

FINAL

WATER EFFICIENCY MASTER PLAN 2020/2021

Prepared by :



MADDAUS
WATER
MANAGEMENT INC.





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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill	DWR	California Department of Water Resources
AB 1668	Water Conservation Legislation	EBMUD	East Bay Municipal Utility District
ABAG	Association of Bay Area Governments	EBPP	Electronic Bill Payment and Presentment
acct	Account	EO	Executive Order
ACWD	Alameda County Water District	ETo	Evapotranspiration
AF	Acre-Feet	FY	Fiscal Year
AFY	Acre-Feet per Year	GIS	Geographic Information System
AMI	Advanced Metering Infrastructure	GPCD	Gallons per Capita per Day
AWWA	American Water Works Association	GPDA	Gallons per Day per Account
AWWARF	American Water Works Association Research Foundation	gpd	Gallons per Day
BMP	Best Management Practice	gpf	Gallons per Flush
BUS	Business	gpm	Gallons per Minute
BUSLDS	Business Landscape	HET	High Efficiency Toilet
CalWEP	California Water Efficiency Partnership	HEU	High Efficiency urinal
CCF	Hundred Cubic Feet	HOT	Help on Tap Customer Assistance Program
CEC	California Energy Commission	IE	Irrigation Efficiency
CIMIS	California Irrigation Management Information System	IND	Industrial
COM	Commercial	INDLDS	Industrial Landscape
CII	Commercial, Industrial, and Institutional	INSTLDS	Institutional and Other Landscape
CUWA	California Urban Water Agencies	INS	Institutional
CUWCC	California Urban Water Conservation Council	IRP	Integrated Resources Planning
CYES	California Youth Energy Services	LEAF	Local Ecology Agriculture Fremont
DSS Model	Decision Support System Model Developed by MWM for the Water Efficiency Master Plan	MAWA	Maximum Applied Water Allowance
		MF/MFR	Multifamily/Multifamily Residential
		MGD	Million Gallons per Day

MTC	Metropolitan Transportation Commission	SB 606	Water Conservation Legislation
MWELO	Model Water Efficient Landscape Ordinance	SB X7-7	Water Conservation Act of 2009
MWM	Maddaus Water Management	SF	Single Family
OTHER	Institutional and Other	SFPUC	San Francisco Public Utilities Commission
Plan	Water Efficiency Master Plan	SFR	Single Family Residential
psi	Pounds per Square Inch	SWP	State Water Project
PV	Present Value	SWRCB	State Water Resources Control Board
QUEL	Bay Area Qualified Water Efficient Landscaper	ULFT	Ultra-Low Flush Toilet
RELDS	Multifamily Landscape	UHET	Ultra-High Efficiency Toilet
RES	Residential	UWMP	Urban Water Management Plan
REUWS	Residential End Uses of Water Study	WBIC	Weather-Based Irrigation Controller
RFP	Request for Proposals	WSE	Water Shortage Emergency
SB	Senate Bill	WUE	Water Use Efficiency

COMMON TERMINOLOGY

- ◆ **AMI** – Advanced Metering Infrastructure, a network of smart meters that can take frequent readings (hourly or more often) and provide almost real-time water use data to customers.
- ◆ **Conservation vs. Water Use Efficiency** – Alameda County Water District is moving away from using “Conservation” as a term in favor of “Water Use Efficiency” when describing its ongoing program to help customers reduce water use. Although Alameda County Water District’s current program is referred to as a conservation program, that will change with the implementation of this Water Efficiency Master Plan. Both terms describe actions that reduce water use, but water use efficiency is a more accurate way to describe what measures do for a customer – measures increase a customer’s water use efficiency, allowing them to do more with less without giving up anything or changing their behaviors and habits. Conservation encompasses behavioral changes to reduce water use; those behavioral changes may involve quality of life changes to temporarily save water (e.g., capturing water in a bucket from the shower to flush a toilet), particularly during a drought.
- ◆ **Measure** – Refers to an action that delivers water use efficiency (e.g., toilet retrofits). These actions also may be referred to as a “program,” but for this report we are using “measure” to describe these actions.
- ◆ **Program** – Refers to a group of measures initiated collectively to achieve water use efficiency in the service area.
- ◆ **Strategy** – Refers to an approach for developing a Water Use Efficiency Program.

EXECUTIVE SUMMARY

Introduction

For over 40 years, Alameda County Water District (ACWD) has embraced water use efficiency by offering water use efficiency programs and services to all service area customers. Two major events occurred in the early 90s that shaped ACWD's Water Use Efficiency Program into what it is today:

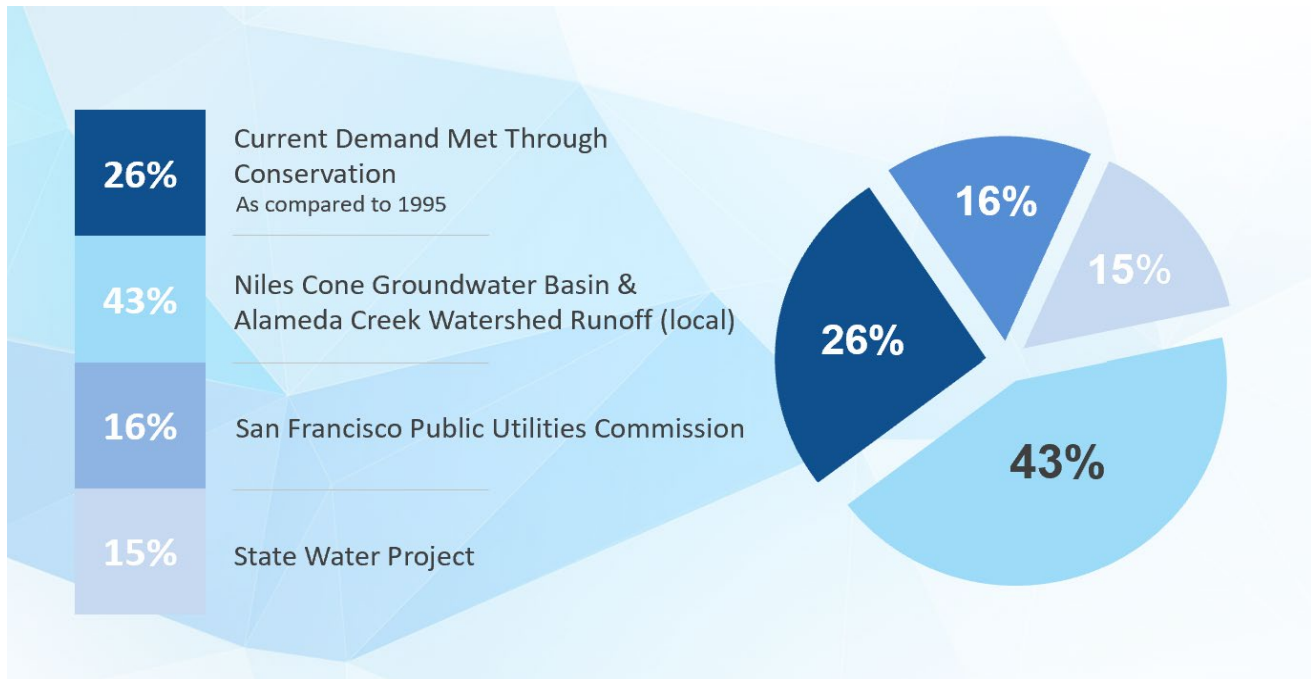
- ◆ In 1991, ACWD was a founding member of the California Urban Water Conservation Council (CUWCC), now known as the California Water Efficiency Partnership (CalWEP)¹. CUWCC established an Urban Water Conservation Memorandum of Understanding that ACWD, along with other founding water agencies, signed and therefore committed to make water use efficiency services accessible to all customers through the implementation of cost-effective water use efficiency best management practices (BMPs). Since that time, ACWD's Water Use Efficiency Program has included BMPs that aggressively reduce both indoor and outdoor water use, such as toilet and clothes washer rebates, large landscape surveys and water budgets, commercial audits, and public education and outreach.
- ◆ In 1995, ACWD developed its first Integrated Resources Plan (IRP). The IRP process looks broadly at the options available for matching water supplies and customer demands. Water use efficiency measures² are identified in the process as a way to reduce demand and even delay or eliminate the need for additional supply.

ACWD's Water Use Efficiency Program has morphed over the years to incorporate new technologies and techniques for encouraging water use efficiency in the service area. It has served ACWD and its customers well, resulting in nearly 26% of ACWD's current demand (as compared to 1995 demands) being met through customer water use efficiency (Figure ES-1).

¹ CUWCC restructured and refocused at the end of 2016 to allow for a new organization, CalWEP, to form in its place. CUWCC was a quasi-regulatory organization, but with new state requirements serving the same purpose, that regulatory role was no longer needed to move water use efficiency forward in California. CalWEP has the same expertise and leadership as CUWCC, but is now focused on supporting water agencies with water use efficiency tools and programs to help them meet new state targets.

² Though "demand management measure" and "water conservation measure" are not terms used in this report, it may be relevant to readers who are more familiar with the terms to understand that these are essentially the same as the term "water use efficiency measure." In this report, "measure" is used to refer to a water use efficiency intervention such as a toilet rebate. A measure can also be referred to as a "program" or "strategy." However, in this Plan, "program" refers to ACWD's Water Use Efficiency Program, which includes a group of measures implemented collectively and other programmatic elements, and "strategy" refers to an approach for developing and grouping measures into a "Program."

Figure ES-1. Average Sources of Supply



While ACWD's Water Use Efficiency Program has been very successful, recent developments are surfacing that are related to water supply uncertainty and new state regulations governing water use. Additionally, ACWD's Board of Directors (Board) became interested in pursuing an Advanced Metering Infrastructure (AMI) system. These developments prompted ACWD to conduct a more thorough analysis of its service area water use and water use efficiency potential, and to initiate a Water Efficiency Master Planning process. This Water Efficiency Master Plan (Plan) summarizes that planning process and resulting recommendations.

The Plan takes inventory of water use efficiency gains achieved to date, identifies what remains to be achieved, and provides a roadmap to move forward with ACWD's commitment to water use efficiency. It does this through a comprehensive review of historical and current water use, water use efficiency program participation data, and input from the community through a professional survey, which identified saturation of high efficiency fixtures, water use efficiency actions and behaviors, and customer interests. The Plan then identifies a strategy to meet ACWD's short-term water use efficiency goals and provides a foundation for identifying strategies to meet long-term water supply needs.

Plan Development Approach

ACWD hired Maddaus Water Management Inc. (MWM) to conduct the technical analysis to support the Water Efficiency Master Plan. MWM has 25 years of experience in water use efficiency analytics for water agencies and was ACWD's consultant on the original 1995 IRP.

ACWD specifically directed MWM to complete the following:

1. Assess water use efficiency gains from past and current programs
2. Examine passive savings expected from recent and new plumbing codes changes

3. Conduct a Community Survey to identify water use efficiency changes customers made during and after the last major statewide drought (2012-2016³), as well as interests for future water use efficiency measures
4. Assist ACWD in determining water use efficiency measures it should continue, new measures it should pursue, and when
5. Estimate the costs and water savings of these measures
6. Under the direction of ACWD Board priorities, combine the measures into increasingly more aggressive Strategies and evaluate the costs and water savings of these Strategies
7. Develop projections for demand under different scenarios: with plumbing code changes and under each strategy

Water Use Efficiency Strategy Overview

Through the identification and prioritization of water use efficiency measures into strategies, ACWD's Water Efficiency Master Plan enables ACWD to be "future ready" to address customer demand under both short-term and long-term water supply scenarios, identify attainable water use efficiency goals achievable under each strategy, and understand the cost to achieve those goals.

The draft Strategies were presented to the ACWD Board at a workshop in April 2020, scheduled to be discussed again at a Board meeting in March 2021, then scheduled for approval by the Board in April 2021. The Board recommended that for the short term (next 5 years) ACWD pursue Strategy "B," an approach that includes a suite of cost-effective water use efficiency measures that will ensure ACWD meets short-term water needs in its service area. Strategy B combines new measures with existing measures and is expected to result in a cumulative savings of 44,644 acre-feet (AF) of water over 31 years (2020 to 2050).

The foundation for developing water use efficiency strategies was four-fold: (1) survey the community to identify saturation of water efficiency measures, permanent demand reduction from the drought, and customer water use efficiency interests; (2) evaluate current and potential future water use efficiency measures using a set of applicable criteria; (3) quantify the costs and water savings of these measures; and (4) combine the measures into increasingly aggressive strategies, governed by ACWD Board priorities, which the ACWD Board expressed at a Water Resources Planning Workshop in July 2019. In fact, the Board's priorities guided the entire Plan development process.

