\ 60\ psi$ |
| Metering faucets | 0.25 gallons/cycle[1,2] |
| Metering faucets for wash fountains | $0.25 \times \frac{rim\ space\ (inches)}{20}\ gpm\ at\ 60\ psi$[1,2] |

[1]**Sprayheads with independently controlled orifices and metered controls.** The maximum flow rate of each orifice that delivers a preset volume of water before gradually shutting itself off shall not exceed the maximum flow rate for a metering faucet.

[2]**Sprayheads with collectively-controlled orifices and metered controls.** The maximum flow rate of a sprayhead that delivers a preset volume of water before gradually shutting itself off shall be the product of (a) the maximum flow rate for a metering faucet and (b) the number of component lavatories (rim space of the lavatory in inches [millimeters] divided by 20 inches [508 millimeters]).

(5) **Showerheads, lavatory faucets, kitchen faucets, aerators, and public lavatory faucets**. See Section 1605.3 (h) for standards for all showerheads, lavatory faucets, kitchen faucets, aerators, and public lavatory faucets sold or offered for sale in California.

...

The following documents are incorporated by reference in Section 1605.1.

...

(i) Plumbing Fixtures.

See Section 1605.3(i) for water efficiency standards for plumbing fixtures.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

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## Section 1605.2. State Standards for Non-Federally-Regulated Appliances.

...

(i) Plumbing Fixtures.

See Section 1605.3(i) for water efficiency standards for plumbing fixtures.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1605.3. State Standards for Non-Federally-Regulated Appliances.

...

(h) Plumbing Fittings.

**(1) Tub Spout Diverters and Showerhead Tub Spout Diverter Combinations.** The leakage rate of tub spout diverters manufactured on or after March 1, 2003 shall be not greater than the applicable values shown in Table H-2. Showerhead tub spout diverter combinations shall meet both the standard for showerheads and the standard for tub spout diverters.

...

(2) **Lavatory Faucets and Aerators.** The flow rate of lavatory faucets and lavatory replacement aerators shall be not greater than the applicable values shown in Table H-3.

**Table H-3: Standards for Lavatory Faucets and Aerators**

| Appliance | Maximum Flow Rate | | |
|---|---|---|---|
| | Manufactured prior to September 1, 2015 | Manufactured on or after September 1, 2015, and prior to July 1, 2016 | Manufactured on or after July 1, 2016 |
| Lavatory faucets and aerators | 2.2 gpm at 60psi[1,2] | 1.5 gpm at 60 psi[1,2] | 1.2 gpm at 60 psi[1,2] |

[1]**Sprayheads with independently-controlled orifices and manual controls**. The maximum flow rate of each orifice that manually turns on or off shall not exceed the maximum flow rate for a lavatory faucet.
[2]**Sprayheads with collectively-controlled orifices and manual controls**. The maximum flow rate of a sprayhead that manually turns on or off shall be the product of (a) the maximum flow rate for a lavatory faucet and (b) the number of component lavatories (rim space of the lavatory in inches (millimeters) divided by 20 inches (508 millimeters).

...

(3) **Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators.** The flow rate of kitchen faucets, kitchen replacement aerators, public lavatory faucets, and public lavatory replacement aerators shall be not greater than the applicable values shown in Table H-4.

(A) For the plumbing fittings identified in Table H-4, noncompliant products may not be sold or offered for sale on or after January 1, 2016, regardless of manufactured date.

**Table H-4: Standards for Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators**

| Appliance | Maximum Flow Rate | |
|---|---|---|
| | Sold or offered for sale prior to January 1, 2016 | Sold or offered for sale on or after January 1, 2016 |
| Kitchen faucets and aerators | 2.2 gpm at 60 psi | 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi |
| Public lavatory faucets and aerators | 2.2 gpm at 60 psi | 0.5 gpm at 60 psi |

...

(4) **Commercial Pre-rinse Spray Valves**.

(A) Commercial pre-rinse spray valves manufactured on or after January 1, 2006, shall be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate.

(B) See Section 1605.1(h) for water consumption standards for commercial pre-rinse spray valves.

...

(5) **Showerheads**. The flow rate of showerheads shall be not greater than the applicable values shown in Table H-5.

**Table H-5: Standards for Showerheads**

| Appliance | Maximum Flow Rate | | |
|---|---|---|---|
| | **Manufactured on or after January 1, 1994 and prior to July 1, 2016** | **Manufactured on or after July 1, 2016 and prior to July 1, 2018** | **Manufactured on or after July 1, 2018** |
| Showerheads | 2.5 gpm at 80 psi | 2.0 gpm at 80 psi[1,2,3] | 1.8 gpm at 80 psi[1,2,3] |

[1] The maximum flow rate shall be the highest value obtained through testing at a flowing pressure of 80 ±1 psi and shall not exceed the maximum flow rate in Table H-5.