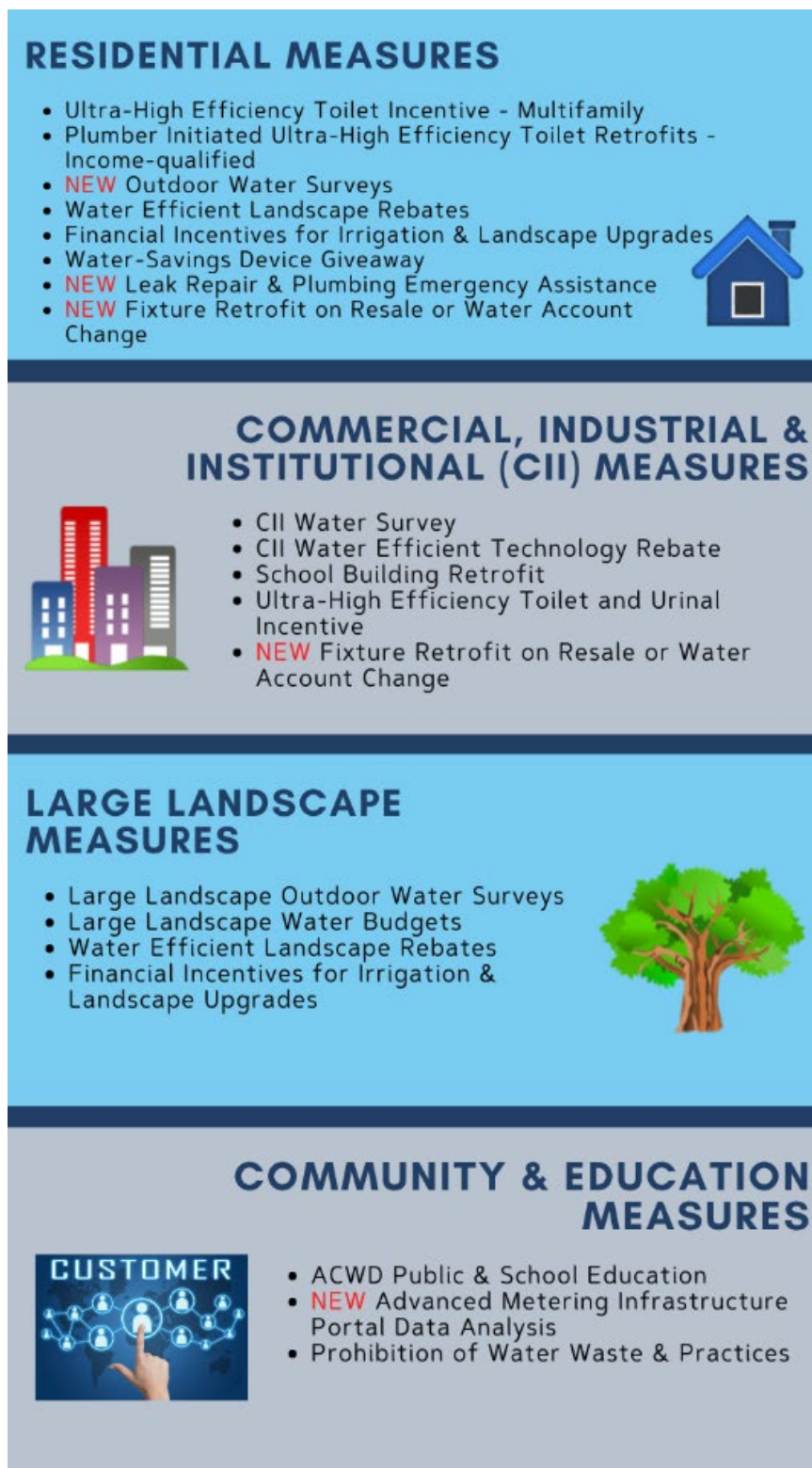
The process to develop Strategy B, and other strategies that were analyzed, included reviewing water use efficiency measures using the Least Cost Planning Decision Support System Model (DSS Model), developed by MWM. A screening of more than 100 measures, directed at existing customers and new development, was conducted utilizing the methodology presented in the American Water Works Association Manual of Practice, *M52 Water Conservation Programs – A Planning Manual* (AWWA, 2017).

The Recommended Strategy includes measures required by law plus more customer-centric, extended measures for outdoor efficiency (e.g., residential and commercial, industrial, and institutional [CII] outdoor water surveys, online landscape water budgets, irrigation and landscape incentives). In addition, this strategy includes measures for surveys and rebates for commercial properties (CII water survey and CII water-efficient technology rebates) and incentives to install high efficiency fixtures in both residential and commercial properties. The model used for the analysis includes a total of 26 measures; Strategy B includes 16 of these measures. Measures

³ The California Department of Water Resources (DWR) references the last major drought as starting in 2012 and continuing through 2016. The state declared a drought emergency and implemented drought response actions from 2014-2017, declaring the end of the drought in April 2017. ACWD declared a water shortage emergency in 2014 and rescinded the declaration in 2016 when supplies were sufficient to meet demands for the current year, as well as a hypothetical extended three-year dry period.

that were incorporated into Strategy B are listed in Figure ES-2. Measures analyzed and incorporated into a strategy are described in more detail in Appendix E.

Figure ES-2. Alameda County Water District Strategy B Measures



This Plan also was developed to support the future intentions of the state of California. After the last major statewide drought (2012-2016), the California Legislature adopted a framework centered on “Making Water Conservation a California Way of Life”⁴ to help the state better prepare for droughts and climate change by establishing statewide water efficiency standards. Assembly Bill (AB) 1668 and Senate Bill (SB) 606, along with related regulations currently under development, will have profound effects on water providers like ACWD over the coming years. Regulations will set indoor and outdoor water use goals, annual water budgets, and documented preparation for long-term droughts. By adhering to Strategy “B,” ACWD will be in a good position to meet the state of California’s current and future requirements and objectives.

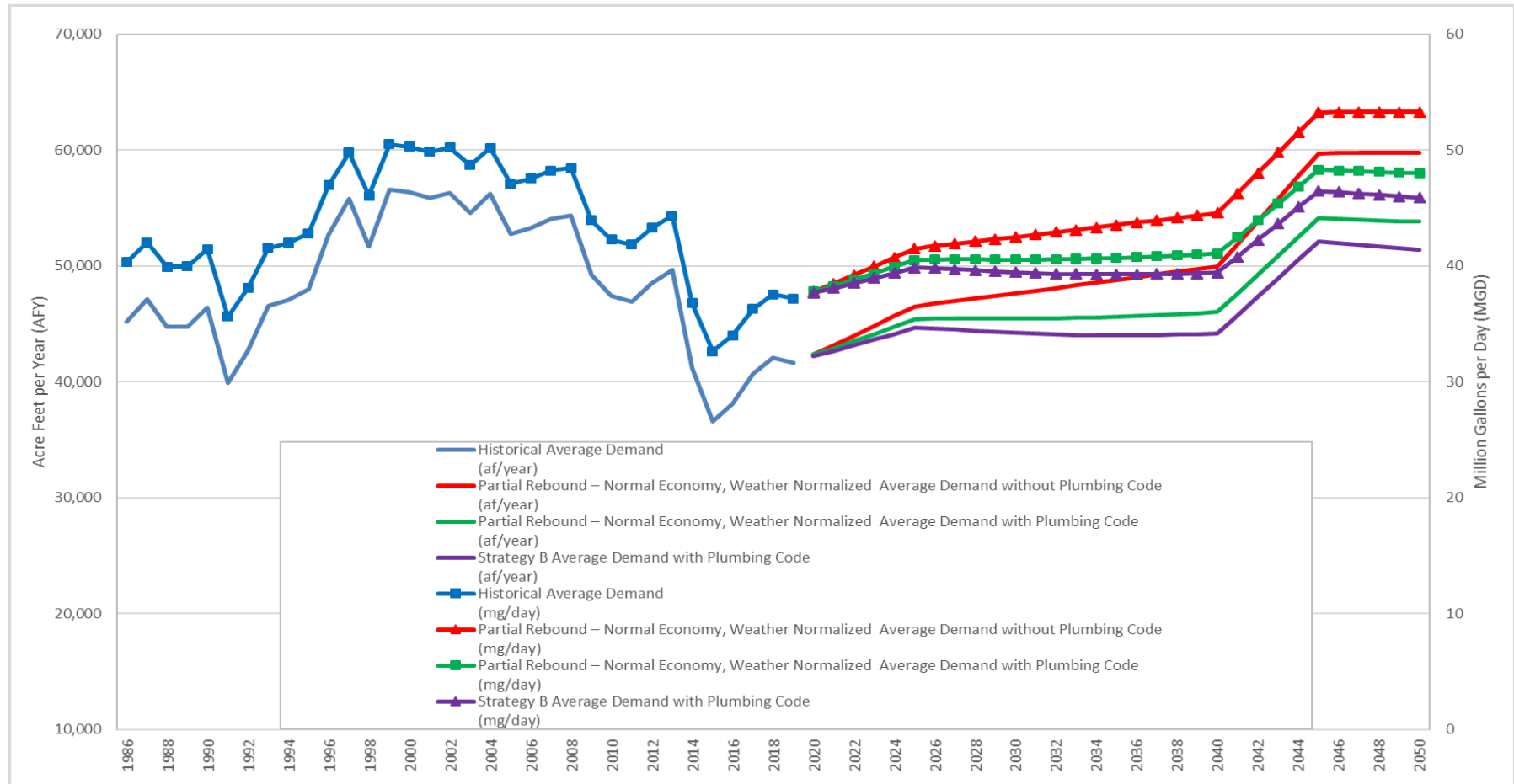
The benefits of the strategy recommended under this Plan include the following:

- ◆ A short-term, 5-year plan that provides a cost-effective means to meet water demands with a foundation for establishing water use efficiency goals out to 2050
- ◆ An expansion of existing efforts to meet state-mandated targets and aggregate water use objectives, with flexibility to adapt to elements not known at the time this Plan was developed
- ◆ Improved accessibility of water use efficiency services for lower income customers in ACWD’s service area
- ◆ Measures that integrate well with ACWD’s AMI project
- ◆ Support for customer interests and taking advantage of regional partnerships

The following figure presents historical and projected acre-feet per year (AFY) use, with million gallons per day (MGD) on the 2nd axis, for Strategy “B.” Plumbing code elements include current local, state, and federal standards for retrofits of items such as toilets, showerheads, faucets, and pre-rinse spray valves.

⁴ California Department of Water Resources, et al. (2017). *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, accessed April 2021:
https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html

Figure ES-3. Alameda County Water District Historical and Projected Demand



Note: The sharp uptick near the end of the demand forecasting period is due to ACWD's assumption of a slower near-term growth rate (to 2040), based on historical growth rates, then accelerated growth between 2040-2045 to include all Association of Bay Area Government/Metropolitan Transportation Commission (ABAG/MTC) projected growth (draft) within the analysis. More information regarding these assumptions is in Section 3.1.

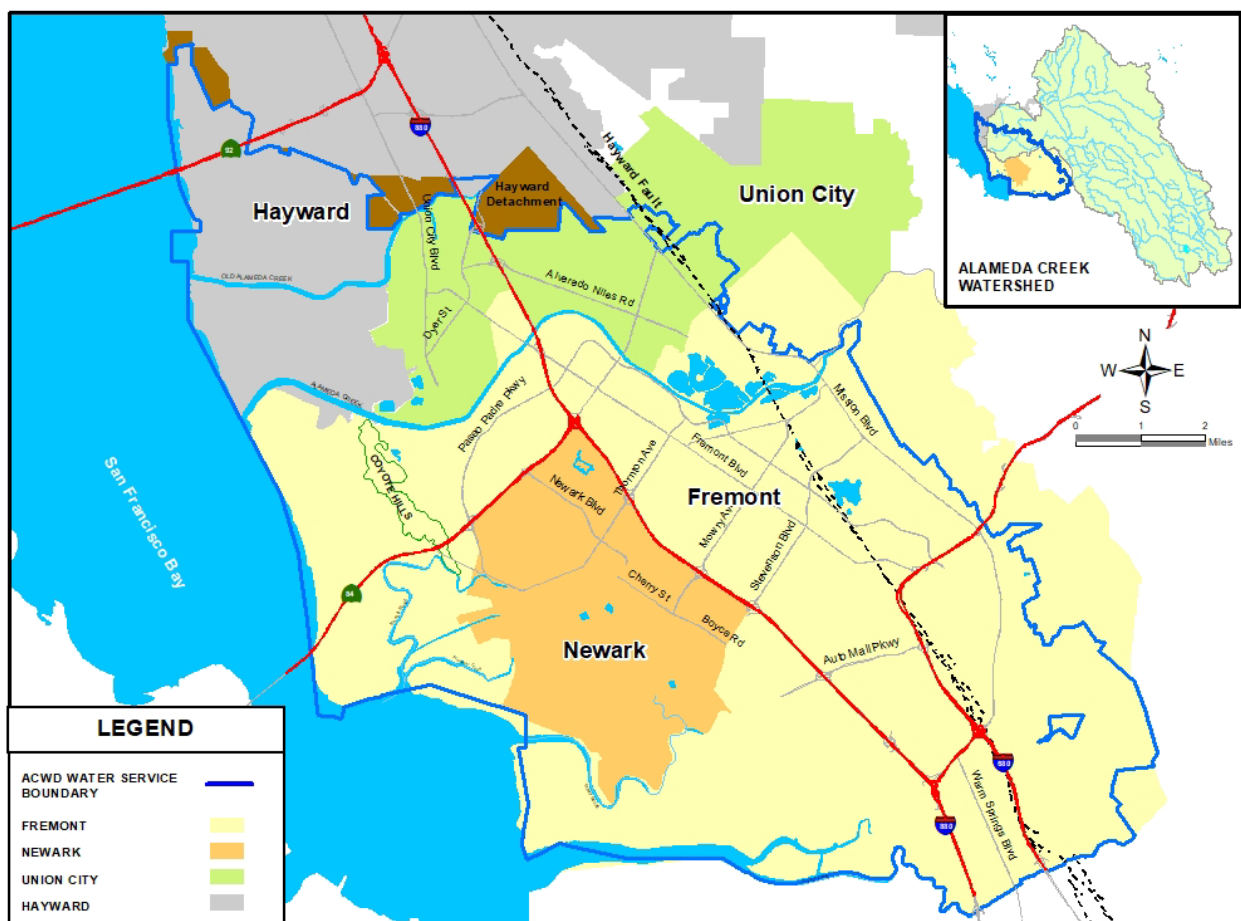
Strategy B has an average annual implementation cost, including administrative costs, of approximately \$1,403,000 for the 31-year analysis period. This total includes all direct ACWD costs to implement the measures. The program is intended to be flexible and structured in a “menu/toolbox” format to allow individual measures to change both in how and when they are implemented. This flexible format will allow adaptation to new or best-available technology and adoption of changes that make sense from a cost/savings perspective. Costs will also change if grants or other cost-sharing partnerships are available.

1 INTRODUCTION

1.1 Alameda County Water District

The Alameda County Water District (ACWD) is a retail water provider located in the San Francisco Bay Area with a service area of approximately 100 square miles generally encompassing the City of Fremont, the City of Newark, and the City of Union City (Figure 1-1). ACWD serves businesses, industrial users, and more than 357,000 residents in these cities through 86,878 active connections (excluding fire lines), 78,403 of which serve residential customers. ACWD has approximately 236 employees and is governed by a publicly elected five-member Board of Directors. ACWD was founded in 1914, making it the first public water agency created under California's County Water District Law, adopted in 1913. The map below shows the ACWD service area.

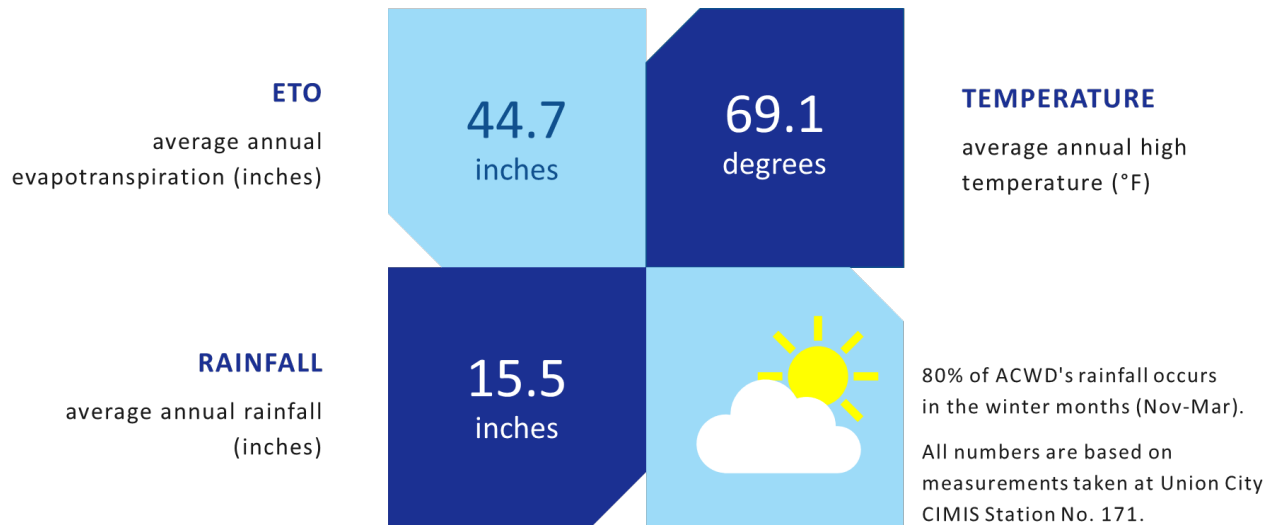
Figure 1-1. Alameda County Water District Boundary Map



Climate

ACWD's service area climate is characterized as a summer-dry, Mediterranean climate, which is temperate and generally very mild. Figure 1-2 provides additional information about the climate, which drives water use in the service area. All the precipitation in the area occurs outside the summer months when landscapes are irrigated most. If climate change, as predicted, produces hotter summers and delayed precipitation (drier falls), irrigation will increase and continue for a longer period into the fall. Water use efficiency measures that address outdoor water use will become even more critical for ACWD. The recommended strategy in this Plan contains many measures that focus on outdoor water use to address these potential impacts.

Figure 1-2. Alameda County Water District Weather Averages

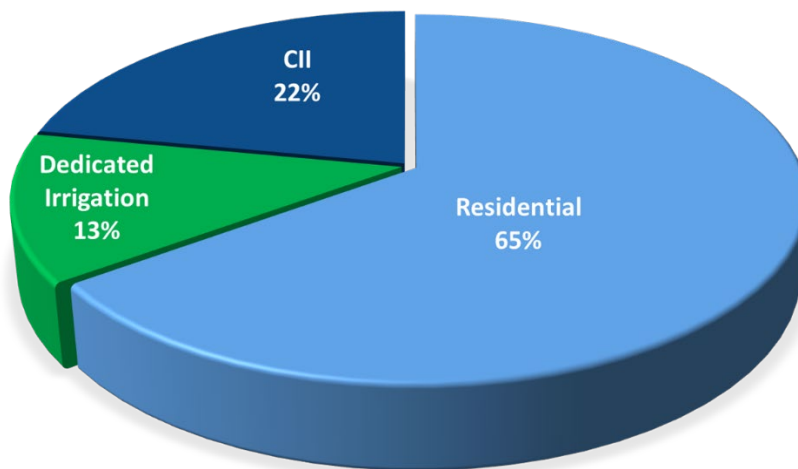


Note: The numbers in the figure above are based on 10-year averages by water year (October 1, 2010 – September 30, 2020) except for average annual high temperature ("TEMPERATURE") which is an average of daily max temperatures in 2019. Source data: California Irrigation Management Information System (CIMIS) Station No. 171 Union City.

Demographics

ACWD's service area is mostly residential, but ACWD does serve water to businesses and industrial customers. ACWD water use by customer type is provided below in Figure 1-3.

Figure 1-3. ACWD Water Use Percentage by Customer Type



The following three figures provide information regarding ACWD's service area demographics⁵ by city. Fremont is the largest city in the area with a population of 235,700, Union City has a population of 74,700 and Newark has 47,200 residents (all rounded to the nearest hundred). All three cities have very diverse communities with over 70% of households with incomes greater than \$75,000 per year. However, each city has significant populations with household incomes below the low-income threshold of \$65,500 (Figure 1-6). The low-income threshold is based on the income guidelines for ACWD's Help on Tap (HOT) customer assistance program. The

⁵ U.S. Census Bureau. American Community Survey 5-Year Estimates web pages. <https://data.census.gov/cedsci/>

HOT income guidelines are based on the greater of 50% Area Median Income (used for households with up to 3 people) or 250% of the Federal Poverty Level (used for households with 4 or more people).

Over the last seven years ACWD has implemented several water use efficiency measures and rates assistance programs that provide support to these communities. Demographics included here are very helpful for determining which measures make sense to implement in the community as well as measure marketing and outreach strategies.

Figure 1-4. ACWD Service Area Ethnicity, 2019

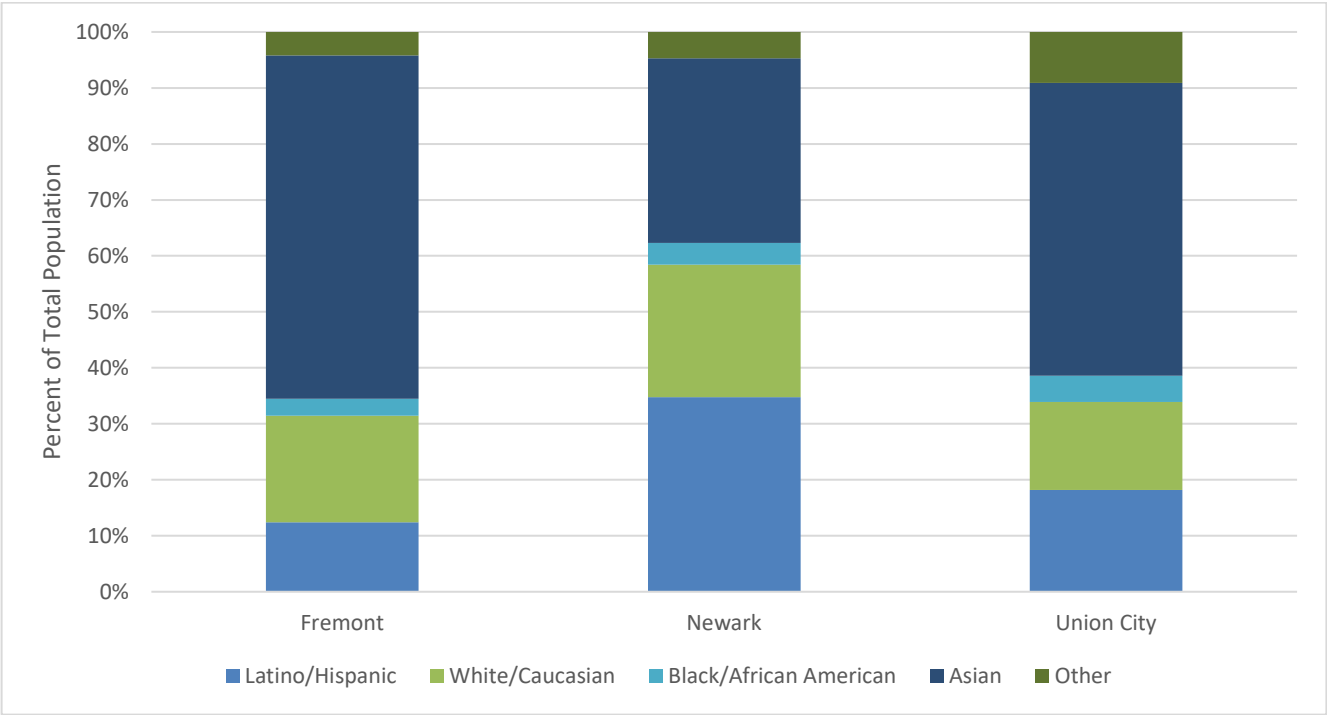


Figure 1-5. ACWD Service Area Age Group, 2019

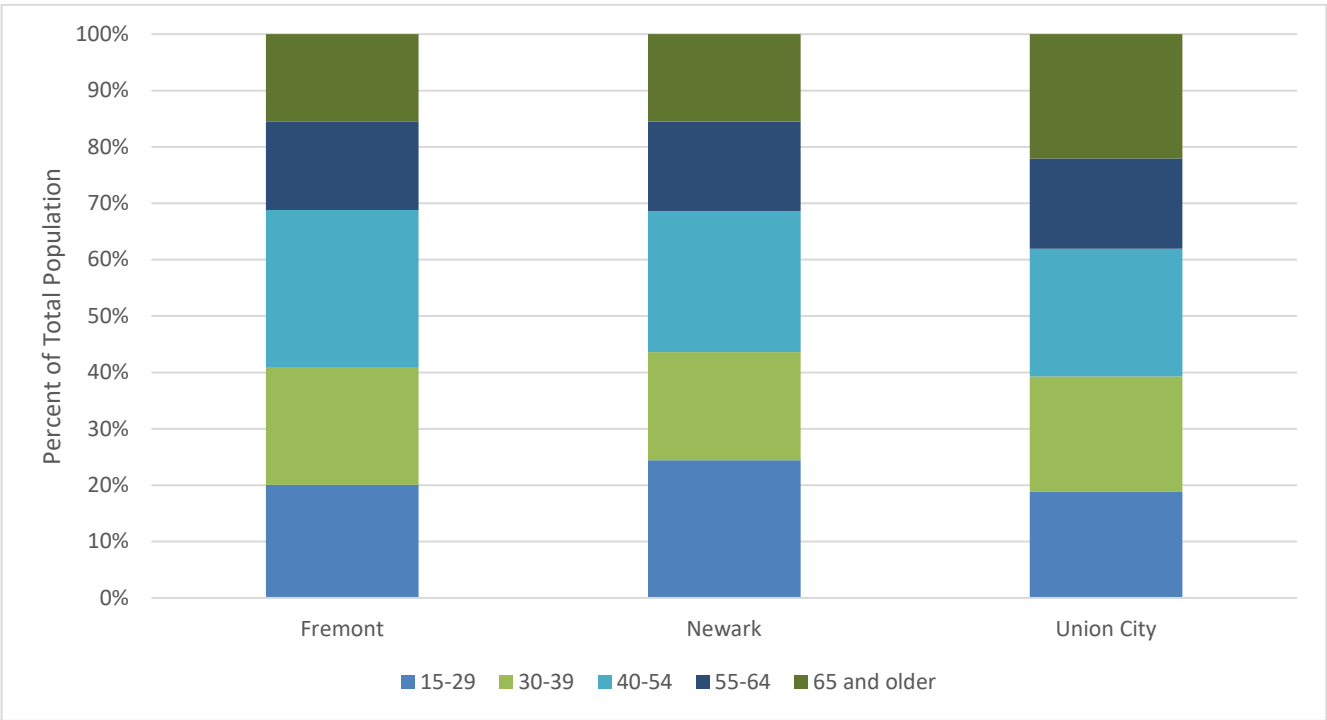
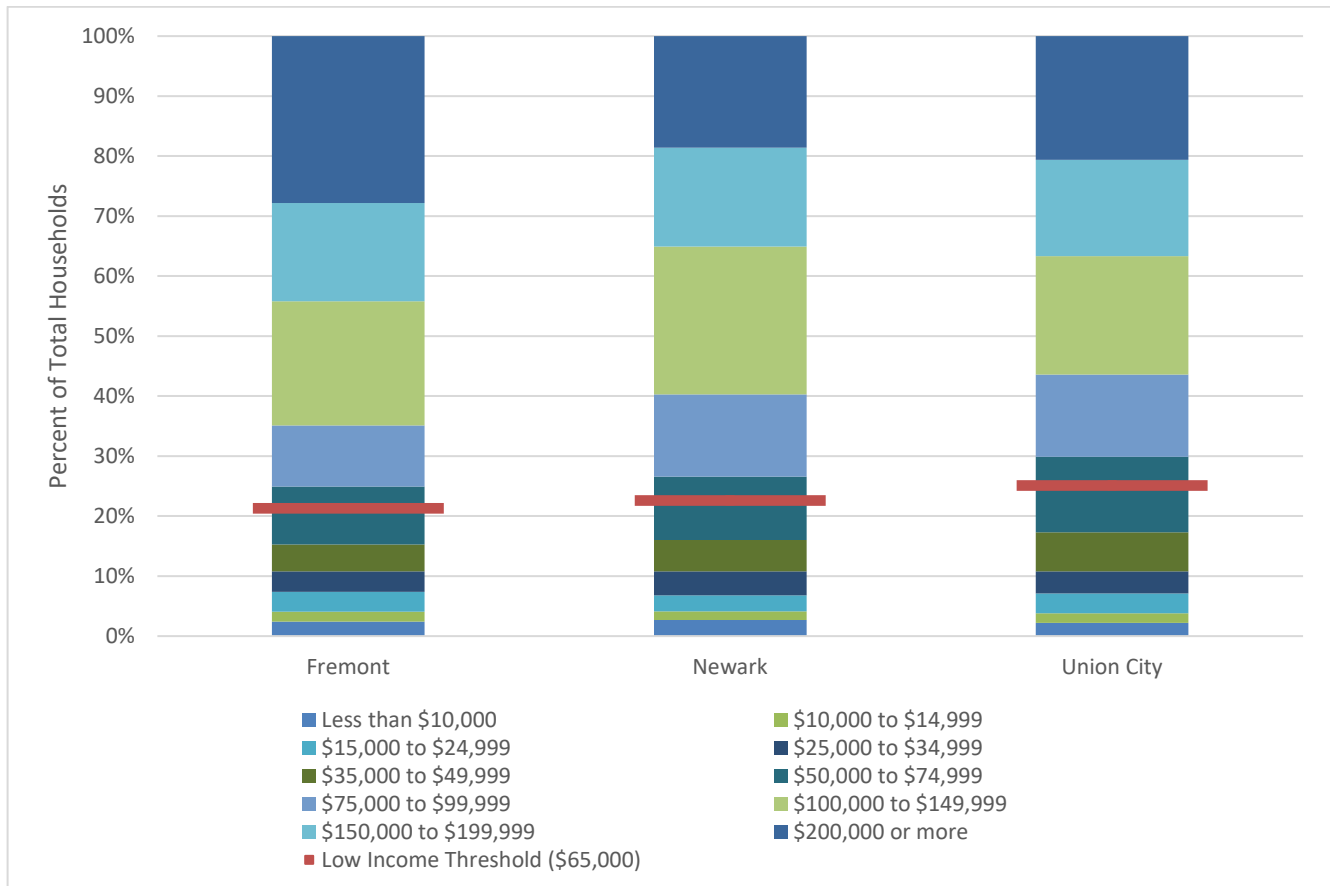


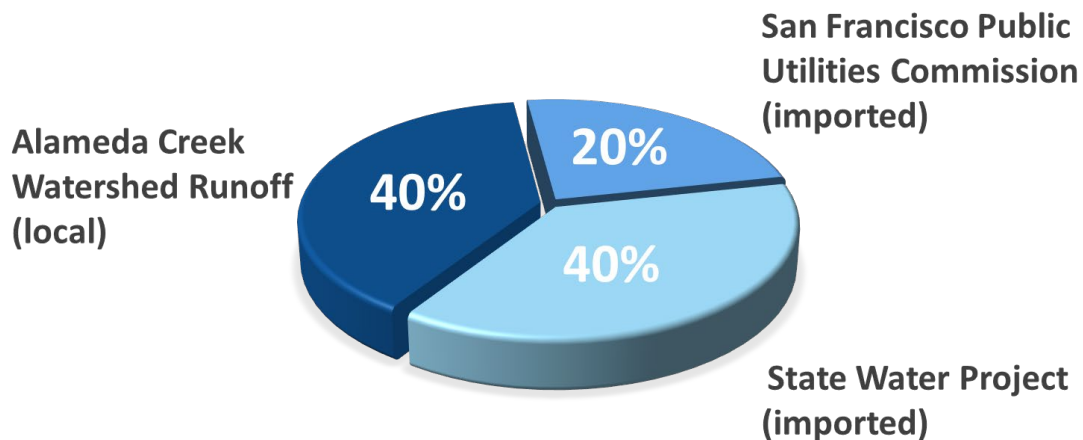
Figure 1-6. ACWD Service Area Household Income, 2019



System Supplies

For more than 100 years, ACWD has fulfilled its mission to provide a reliable supply of high-quality water at a reasonable price through a broad portfolio of water sources (Figure 1-7): runoff from the Alameda Creek Watershed; the local groundwater basin that ACWD continually recharges; desalinated water produced from the brackish water pumped by ACWD's Aquifer Reclamation Program wells, which is considered part of ACWD's local water source; the State Water Project (SWP); and the San Francisco Public Utilities Commission (SFPUC) water system. Supply percentages are rounded to the nearest tenth. This graph does not include the calculation for ACWD's current demand (as compared to 1995 demands) being met through customer water use efficiency as Figure ES-1 does. This diversification of sources has served ACWD and its customers well, but as ACWD's service area population grows, water supply uncertainties loom on the horizon, and droughts linger, customer water use efficiency continues to be an increasingly critical part of maintaining water supply reliability.