[2] **Minimum flow rate.** The minimum flow rate, determined through testing at a flowing pressure of 20 ± 1 psi, shall not be less than 60 percent of the maximum flow rate in Table H-5. The minimum flow rate determined through testing at flowing pressures of 45 and 80 ± 1 psi shall not be less than 75 percent of the maximum flow rate in Table H-5.

[3] Showerheads with multiple nozzles. The total flow rate of showerheads with multiple nozzles must be less than or equal to the maximum flow rate in Table H-5 when any or all nozzles are in use at the same time.

...

(6) **Other Plumbing Fittings**. See Section 1605.1(h) for water efficiency standards for plumbing fittings that are federally-regulated consumer products.

...

(i) Plumbing Fixtures.

(1) The water consumption of water closets, and urinals, other than those designed and marketed exclusively for use at prisons or mental health care facilities shall be no greater than the values shown in Table I-2.

**Table I-2 Standards for Plumbing Fixtures**

| Appliance | Maximum Gallons per Flush or Dual-flush effective flush volume | |
|---|---|---|
| | **Sold or offered for sale on or after January 1, 2014[1]** | **Sold or offered for sale on or after January 1, 2016[1]** |
| All water closets | 1.28 | 1.28 |
| Trough-type urinals | $\frac{\text{trough length (inches)}}{16}$ | $\frac{\text{trough length (inches)}}{16}$ |
| Wall mounted urinals | 0.5 | 0.125 |
| Other urinals | 0.5 | 0.5 |

[1]For the items identified in Table I-2, non-compliant products may not be sold or offered for sale on or after the designated date, regardless of manufacture date

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(2) Water closets sold or offered for sale or after January 1, 2016 shall pass the Waste Extraction Test (Section 7.10) of ASME A112.19.2.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1606. Filing by Manufacturers; Listing of Appliances in Database.

...

**Table X Continued – Data Submittal Requirements**

| | Appliance | Required Information | Permissible Answers |
|---|---|---|---|
| H | Plumbing Fittings | *Type | Showerhead, lavatory faucet (independent or collective), public lavatory faucet, kitchen faucet, metering faucet (independent or collective), lavatory replacement aerator, kitchen replacement aerator, wash fountain, lift- type tub spout diverter, turn-type tub spout diverter, pull-type tub spout diverter, and push-type tub spout diverter. |
| | | Flow Rate | |
| | | Pulsating (for showerheads only) | Yes, no |
| | | Minimum Flow Rate at 45 psi and 80 psi (for showerheads manufactured on or after July 1, 2016) | |
| | | Minimum Flow Rate at 20 psi (for showerheads manufactured on or after July 1, 2016) | |
| | | Rim Space (for wash fountains only) | |
| | | Tub Spout Leakage Rate When New | |
| | | Tub Spout Leakage Rate After 15,000 Cycles | |
| | Commercial Pre-rinse Spray Valves | Flow Rate (gpm) | |
| | | Cleaning ability test | Pass, fail |

...

**Table X Continued – Data Submittal Requirements**

| | Appliance | Required Information | Permissible Answers |
|---|---|---|---|
| I | Plumbing Fixtures | *Type | Blowout water closet, gravity tank type water closet, dual-flush water closet, electromechanical hydraulic water closet, flushometer tank water closet, urinal, prison-type urinal, prison-type water closet, flushometer valve water closet, trough-type urinal, wall-mounted urinal, waterless urinal, vacuum other type urinal, vacuum type water closet |
| | | Water Consumption (dual-flush effective flush volume for dual-flush water closet) | |
| | | Passes waste extraction test | Yes, No |
| | | Waste extraction value | grams |
| | | Trough Length (trough-type urinals only) | |

...

**(4) Declaration.**

(A) Each statement shall include a declaration, executed under penalty of perjury of the laws of California, that

...

4. the appliance was tested under the applicable test method specified in Section 1604, and, for the following appliances, was tested as follows:

...

j. for kitchen faucets that utilize an optional and temporary higher flow rate than 1.8 gpm, the higher flow rate has been tested utilizing the test procedure identified for kitchen faucets in Section 1604(h) at 60 psi and verified to have a flow rate less than or equal 2.2 gpm.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code; and Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c), 25402.5.4 and 25960, Public Resources Code; and Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

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