Figure 1-7. Average Sources of Supply, Distribution System Only



1.2 ACWD's Water Use Efficiency Program

Throughout the last 40 or more years, ACWD has demonstrated leadership in the field of water use efficiency. ACWD established its Water Use Efficiency (WUE) Program in 1977. ACWD was also a founding member of the California Urban Water Conservation Council (CUWCC), established in 1991, now known as the California Water Efficiency Partnership (CalWEP).

In 1995, ACWD developed an Integrated Resources Plan (IRP). Working with the community, ACWD comprehensively analyzed the long-term water needs of the Tri-City area and identified the most efficient ways to meet them. Through this process, ACWD regarded water use efficiency an equally important supply augmentation option as its other supply sources. At the time, this was a more innovative approach compared to previous planning efforts, as it focused on more than just providing additional water; it looked at the costs and benefits of dozens of approaches to match water supply to water demand, including water use efficiency. It established that water use efficiency programs can do more than reduce demand; they also can delay or eliminate the need for additional supplies and create efficiencies with existing supplies.

Several water use efficiency options or “packages” were identified out of the IRP planning process. ACWD chose to implement the package that was both cost-effective and focused on reducing outdoor water use and peak demand. The robust, comprehensive Water Use Efficiency Program ACWD offers its customers today developed from this IRP process.

The Water Use Efficiency Program that started from the IRP process has adjusted as needed to accommodate new technology, new implementation methods, and a changing marketplace. However, several things have stayed the same throughout the last 25 years: (1) all customers are provided water use efficiency services; (2) there are a variety of mechanisms to deliver these services: incentives, giveaways, technical support, and education; and (3) there is a heavy focus on outdoor water use efficiency.

ACWD has won several awards for innovation for its programs over the years. ACWD also was one of the first agencies in California to implement a Geographic Information System-based (GIS-based) landscape water budget program for landscape accounts, a residential high water use program to target over-irrigation, and a water efficient home upgrade program for income-qualified customers.





In 2010, ACWD received the Clair A. Hill Award for excellence in water management and innovation from the Association of California Water Agencies. As the honored recipient, ACWD was privileged to administer the Clair A. Hill Scholarship for the 2011-2012 academic year. Offered in the name of water leader Clair A. Hill, this \$5,000 scholarship was awarded to a qualified student in a water resources-related field of study. In 2015, ACWD received the Silicon Valley Water Conservation Award under the Water Utility category for its Water Savings

Assistance Program targeting lower income customers. That same year, ACWD nominated a service area student, Akhil Dua, under the Water Champion category, for a turf removal project he spearheaded as a hopeful Eagle Scout, in partnership with the City of Union City. He also received an award that year for his efforts.

When ACWD began developing this Plan, ACWD's WUE Program offered rebates for both indoor and outdoor water-efficient fixtures, devices and other water use efficiency measures, free devices and other incentives, technical assistance (audits) and information, school assemblies, and outreach; ACWD also was considering a service area-wide AMI implementation project.

Figure 1-7 lists all the measures that were part of ACWD's Water Use Efficiency Program when this Plan was developed. While this Plan contains some high-level discussion of ACWD's past and current water use efficiency measures, the Demand Management chapter in ACWD's latest Urban Water Management Plan (UWMP)^{6,7} contains more details regarding specific measures and past participation levels.

Figure 1-8. Alameda County Water District's 2020 Water Use Efficiency Program

ACWD's 2020 Water Use Efficiency Program	
Commercial, Industrial, and Institutional <ul style="list-style-type: none"> • High efficiency clothes washer rebates • Water use efficiency surveys (indoor and outdoor assessment) • High efficiency toilet and urinal rebates • Free water-efficient devices 	Large Landscape Customers <ul style="list-style-type: none"> • "Smart" weather-based irrigation controller rebates • Water-efficient landscape rebates • Landscape water use budgets (online service) • Awards and recognition for efficient water use • Landscape and irrigation surveys 
	Residential Customers <ul style="list-style-type: none"> • High efficiency toilet rebates (MFR only) • "Smart" weather-based irrigation controller rebates • Free water saver kits and water-efficient devices: faucet aerators, showerheads, hose nozzles • Rain barrel rebates • Water-efficient landscape rebates • Water savings assistance for low-income customers 
All Customers <ul style="list-style-type: none"> • Water use efficiency customer service • Educational materials: water-wise gardening online tool, tips, and technical information • Water use efficiency outreach: events, newsletters, newspaper ads/articles, ACWD website, Point of Sale information • Water-efficient landscape/landscaper training workshops • Water-efficient landscape demonstration garden • Water waste monitoring/ordinance enforcement 	

⁶ Alameda County Water District. (2016). *Urban Water Management Plan 2015-2020*.

⁷ Ibid. (2021). *Urban Water Management Plan 2020-2025*. Pending completion in July 2021. See the Alameda County Water District website for more information: <https://www.acwd.org/365/Urban-Water-Management-Plan>.

Outdoor Water Use Efficiency

ACWD offers many measures that address outdoor water use efficiency, several of which are available to all customers (see Figure 1-8). Outdoor use has been a focus of ACWD's program since the 1995 IRP. ACWD was one of the first agencies in California to implement a GIS-based landscape water budget measure for its landscape accounts. It started in 2000, with over 800 sites (representing approximately 1,600 accounts) receiving reports each year. ACWD was also a leader in implementing a GIS-based residential high-water use notification and assistance measure, similar to popular "home water use" reporting measures currently being run by other agencies. ACWD's program started in 2004 and ran through 2014 with over 1,000 of the highest water user customers contacted each year. That measure was initiated to target over-irrigation but was also successful in identifying other water use efficiency opportunities, such as large families that could benefit from clothes washer rebates. Those measures transitioned to online services within the last several years and will be updated and expanded upon with new online tools available through AMI.

Public Education and Outreach

ACWD has a comprehensive public outreach program. ACWD has offered water education school assemblies for local schools for over 20 years and distributes educational materials to teachers to adapt to their curriculum. ACWD uses numerous other channels for outreach to customers, such as a newsletter that is sent out to all addresses in the service area several times per year, a website that is regularly updated, and a weekly item in the local newspaper. ACWD is active on social media and hosts numerous community events, many of which went virtual during the COVID-19 pandemic. ACWD also provides customers with water use efficiency tips and technical information. These outreach avenues are listed with ACWD's 2020 Water Use Efficiency Program information in Figure 1-8. Examples of local and regional outreach initiatives can be found in Appendix I.

Water Waste Ordinance

In 2008, ACWD's Board adopted an ordinance that prohibits the wasteful use of water. The Ordinance can be found on ACWD's website.⁸ ACWD's Ordinance is in place at all times and is only superseded by a more stringent ordinance initiated through a Water Shortage Emergency Declaration. The Ordinance provides a mechanism to enforce against water waste in the ACWD community. ACWD has a water waste reporting form on its website where any citizen who identifies a water waste situation occurring in the service area can report it. ACWD's water use efficiency team follows up with a notification to the individual that is reportedly wasting water. ACWD receives an average of 55 water waste reports per year.

Water Efficiency in Building Codes and Standards

ACWD regularly coordinates with its service area cities on items that relate to water use efficiency. ACWD provides WUE recommendations for new developments with efficiency standards that go beyond code. These recommendations can be found on ACWD's website.⁹ The document is updated regularly to ensure that the most water-efficient fixtures are included in the recommendation. ACWD coordinated with both the City of Fremont and the City of Union City on the development of and updates to their Climate Action Plans by providing data and input on water use efficiency elements. ACWD supports the implementation of the California Model Water Efficient Ordinance (MWELo)¹⁰ and SB 407¹¹ by providing incentives and technical support to customers

⁸ <https://www.acwd.org/wwordinance>

⁹ <https://www.acwd.org/conserve>

¹⁰ California Department of Water Resources. (2015). *Model Water Efficient Landscape Ordinance*. <https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance>

¹¹ California State Legislature. Senate Bill 407 (Padilla), October 11, 2009. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100SB407

who are required to comply with these laws. ACWD also supports service area city adoption of CALGreen¹² standards.

Promote Water Efficient Products and Services

ACWD is a promotional partner of the U.S. Environmental Protection Agency WaterSense¹³ (WaterSense) program. As a promotional partner, ACWD promotes WaterSense labeled products and services. The WaterSense program helps ACWD direct its customers to water-efficient products and services that have been tested and certified through a rigorous process, to ensure that ACWD's customers are getting the best products with the highest water use efficiency performance. ACWD promotes products and services that are not WaterSense certified if a certification for those items and services is not yet available. However, the WaterSense program is fairly comprehensive and covers toilets, urinals, faucet aerators, showerheads, landscape contractor workshops and certifications, weather-based irrigation controllers, and sprinkler bodies. Other WaterSense promotional partnership activities include co-promotion of WaterSense outreach campaigns such as "Fix a Leak Week."

Metering Practices

All ACWD connections are metered and billed based on the volume of water used. ACWD is pursuing a full-service AMI program which will continue ACWD's practice of metering all connections while also providing ACWD, and all its customers through a customer portal, detailed water use data in up to 15-minute increments. ACWD will be able to identify leaks and over-irrigation, as well as target customers for water use efficiency programs that make the most sense for them. More details regarding ACWD's AMI project and the measure savings are provided in Section 1.5 and Appendix E, respectively.

Rate Structures and Billing Practices

ACWD currently has a uniform rate structure,¹⁴ which means that each unit of water (CCF) is charged at the same rate. One unit is equivalent to 100 cubic feet or 748 gallons of water. The more water that a customer uses the higher their bill. ACWD also has a fixed charge that covers a portion of the fixed costs of operating the water system, which includes meter reading, customer service, service line and water main maintenance and renewal, and other infrastructure costs. However, most of the revenue that ACWD collects from customers is from the commodity or volumetric charge, which is the per unit of use charge described above.

With an upcoming AMI deployment project, ACWD will provide its customers with direct access to their water usage. The AMI customer portal will be integrated with the online billing and payment system to ensure customers can make a connection between their water use and the cost of that water. Making this connection is critical for encouraging customers to use water more efficiently. ACWD periodically conducts an analysis to ensure water rates accurately reflect the cost of water service. ACWD also uses outside expert consultants to ensure that its rates are properly determined.

¹² California Green (CALGreen) Building Standards 2019 Code, effective January 1, 2020.

<https://www.dgs.ca.gov/BSC/Resources/Page-Content/Building-Standards-Commission-Resources-List-Folder/CALGreen#@ViewBag.JumpTo>

¹³ <https://www.epa.gov/watersense>

¹⁴ www.acwd.org/rates

1.3 Water Use Efficiency Program Success

Over the last 25 years, ACWD's Water Use Efficiency Program has been extremely successful and is estimated to have saved over 21,600¹⁵ acre-feet (AF) through the implementation of water use efficiency measures. ACWD and its customers have met or exceeded nearly all goals set in 1995. State-imposed targets for water use efficiency for 2020 also have been met, as described below. Per capita water demand has dropped more than 30% during that same period. So, while the population in the service area has grown, investments in IRP strategies including water use efficiency have allowed ACWD to avoid or defer capital projects. Additionally, as of 2019 ACWD's total systemwide water use was 16% below year 2013 water use; 2013 was the year used as a baseline for drought response analysis by the state. This means ACWD's customers have successfully maintained a significant portion of the water use reductions they initiated during the last drought.

ACWD has utilized a suite of benchmarks to assess its Water Use Efficiency Program implementation and effectiveness. These include metrics on how water saved compares with IRP targets through annual assessments of supplies and demands, gallons per capita per day (GPCD) monitoring, reporting on BMPs per ACWD's membership in CUWCC (no longer required but ACWD continues to implement and track BMPs), and annual assessments of compliance with state-imposed water use efficiency targets – Senate Bill X7-7 (SB X7-7)¹⁶ per capita water use goals. ACWD then reports this status through its UWMP every five years.

SB X7-7, also known as 20x2020, was adopted by the state in 2009 and required water agencies to set and report on water efficiency targets in their UWMPs. This state action effectively rendered the prescriptive BMP reporting process through CUWCC obsolete, as now agencies were obligated to report their GPCD water use efficiency gains directly to the state. This change eventually led to the dismantling of CUWCC as a quasi-regulatory agency and the creation of CalWEP. CalWEP's current role is to support water agencies by identifying programs and tools to help agencies in the state of California achieve water use efficiency and comply with state regulations.

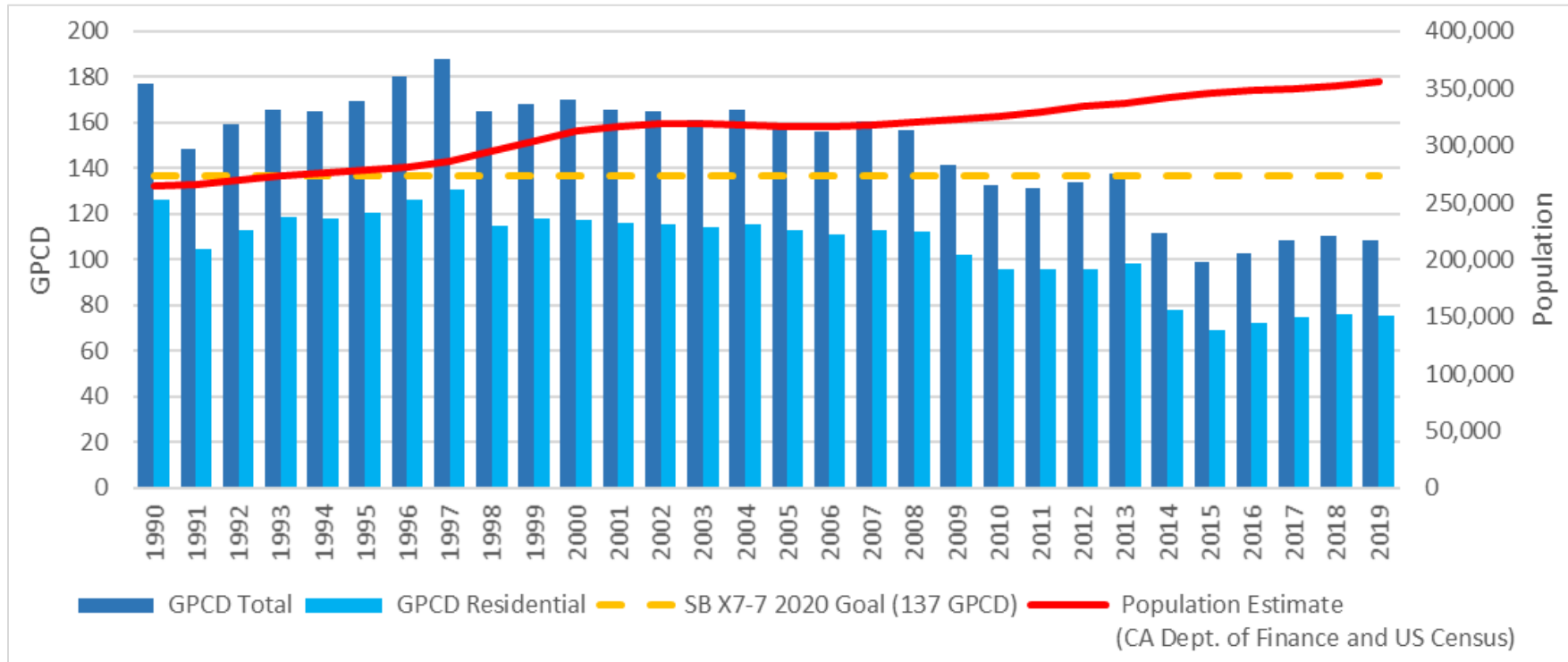
In 2010, ACWD's 2020 SB X7-7 GPCD target was determined to be 137 gallons, as documented in the 2010-2015 UWMP and restated in the 2015-2020 UWMP. With ACWD's GPCD holding steady well under 137 gallons as of the development of this Plan, ACWD has already met its SB X7-7 20x2020 target. ACWD's target is identified as the dashed yellow line in Figure 1-9.

ACWD also tracks performance metrics related to participation in indoor and outdoor measures. ACWD tracks the number of rebates and incentives awarded, giveaways provided, technical assistance program participation (number of surveys), education program for schools (number of students and classes participating), and public attendance at events and workshops (homeowner landscaping workshops and landscape contractor certification training workshops). While ACWD tracks all water use efficiency measures, it is actively working to streamline this process through the development of a water use efficiency measure tracking database. This database will contain past activities data as well as current data. The database will tie in with a new AMI system and eventually allow customers to apply for all ACWD programs online, reducing the manual processing and reporting burden on ACWD's conservation staff.

¹⁵ This estimate is based on the difference between ACWD's SB X7-7 (see the next SB X7-7 footnote) baseline monthly per capita water use, a 10-year average by month for 1995-2004, and the current (2020) 10-year monthly moving average, with monthly values combined into an annual savings number.

¹⁶ SB X7-7, also known as the Water Conservation Act of 2009, was a significant amendment introduced after the drought of 2007-2009 and because of the California governor's call for a statewide 20% reduction in urban water use by the year 2020. See the California Department of Water Resources' SB X7-7 website for more information, accessed April 2021: <https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-X7-7>

Figure 1-9. Gallons Per Capita Per Day and Population



These past WUE successes have dramatically improved ACWD’s water supply reliability, even as deliveries from the Delta have grown more uncertain. However, there is more water supply uncertainty on the horizon for ACWD. While water use efficiency has allowed ACWD to stretch its supplies even during the most severe drought conditions, ACWD did have some challenges during the last extended state drought from 2012-2016.

1.4 ACWD Drought Response

In early 2014, ACWD had to quickly initiate drought actions, also known as Water Shortage Contingency Planning, when two of its three main sources of supplies were impacted by dry conditions and other extenuating circumstances.

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. ACWD immediately followed with a voluntary request to its customers to cut back by 20%. Shortly after that, ACWD made that request mandatory as its State Water Project supply was reduced to an unprecedented 0%. In March 2014, ACWD declared a Water Shortage Emergency (WSE). ACWD's Board adopted a WSE Ordinance that primarily focused on outdoor water use restrictions. In July 2014, ACWD adopted a drought surcharge for excessive use, as the state issued restrictions on water use that were very similar to what ACWD already had in place. The state also began requiring water agencies to report monthly on water use and drought actions.

In April 2015, the state, not seeing enough of a reduction in water use statewide, established mandatory restrictions. Responsibility for enforcement of those restrictions was placed on water agencies. ACWD's state-mandated cutback was 16%, which was based on a state formula that used residential GPCD. By that time, ACWD had already achieved a 20% demand reduction. The state's action and the media storm that followed produced an additional 8% plus reduction by ACWD's customers – reducing demand well below the state requirement.

ACWD's quick and early success with demand reductions can be attributed to its WSE Ordinance, which required that customers reduce irrigation to two (2) days per week during the summer and one (1) day per week during the spring and fall. No irrigation was allowed during the winter months unless there was an extended (over two weeks) dry period, and no irrigation was allowed if it rained.

Many residents stopped watering their lawns altogether, and as of the approval of this Plan,

A BRIEF HISTORY OF RECENT DROUGHT IN ALAMEDA COUNTY WATER DISTRICT

JAN 17, 2014

Governor proclaims drought emergency. ACWD requests 20% voluntary reduction.

JAN 31, 2014

Unprecedented State Water Project allocation of zero.

MAR 13, 2014

ACWD declares a Water Shortage Emergency (WSE).

JULY 15, 2014

State Water Resources Control Board (SWRCB) adopts statewide emergency conservation regulations.

END OF 2014

ACWD successfully achieves 20% plus reductions.

APR 1, 2015

Governor directs first ever Statewide Mandatory Water Reductions. ACWD's target reduction is 16%.

END OF 2015

ACWD achieves close to 30% reduction in usage.

MAY 2016

SWRCB adopts new regulation which allows agencies to demonstrate they have adequate water supplies.

JUNE 2016

ACWD submits alternative and findings that eliminates its mandatory reduction and rescinds its WSE Ordinance.

APR 7, 2017

Governor Brown lifts the drought emergency.

END OF 2017

Monthly reporting requirements and prohibitions on wasteful water use expire.



Lake Oroville 2014,
California Department of Water Resources



Alameda Creek, ACWD Photo Library, Stephanie Penn



Water-efficient landscape conversion project,
ACWD Photo Library, Stephanie Penn



Quarry Lakes, ACWD Photo Library, Frank Jahn

much of that demand has yet to return. ACWD analyzed responses collected from the Community Survey conducted for this Plan. (See Appendix G for more information about the survey.) The analysis indicated that there is permanent demand reduction from customers who modified their landscape to a water-efficient landscape. The permanent reduction is estimated to be 1 MGD. Another 2.75 MGD of the drought-induced outdoor water use reduction is expected to return over the next five years (2020-2024). There is more discussion on this in Section 3 of this Plan.

The State Water Resources Control Board (SWRCB) updated its emergency regulation in May 2016. The update allowed water suppliers to self-certify as to whether they had sufficient supplies based on a hypothetical extended dry-year period mirroring the past three years, with assumed demand as an average of 2013 and 2014 actual demands. ACWD's self-certification analysis resulted in sufficient supplies, eliminating ACWD's state-mandated reduction. In June 2016, ACWD rescinded its WSE Ordinance. ACWD's monthly reporting to SWRCB continued even after the regulation mandating it expired in November 2017.

The drought presented some unprecedented challenges for ACWD. ACWD had to make quick and deliberate decisions to reduce demand. Part of ACWD's success in reducing demands can be attributed to ACWD's WUE program and customer outreach for the program. If ACWD had not already had a robust and comprehensive WUE program and outreach channels, demand reductions would have been much more challenging. For example, ACWD had a water-efficient landscape rebate program that encouraged many customers to permanently replace their landscape with a more climate-appropriate and water-efficient landscape. Providing customers with this incentive during the drought was a critical part of demand reduction success.

Despite successes with ACWD's Water Use Efficiency Program and drought response, ACWD saw a need to revisit previous analysis and conduct a comprehensive review of its WUE Program, as outlined in ACWD's 2018 Strategic Plan. The Strategic Plan identifies future supply and demand uncertainties such as the Bay Delta Water Quality Control Plan, climate change impacts, and future droughts, as well as impending state regulations ("Making Water Conservation a California Way of Life") and the implementation of AMI.

ACWD needed to develop a strategy that could govern implementation of the WUE program in the short term (5 years) and provide a roadmap for the next 25 years that would align with ACWD's long-term planning projects. Thus, ACWD embarked on a Plan development process.

1.5 Water Efficiency Master Plan Purpose & Drivers

The Water Efficiency Master Plan will direct ACWD's WUE program for the next five years (2021-2025) and will provide a foundation for water supply planning out to 2050. The Plan presents an overview of ACWD's past and current water use or baseline use, projected future use with population growth and drought rebound, and an evaluation of remaining water use efficiency potential, with recommended water use efficiency strategies for the short term, as well as considerations and direction for the long term. The Plan is guided by the AWWA Manual of Practice M52 – *AWWA Water Conservation Programs – A Planning Manual* (AWWA, 2017).

When ACWD began analysis for this Plan, it was interested in gaining a better understanding of what water use changes its customers made during the last drought, which actions resulted in permanent savings, and which actions were temporary changes that may contribute to a rebound in water use in the future. Typically, after a drought there is a slow but steady "rebound" effect, where some customer behavioral changes fade and reset to pre-drought behaviors. However, there tends to be a permanent downward shift in overall water consumption, attributed to both permanent behavioral changes ("conservation ethic") and permanent water use efficiency actions, such as

ACWD's Specific Plan Objectives

- ◆ Engage the community in identifying past water use efficiency actions and customer interests
- ◆ Develop an assessment of past Water Use Efficiency Program efforts, current and projected water use, and conservation potential
- ◆ Determine the best strategy for the Water Use Efficiency Program for the short term and provide a foundation for the long term

removing older fixtures in favor of efficient models and removing turf in favor of water-efficient landscaping. In retrospect, the trend is clear, but identifying where temporary behavior ends and permanent change begins has always been challenging for water resources planning when projecting future water demand. Engaging the community in this analysis through a Community Survey was critical to making assumptions about drought rebound potential and projected future water demand.

ACWD also recognized that there had been a substantial shift in the challenges and drivers for water management – in part because of the recent drought, but also because of other water supply uncertainties, the onslaught of new technology such as AMI, and the need to comply with developing water use efficiency regulations. This Plan, and its associated analyses, was needed to identify short-term WUE actions that could ensure water supply reliability, keep demands low, and be “drought ready,” while also providing guidance regarding water use efficiency’s role under long-term water supply planning scenarios. ACWD also wanted to make sure it was on track to meet new state Water Conservation Legislation, of which many elements were yet to be determined. In addition, ACWD wanted to gain a better understanding of the impact of AMI from a water use efficiency perspective – its savings potential and measures that would benefit from the technology.

Analysis conducted for the Plan took all of this into consideration, identifying WUE Strategies at increasing cost and savings levels to address ACWD’s current and future demand management needs. The first strategy is modeled after ACWD’s current program but trimmed down to demonstrate the bare minimum ACWD should implement to keep on track with initial IRP planning objectives. It includes measures that are cost effective when compared to ACWD’s current cost of production. The second strategy is an expanded version of the first strategy with more measures than ACWD’s current program. It includes measures that are cost effective when compared to the Fiscal Year (FY) 2025/26 cost of SFPUC water supply, ACWD’s most expensive source of water. The third strategy includes all measures in the first two strategies plus additional measures that establish codes and regulations for new and existing development and rates changes. It includes measures that are cost effective when compared to the potential cost of new supplies.

As mentioned above, there are several major water management drivers for this Plan. These drivers were all identified in ACWD’s 2018 Strategic Plan through its objectives and identified actions.

ACWD Strategic Plan

In 2018, ACWD established its 5-year strategic goals which provided a roadmap for carrying out ACWD’s core mission. Those goals are as follows:

1. Maintain and improve the cost effectiveness and value of ACWD services
2. Sustain a reliable, high quality water supply for ACWD customers
3. Improve ACWD’s financial stability and transparency
4. Improve workforce recruitment, maintain retention, and enhance employee engagement
5. Promote clear and open communications, outreach, and engagement with customers and communities

ACWD’s Water Use Efficiency Program ties in with several of these goals and was specifically called out in Strategic Plan Goal 2: Sustain a reliable, high quality water supply for ACWD customers; objective 2.3: Evaluate New and Innovative Water Management Concepts. This objective declares that ACWD should develop and implement a Water Efficiency Master Plan to leverage the benefits of AMI and address changing water use efficiency regulations. The Plan is also tied into objective 2.4: Plan for Future Water Supplies, as it informs ACWD’s major planning objectives: the demand forecast update, the UWMP, and a full IRP update planned for 2023-2025.

Advanced Metering Infrastructure (AMI)

Several years before this planning process was initiated, ACWD’s Board began seriously considering implementation of a service area-wide AMI deployment project. AMI provides several benefits for ACWD including increased operational efficiencies, enhanced customer service, reduced environmental impact, and increased water use efficiency. One of the biggest changes of AMI is that it takes ACWD from manually reading

customer consumption on a bimonthly basis (monthly for a handful of meters) to near real-time remote access of customer consumption data.

The AMI project was approved by the Board of Directors just as this Plan was in its final stages of completion. The project includes a best-in-class customer web portal to provide customers access to their usage data at any time during their billing cycle that will be integrated with existing systems that provide additional customer self-service functions.

AMI will provide a tremendous amount of water consumption data that can be used to analyze customer water use trends, identify leaks and high-water use, target customers for water use efficiency measures, and evaluate the success of these measures. The AMI measure, as analyzed in this Plan, demonstrates that significant water savings can be achieved through access to detailed (15-minute) water usage information. All WUE strategies in this Plan include AMI Portal Data Analysis as a water use efficiency measure.

New State Legislation

In 2018, California Governor Edmund G. Brown Jr. signed AB 1668 (Friedman)¹⁷ and SB 606 (Hertzberg).¹⁸ These bills provide a framework for implementing new standards to establish “Making Water Conservation a California Way of Life” and better prepare the state for droughts and climate change. The new standards must be in place by July 2022.

The two bills go beyond existing SB X7-7 requirements to further strengthen the state’s water resiliency in the face of future droughts. Bill provisions include establishing standards for the following:¹⁹

- ◆ Residential indoor use with an initial per person water use standard of 55 gallons per day (gpd) until 2025, 52.5 gallons from 2025 to 2030, and 50 gallons beginning in 2030
- ◆ Outdoor irrigation (residential and dedicated landscape water meters)
- ◆ Performance measures for CII water use
- ◆ Water loss standards

This Plan provides a recommended strategy for meeting these new standards with measures for all customer types. The strategy anticipates what the standards may be, based on the best available information at the time this Plan was developed.

Water Supply Uncertainty

ACWD is facing many uncertainties about the reliability of its water sources and what its water needs will be in the future. Decisions over the next five years related to the Bay-Delta Water Quality Control Plan will be the most critical. The outcome of those decisions, and other supply uncertainties explained in this section, will help determine if ACWD needs to develop new water supplies. Increased water use efficiency can help offset or delay development of expensive new sources.

Some of the challenges to ACWD’s water supply include the following:

Bay-Delta Water Quality Control Plan and Increasing Delta Flow Requirements – The SWRCB is in the process of establishing enhanced flow requirements for rivers flowing into and through the Sacramento-San Joaquin

¹⁷ Ibid. Assembly Bill 1668 (Friedman), May 31, 2018.

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1668

¹⁸ Senate Bill 606 (Hertzberg), May 31, 2018.

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB606

¹⁹ <https://www.ca.gov/archive/gov39/2018/05/31/governor-brown-signs-legislation-establishing-statewide-water-efficiency-goals/index.html>

River Delta (Delta) under the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan. The plan calls for unimpaired flows during winter and spring months for rivers flowing into the Delta. These new flow requirements will directly offset the available supply for ACWD to import from both the SWP and SFPUC.

These impacts will be felt in normal years but will also significantly deplete the surpluses needed to fill ACWD's off-site groundwater bank in Semitropic. ACWD contracted with the Semitropic water bank in the 1990s for the purpose of storing wet year surpluses for use during dry years, a practice known as "conjunctive use" management. Water use efficiency measures increase the availability of surpluses for banking in Semitropic.

Local Fisheries Restoration Flow Requirements – Together with a team of non-governmental organizations and local, state, and federal government agencies, ACWD is working toward reestablishing a native steelhead fishery on Alameda Creek. ACWD has committed to providing additional stream flows needed to enhance migration success for steelhead and other salmonids.

Climate Change – The issue of climate change has become an important factor in water resources planning in California and is frequently considered in water management and water use efficiency planning, though the extent and precise effects of climate change remain uncertain. ACWD's climate change analyses find that the known and anticipated effects of climate change will have significant impacts on our water supplies and our operations. Anticipated impacts include, but are not limited to, reductions in annual snowpack, changes in precipitation, sea-level rise, saltwater intrusion in the Delta and ACWD's coastal aquifer, and increased temperature-dependent water demands. The SWP is anticipated to have operational challenges in the Delta stemming from sea level rise as a result of climate change, reducing the ability and quantity of water it is able to deliver. Reduction in snowpack and earlier snow melt in the Sierra Nevada mountain range poses a threat to both the SWP and SFPUC supplies. Sea-level rise will also reduce ACWD's freshwater storage in the Niles Cone groundwater basin.

The result of enhanced flow requirements in the Delta and on Alameda Creek combined with the anticipated impacts of climate change lead to a significant reduction in ACWD's water supply reliability. This Plan is the first step in many planning processes ACWD will pursue in the near future to address these uncertainties. The information in this Plan will provide the foundation for an upcoming Water Supply Master Planning process, as it provides a demand forecast with projected savings from water use efficiency measures for ACWD. The model used for this Plan's analysis provides water use efficiency savings estimates for individual measures, which can be modified to identify additional water savings potential if measure targets are increased. More information about water use efficiency measures and targets can be found in Section 5.

AWWA G480 Standard

ACWD intends for this Plan and its WUE strategy to comply with the American Water Works Association G480 Water Conservation Program Operation and Management Standard (G480 Standard). The G480 Standard is defined on the AWWA web page as follows:

The G480-13 Water Conservation Program Operation and Management Standard (G480 Standard) is a voluntary standard that can be adopted by water providers at their own discretion. The G480 Standard describes the critical elements of an effective water conservation program and encompasses activities undertaken by a utility within its own operations to improve water use on the supply side through distribution system management and on the demand side through customer billing and education practices. A conservation program meeting this standard has the potential to impact all water users.²⁰

²⁰ American Water Works Association. G480 Standard and AWE Leaderboard web page, accessed April 2021: <https://www.allianceforwaterefficiency.org/resources/topic/g480-standard-and-awe-leaderboard>

All elements of the AWWA G480 Standard are included in this Plan. Achieving this standard puts ACWD in a position to be recognized as a leader in water use efficiency on the Alliance for Water Efficiency's G480 Leaderboard.

1.6 Water Efficiency Master Plan Approach

In 2019, ACWD hired MWM through a Request for Proposals (RFP) process to conduct the analysis associated with the development of the Plan. MWM utilized its proprietary Least Cost Planning Decision Support System Model (DSS Model) to evaluate current and potential water use efficiency measures. The DSS Model is a software tool that assists water planners with evaluating alternative water use efficiency program options. It prepares long-range water demand projections and quantifies the demand reduction effects of selected measures, along with the effects of plumbing codes and appliance standards.²¹ The approach used for this project is summarized herein. Detailed information about each step in the process is included in subsequent sections of this Plan.

ACWD worked closely with MWM to compile extensive historical data on the region, agency, water use efficiency measures, production, consumption, weather, and various census data points. Together, these formed the foundation for the DSS Model used for this project. ACWD's project team utilized the template data collection workbook provided by MWM to compile and verify data. The project team at MWM verified and tested data against historical records to ensure accuracy and logic as the DSS Model was developed. A Community Survey was conducted to further refine the model inputs. The survey asked questions that were geared toward identifying customer actions during the drought, the current level of efficiency of customer water using fixtures, and interests in water use efficiency measures. More detailed information about the DSS Model can be found in Appendix B of this Plan, including a description of the assumptions, analysis, and methodology used. More details about the Community Survey and how it was used in the model are included in Appendix G.

MWM reviewed existing ACWD practices and procedures to create a comprehensive list of water use efficiency measures currently in place. Based on the analysis of current water use patterns, and taking into account characteristics of the service area, a list of more than 100 potential water use efficiency measures was compiled and reviewed by ACWD staff in a measure screening workshop with MWM. The MWM team also reviewed relevant literature and practices of other agencies to determine potential measures that could be implemented by ACWD. MWM used its master potential measures database and followed the process outlined in the AWWA Manual of Practice *M52 – Water Conservation Programs – A Planning Manual*.

ACWD then received the Measure Screening Template and began screening the water use efficiency measures. ACWD developed screening criteria which included water savings potential, account saturation, equitability, community and social acceptance, and feasibility of implementation related to cost and staffing, as well as other criteria as outlined in Section 5.1. The list was then compared to input from customers through a Community Survey (Appendix G), other online customer surveys, and Board workshops and meetings; customer interests played a major role in identifying water use efficiency measures that were analyzed for this Plan.

During the measure screening process, 26 measures were selected for further detailed economic analysis. The evaluation included measures directed at existing accounts as well as new development (i.e., measures that would encourage and/or require new residential and business customers to be more water efficient).

Assumptions and results for measures evaluated and selected for incorporation into Strategies are described in this Plan. Based on a preliminary analysis of the individual measures, three Strategies (Strategies A, B and C)

²¹ 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, such as plumbing fixtures and appliance uses. It 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. It also may use a top-down approach with a utility prepared water demand forecast.

were developed by MWM with input from ACWD staff. Each of the three Strategies were evaluated to determine the net effect of running multiple measures together over the 31-year period of analysis (2020–2050).

Using the DSS Model, projections of future water demand, with and without plumbing code as well as with and without active water use efficiency programs, were made for ACWD’s water service area for every year in the 31-year analysis period. Water savings, costs, and benefit-cost evaluations were performed on the selected measures.

Throughout the planning process, ACWD and MWM met more than 20 times, primarily in an effort to complete the DSS Model, which is robust for each of the 26 measures modeled. In the model, ACWD identified fixture costs, applicable customer classes, time period of implementation, measure life, administrative costs, end uses, end-use savings per replacement, and a target number or percentage of accounts per program year based on current staffing level capacities and assumed customer interest. Following DSS Model completion and approval of Strategy B as the recommended approach for implementation for the next five years, the Draft and Final Water Efficiency Master Plans were prepared. Figure 1-10 provides an overview of the Plan development timeline.

Figure 1-10. Water Efficiency Master Plan Development – Major Project Milestones



The Final Plan projects long-range demands, identifies attainable water use efficiency goals, and proposes strategies to meet these goals. It systematically evaluates and quantifies a short-term water use efficiency strategy for the service area while providing a foundation, or “toolbox,” that enables ACWD to pursue a long-term strategy. In other words, it is “future ready” with the capacity to initiate a long-term potential strategy, if needed. It serves as a guide for future water use efficiency investments and activities. It also includes a functional implementation plan for ACWD to establish and administer cost-effective water use efficiency measures.

ACWD will use this Plan and its robust analysis in future water supply planning documents. The Plan will be used immediately to prepare the Water Use Efficiency (Demand Management Measures) chapter in its 2020-2025 UWMP. The Plan will also start ACWD on a path for compliance with AB 1668 and SB 606 “Making Water Conservation a California Way of Life” legislation (signed on May 31, 2018) by documenting water use efficiency measures that address end uses subject to new state standards. While the Final Plan was developed to align with new state legislation, full details on these requirements were not yet available when the Plan was finalized. When detailed guidance is available, this Plan may need to be modified to include additional actions.

2 HISTORICAL AND CURRENT WATER USE

This section presents information about the data collection process, historical production, and customer category consumption data.

2.1 Information Review and Data Collection Methods

Data relevant to this effort was collected, reviewed, and entered into ACWD's Data Collection Workbook. To help streamline the process, MWM initially entered data from readily available sources, like the 2015 UWMP, into the Excel Data Collection Workbook prior to sending the file to ACWD staff for updating and review.

Several iterations of data review by both ACWD staff and MWM followed including confirmation of the number and types of customers within ACWD's service area. Data from each customer category was analyzed separately. Monthly production data²² from 1986-2019 was also reviewed. MWM and ACWD staff decided to use the data from 2019 to derive typical non-drought average water use per account per day because there was a full year of data to work with and it was furthest from the last drought.

Based on ACWD's water billing system, residential water use was broken down into single family and multifamily categories. MWM used historical monthly billing data (obtained from bimonthly reading cycles) to segregate indoor and outdoor water use by customer type. Non-residential categories of use were analyzed separately. Average daily commercial, industrial, and institutional water use was expressed on a gallons-per-account or gallons-per-employee basis.

Figure 2-1 presents data topics and data items that were requested, gathered, and stored in ACWD's Data Collection Workbook. Items were tracked in a checklist in a robust data Excel file kept by MWM and ACWD.

²² Production data did not include private pumping production data, and consumption did not include billed well consumption data. While this data was not included in the Plan analysis, ACWD will continue to monitor this use outside of the DSS Model for potential water use efficiency gains, which would primarily apply to outdoor water use. However, any potential water use efficiency gains from measures addressing this use are known to be less than 1% of total water use.

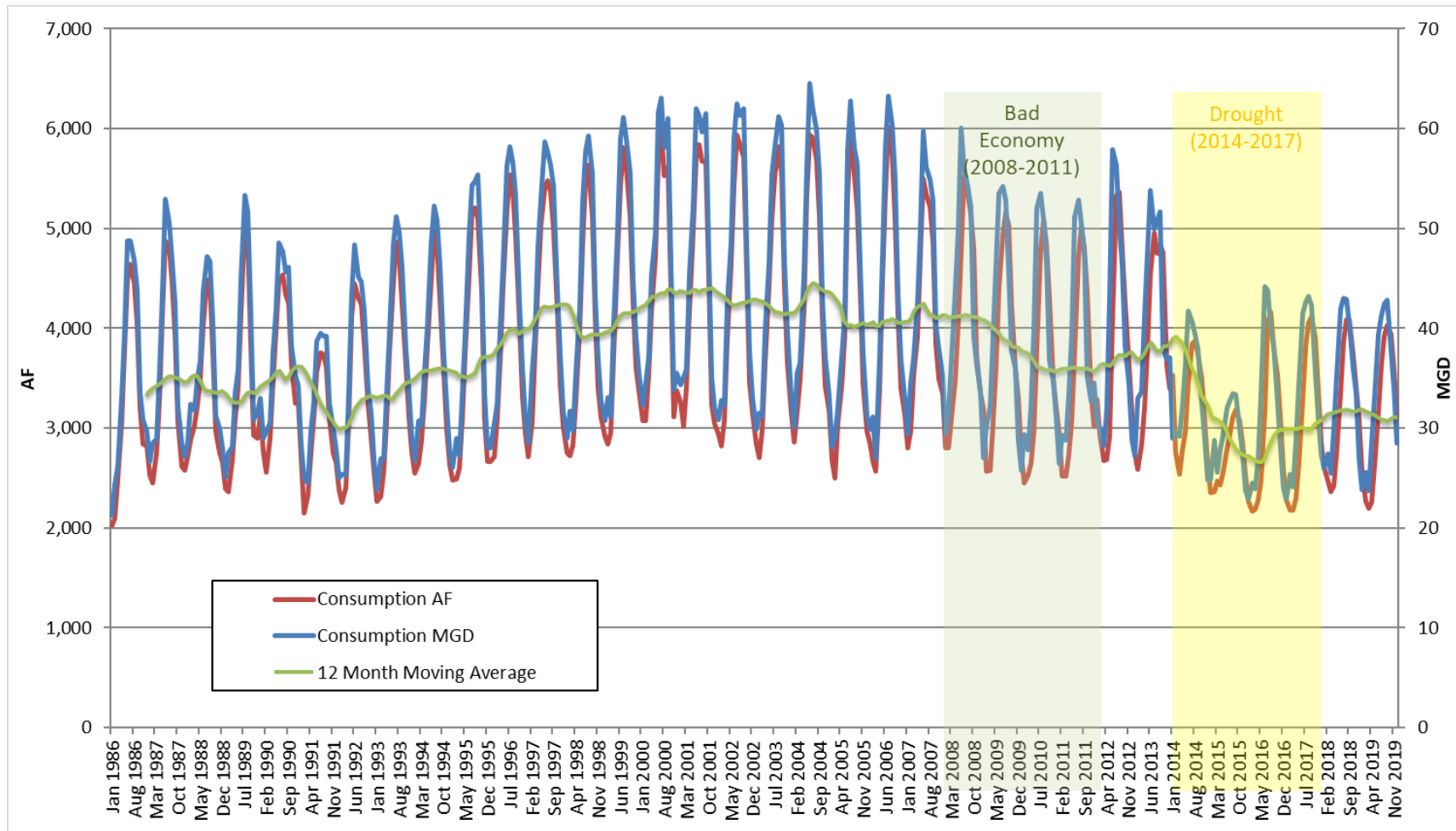
Figure 2-1. Data Collection Workbook Topics and Items Requested



2.2 ACWD Past and Current Consumption Data

Figure 2-2 illustrates historical monthly total consumption from 1986 through 2019. Consumption data was measured at the customer meters. ACWD's water use decreased during the 2008-2011 recession and then again during the historic state of California multi-year drought (2012-2016) which has influenced ACWD water consumption from 2014 through this Plan's baseline year of 2019.

Figure 2-2. Alameda County Water District Historical Consumption



Note: This graph's x-axis only shows every 7 months; however, every month of the year is shown in the graph.

ACWD has several types of water users with 86,878 active connections (excluding fire lines), all of which are metered. For this analysis, current and projected user categories are classified as follows:

- ◆ Residential
- ◆ Multifamily
- ◆ Business
- ◆ Industrial
- ◆ Institutional and Other
- ◆ Business Landscape
- ◆ Multifamily Landscape
- ◆ Industrial Landscape
- ◆ Institutional and Other Landscape

Figure 2-3 presents the water use profile of the average annual billed metered consumption of the various user categories based on bimonthly water use and account data from post-drought year 2019. This is used to derive average per account per day water use.

Figure 2-3. Average Consumption by User Category

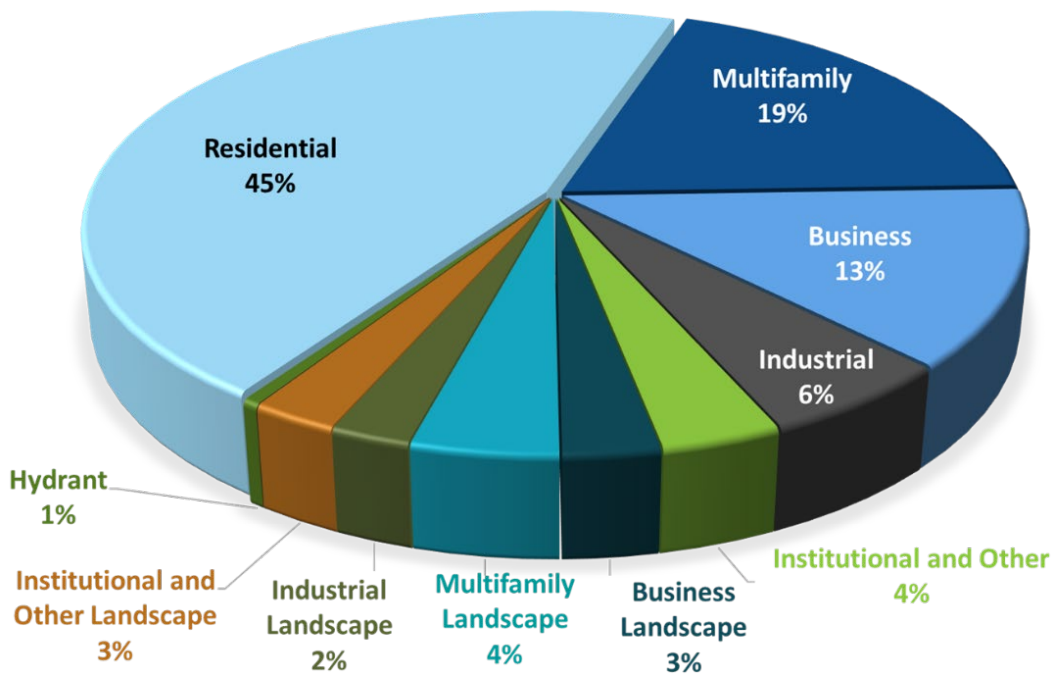
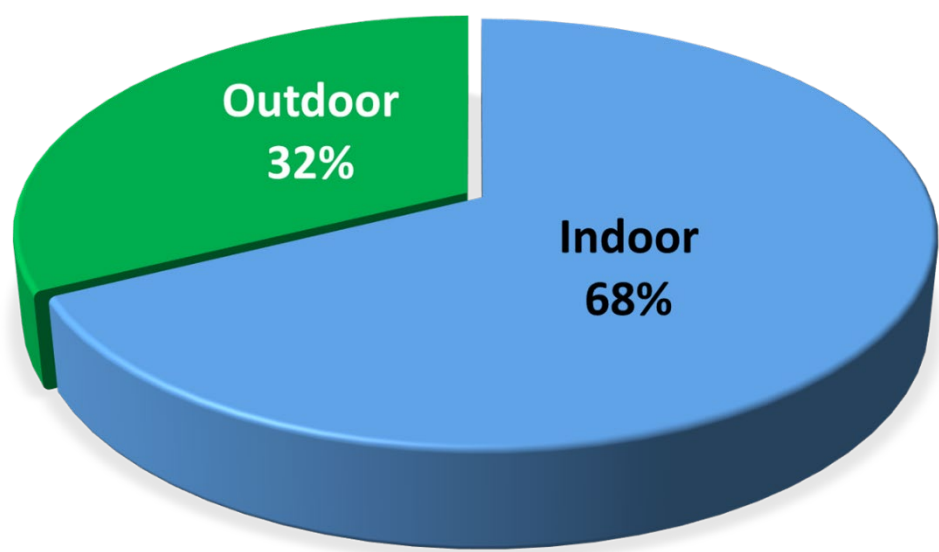


Figure 2-4 displays the breakdown of water use into indoor and outdoor components based on the assumption that indoor use is approximately equal to the minimum use in the winter. Year 2019 water use was selected for this profile, representing post-drought conditions. While there may be minimal landscape watering in the winter, or leakage from irrigation systems, it is assumed that this is minor – less than 5-10% of the average winter water use.

Figure 2-4. Water System Indoor versus Outdoor Overall Water Use



3 DEMAND FORECAST WITH AND WITHOUT PLUMBING CODE SAVINGS

This section presents baseline water demands with and without the plumbing code, including details regarding the national and state plumbing codes and the DSS Model, which is used to prepare a long-range, detailed demand forecast (see DSS Model overview in Appendix B). This section also includes a discussion about the demand forecasting approach and the how the Community Survey (Appendix G) was utilized to further refine the baseline.

3.1 Projected Baseline Demand

The assumptions having the most dramatic effect on future demands are: (1) the natural replacement rate of fixtures; (2) the method for projecting residential and commercial future use; and (3) the percent of estimated real water losses. Baseline customer category water use was determined using 2019 post-drought historical monthly water use (from bimonthly billing data). Appendix C contains a detailed summary of the key assumptions used for developing projected baseline demands, including the population and employment projection basis used in ACWD's DSS Model.

Demand Forecasting Approach

Baseline demand was developed based on an increase in residential population and employment numbers reflected in early draft data obtained from Association of Bay Area Governments/Metropolitan Transportation Commission (ABAG/MTC) from their Draft Blueprint Growth Pattern (Blueprint), a technical study developed for use in preparing the Plan Bay Area 2050.²³ ACWD wanted to incorporate the most recent data available into its demand forecast which would also be included in its UWMP. The Final Blueprint Growth Pattern was released December 2020, and the supporting data only made available in Late January, after this Plan's analysis had been completed. The Final Blueprint Growth Pattern to be included in Plan Bay Area 2050 adjusted housing projections downward by approximately 3%.

The Blueprint provided household numbers, which ACWD converted to population using appropriate household size numbers (i.e., average persons per household), reflective of the high-density development anticipated in the Plan. ACWD also reduced the growth rate of new housing assumed in the Blueprint over the near term (2020 to 2040) to one that is more consistent with the demonstrated pace of redevelopment in the Tri-City area over the past decade. This created a slower near-term population growth rate than both the Blueprint (draft and final numbers) and the service area city general plan projections which all contain linear growth rate projections. Historically, actual growth has been lower than what has been contained in these planning documents. Finally, ACWD assumed accelerated growth between 2040-2045 to include all the remaining Blueprint projected growth (draft). This resulted in a sharp uptick near the end of the demand forecasting period.

This is a somewhat nontraditional approach compared to traditional linear forecasting, but linear forecasts tend to be too high and create the false impression that new supplies will be required sooner than actually needed. This nontraditional approach allows time to "true" up the growth every five years in the UWMP, which prevents premature planning of expensive supply augmentation projects. In other words, it provides time to see whether the growth will materialize. At the same time, this approach demonstrates awareness of regional planning, provides the ability to complete Water Supply Assessments as most proposed development is included in the resulting demands, provides published regional planning numbers for reference, and supports establishment of

²³ Association of Bay Area Governments/Metropolitan Transportation Commission (ABAG/MTC). (2020). Plan Bay Area 2050, Technical Appendix: Draft Blueprint Growth Pattern, released July 2020. <https://www.planbayarea.org/>

appropriate development fees, because all the projected numbers are included. This approach was shared with service area cities and was accepted as a reasonable approach for the UWMP.

The final Blueprint growth data released in December 2020 reflects a reduction in total housing units between 2015-2050 compared to their previous growth numbers. The impact to this Plan's analysis is a 3% reduction in demand, with and without water use efficiency savings by 2045 through 2050. However, ABAG's revised growth rate is still higher than what ACWD utilized in its forecast between 2020-2040, as the reduction doesn't materialize until after 2040. ACWD is still confident that the forecast used for this Plan and UWMP is appropriate for the analyses. The near-term demand is more realistic than ABAG/MTC's and the error lies in the range of uncertainty, after 2040. Additionally, forecast information will be revisited and revised during the next UWMP and the Water Supply Master Planning processes.

This Plan's approach differed from previous ACWD demand forecasting. In the past, ACWD used vacant land inventories combined with general and specific plan zoning information to develop projections which were verified with City land-use planners and ABAG forecasts. Today ACWD's service area is largely built-out and has entered a new phase of redevelopment, a process of intensifying land and water use, with corresponding offsets from displaced water demands in the process. Further complicating the process has been a move toward regional planning and transit-oriented development, led by ABAG/MTC, which places growth targets on regions such as the Tri-City to develop high density housing and employment centers near transportation hubs. These plans lead and inform city land-use planning processes and are more generalized in location. ACWD decided to move forward with the approach in this study and for the 2020-2025 UWMP because it is a more appropriate model for forecasting based on regional growth data inputs.

More discussion on the demand forecasting approach, both the current and past approaches, can be found in ACWD's past and current UWMPs.

Post-Drought Demand Rebound Analysis

Baseline demand was modified to reflect potential additional post-drought demand rebound. ACWD staff analyzed the results of the Community Survey that was developed for the project. Responses regarding outdoor use, specifically those related to landscape changes, were extensively reviewed to determine permanent demand reductions versus temporary changes. The survey included questions regarding whether customers let their lawns die during the last drought, and if they did, whether they have taken action since the end of the drought. Actions included replacing dead lawn with new lawn or converting dead lawn to water-efficient landscaping. If they indicated that their lawn is still dead, they were asked to identify their intention for the future – again, whether they would reinstall new lawn or opt for water-efficient landscaping. Through this analysis, ACWD found an estimated 1 MGD of permanent demand reduction (i.e., use that will not return) and 2.75 MGD that may return over the next five years (2020-2024) if customers follow through with their intentions. This informed the demand rebound that went into the DSS Model. Survey questions relevant to this analysis are contained in Appendix G.

3.2 Estimated Plumbing Code Savings

In the codes and standards portion of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled to forecast service area water fixture use. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. This approach yields two distinct demand forecasts related to plumbing code savings: (1) with plumbing codes and (2) without plumbing codes. Plumbing code measures are independent of any water use efficiency program and are based on customers following applicable local, state, and federal laws, building codes, and ordinances.

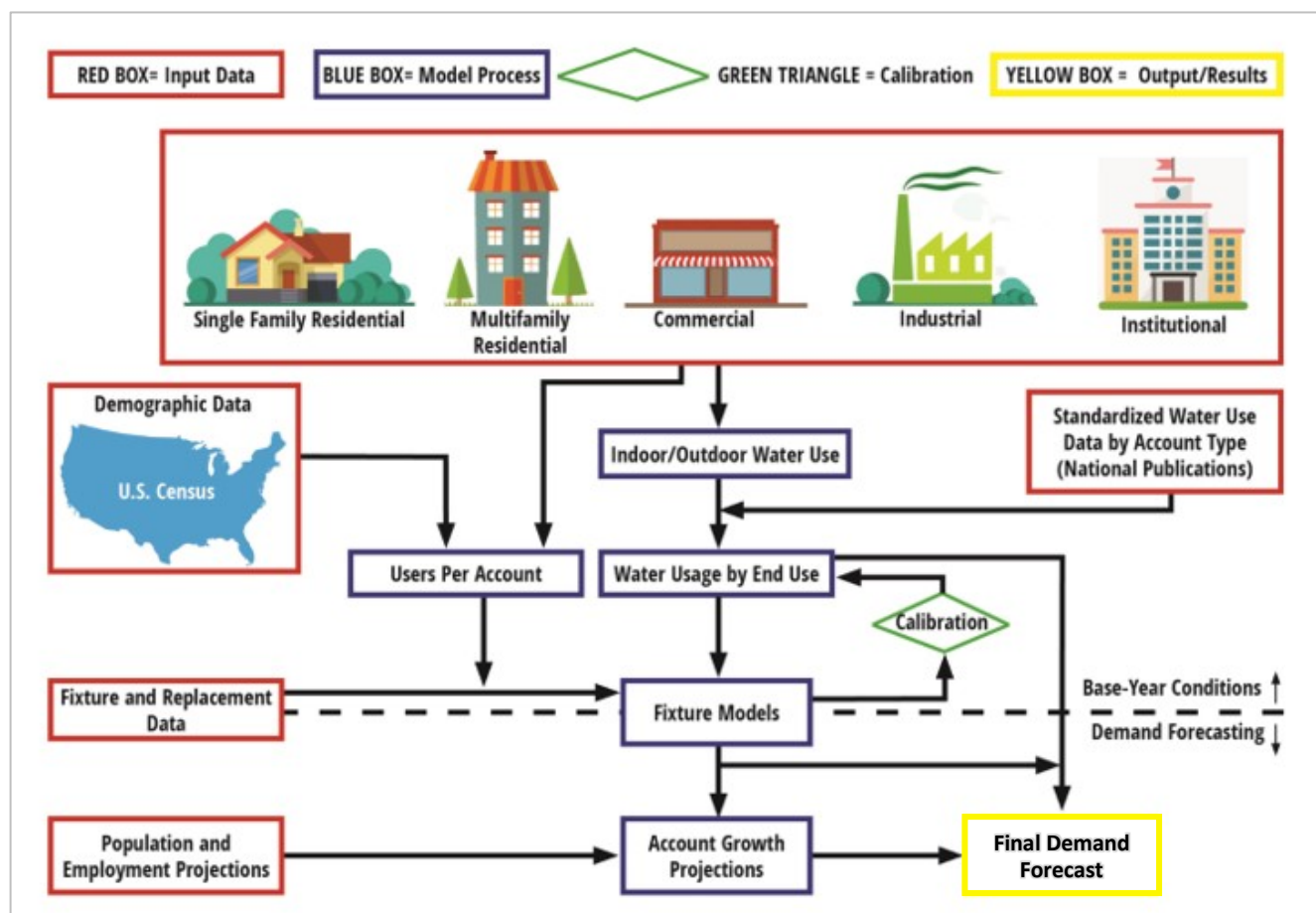
Plumbing code-related water savings are considered "passive" and reliable long-term savings and can be depended upon over time to help reduce overall system water demand. In contrast, water savings are considered "active" if a specific action unrelated to the implementation of codes and standards is taken by ACWD

to accomplish water use efficiency measure savings (e.g., offering turf removal rebates). The DSS Model incorporates the following items as a “code,” meaning that the savings are assumed to occur and therefore are “passive” savings:

- ◆ The Federal Energy Policy Act of 1992 (amended in 2005)
- ◆ California Code of Regulations Title 20 California State Law (Assembly Bill 715)
- ◆ California State Law Senate Bill 407
- ◆ 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations
- ◆ 2019 CALGreen Code (effective January 1, 2020)

Figure 3-1 conceptually describes how plumbing codes using “fixture models” are incorporated into the flow of information in the DSS Model. The demand forecast, including plumbing code savings, further assumes no active involvement by ACWD, 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 ACWD expense.

Figure 3-1. DSS Model Overview Used to Make Water Demand Forecast



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). Further information about plumbing codes and standards, passive water savings, fixture replacement and estimates, and additional assumptions and corresponding resources used in the DSS Model to determine projected demands with plumbing codes can be found in Appendix C.

Community Survey

In 2019, ACWD conducted a Community Survey to obtain fixture saturation information. The survey results contributed both qualitative and quantitative inputs to the DSS Model. This further increased the accuracy of ACWD's assessment of water use efficiency measures by determining the saturation of low-flow fixtures and devices, the level of adoption of other water use efficiency measures, the water use efficiency potential in the service area, and an assessment of water fixture demographics and program participation.

Furthermore, the Community Survey results played a role in plumbing code calculation in the DSS Model by utilizing real saturation data that was gathered during the survey. MWM incorporated the survey results with U.S. Census data, ACWD historical conservation data, and assumed natural replacement rate per fixture to determine the current level of water-efficient fixtures and devices installed within ACWD's service area. This included toilets, urinals, showers, faucets, and clothes washers. The survey data can be found in Appendix G.

Plumbing Code Savings Compared to Previous ACWD Estimates

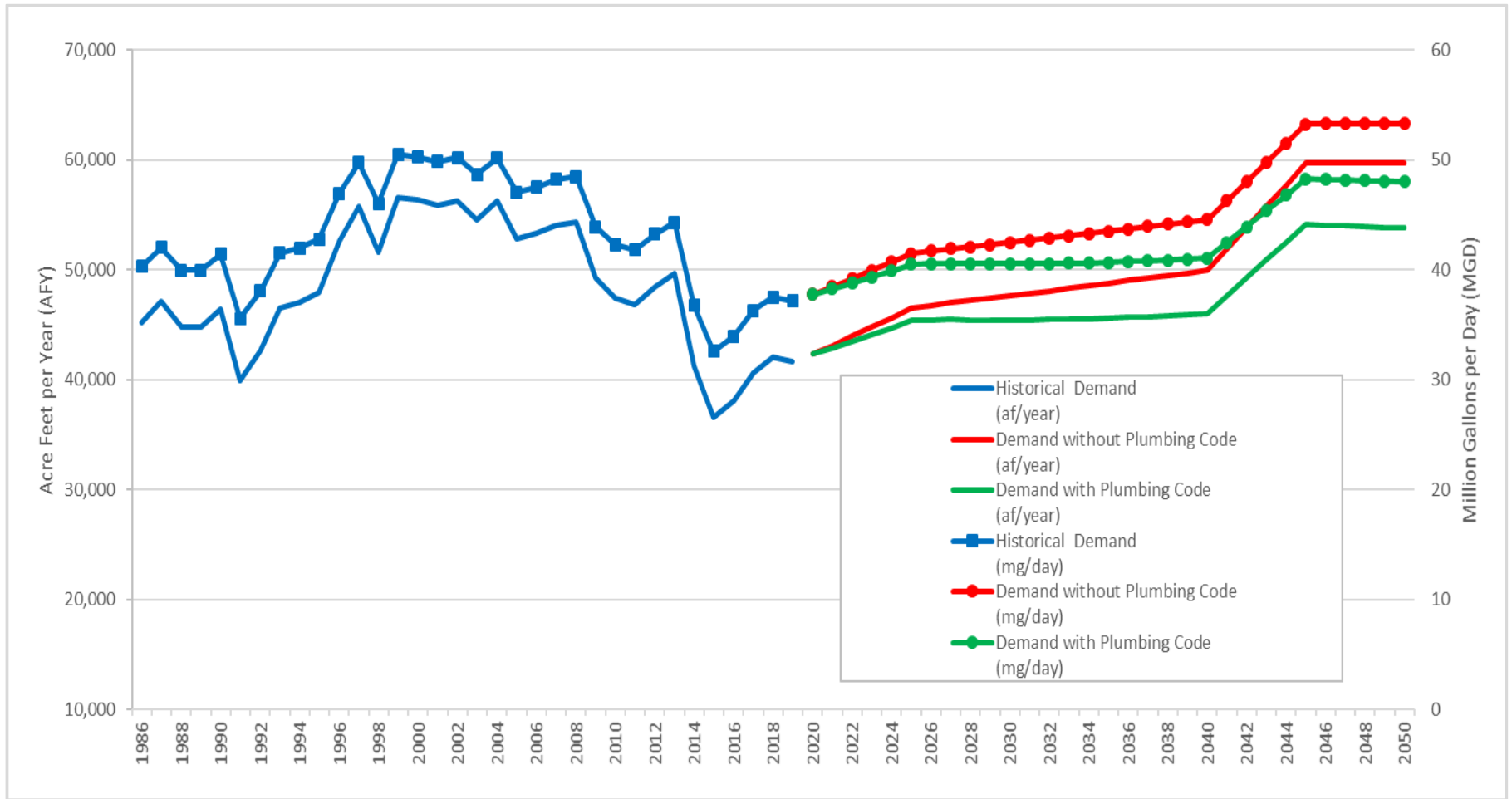
Estimated savings from the plumbing code increased significantly compared to the estimated savings from the last ACWD demand forecast. This was due to more efficient plumbing code standards adopted during the last drought and a more rigorous analysis of the plumbing code performed by the DSS Model. More information about the differences between plumbing code savings calculations in the past and current demand forecast are included in the latest UWMP.

Table 3-1 shows the water system demands for ACWD in acre-feet in 5-year increments over the 31-year modeling period (2020-2050). Figure 3-2 illustrates demands in graphical format. Both the table and the figure include historical (baseline) demand as well as demand with and without plumbing code.

Table 3-1. Alameda County Water District Water System Demands for Years 2020-2050

AFY/MGD	2020	2025	2030	2035	2040	2045	2050
Baseline Demands	42,354 AFY 38 MGD	46,500 AFY 41 MGD	47,628 AFY 42 MGD	48,785 AFY 44 MGD	49,966 AFY 45 MGD	59,691 AFY 53 MGD	59,735 AFY 53 MGD
Plumbing Code Savings	0 AFY 0 MGD	1,111 AFY 1 MGD	2,180 AFY 2 MGD	3,175 AFY 3 MGD	3,935 AFY 4 MGD	5,574 AFY 5 MGD	5,926 AFY 5 MGD
Demands with Plumbing Code Savings	42,354 AFY 38 MGD	45,389 AFY 40 MGD	45,448 AFY 41 MGD	45,610 AFY 41 MGD	46,031 AFY 41 MGD	54,117 AFY 48 MGD	53,809 AFY 48 MGD

Figure 3-2. Alameda County Water District Water System Demands



The sharp uptick near the end of the demand forecasting period is due to ACWD's assumption of a slower near-term growth rate (to 2040), based on historical growth rates, then accelerated growth between 2040-2045 to include all ABAG/MTC projected growth (draft) within the analysis. More information regarding these assumptions is in Section 3.1.

4 FUTURE STATE WATER USE OBJECTIVES

This section presents information on relevant California state legislation and related water use objectives.

4.1 California Legislation and the Water Use Objectives

On April 7, 2017, the state of California released the “Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16” Final Framework Report²⁴ (State Framework Report). The State Framework Report, which builds upon Governor Brown’s call for new long-term water use efficiency requirements in Executive Order (EO) B-37-16, provided the state’s proposed approach for implementing new long-term water conservation requirements. A key element of the report was proposed new water use targets for urban water suppliers that go beyond existing SB X7-7 requirements and are based on strengthened standards for indoor residential per capita use, outdoor irrigation, CII water use, and water loss.

On May 17, 2018, the California Legislature adopted Assembly Bill 1668 (Friedman) and Senate Bill 606 (Hertzberg) to implement these new long-term water use efficiency requirements, including new urban water use objectives for urban water suppliers. This legislation incorporated some key components of the State Framework Report, although some specific elements of the approach for implementing the new water use objectives were changed during the legislative process.

California Legislation

- ◆ April 7, 2017 – EO B-37-16 “Making Water Conservation a California Way of Life” State Framework Report
- ◆ May 17, 2018 – AB 1668 and SB 606 adopted to implement new long-term water use efficiency requirements

Adopted Legislation and Regulatory Schedule

The legislation requires SWRCB, in coordination with the California Department of Water Resources (DWR), to adopt long-term standards for the efficient use of water. The legislation establishes specified standards for per capita daily indoor residential use. In addition to performance measures for CII water use, and with stakeholder input, the SWRCB will adopt long-term efficiency standards for outdoor water use and water loss through leaks.

The legislation requires each urban retail water supplier to calculate and report an urban water use objective, which is an estimate of aggregate efficient water use for the previous year based on the adopted water use efficiency standards. Urban retail water suppliers will be required to calculate and report urban water use objectives by January 1, 2024, then by January 1 every year thereafter, and to compare actual water use to the objective for the prior year by the same date.

The legislation grants SWRCB the authority to enforce compliance with the urban water use objectives, with enforcement actions ramping up over the first three years of implementation. The legislation also establishes a schedule for state agencies to develop the methodology for implementing the requirements, as presented in Table 4-1.

²⁴ California Department of Water Resources, et al. (2017). *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, accessed April 2021:
https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html

Table 4-1. Implementation Schedule for AB 1668 and SB 606 Key Requirements

Date	AB 1668/SB 606 Requirement
January 1, 2021	<ol style="list-style-type: none"> 1. DWR recommends to legislature standards for indoor residential water use. Defaults are: <ul style="list-style-type: none"> • 55 GPCD until 2025 • 52.5 GPCD from 2025 until January 2030 • 50 GPCD beginning in 2030 2. DWR to provide each urban retail water supplier with data regarding irrigable lands at level of detail sufficient to verify accuracy at the parcel level. Received 1/29/2021.
October 1, 2021	<ol style="list-style-type: none"> 1. DWR to recommend standards for outdoor residential use for adoption by SWRCB: <ul style="list-style-type: none"> • Incorporate Model Water Efficient Landscape Ordinance (MWELO) principles • Apply to <i>irrigable lands</i> • Include provisions for swimming pools, spas, etc. 2. DWR to recommend performance measures for CII water use, which may include: <ul style="list-style-type: none"> • CII classification system • Minimum size thresholds for converting mixed CII meters to dedicated irrigation meters • Recommendations for CII best management practices 3. DWR to recommend variance provisions for: <ul style="list-style-type: none"> • Evaporative coolers • Horses and livestock • Seasonal populations • Soil compaction/dust control • Water to sustain wildlife • Water for fire protection 4. DWR to recommend standards for outdoor irrigation of landscape areas with dedicated irrigation meters: <ul style="list-style-type: none"> • Incorporate MWELO principles
June 30, 2022	<ol style="list-style-type: none"> 1. SWRCB to adopt recommended long-term standards for efficient water use: <ul style="list-style-type: none"> • Outdoor residential • Outdoor irrigation of landscape with dedicated irrigation meters at CII customer sites • Water loss (consistent with SB 555 [Wolk]) 2. SWRCB to adopt recommended performance measures for CII water use
January 1, 2024	<ol style="list-style-type: none"> 1. Urban water supplier shall calculate its urban water use objective and its actual water use for previous calendar or fiscal year: <ul style="list-style-type: none"> • Efficient indoor residential water use, plus • Efficient outdoor residential water use, plus • Efficient outdoor water use through dedicated irrigation meters at CII customer sites, plus • Efficient water loss, plus • Variances as appropriate

When this Plan was finalized and approved, most of the standards that will dictate ACWD's water use objective were not yet determined. Table 4-2 lists what was known when this Plan was finalized.

Table 4-2. Alameda County Water District's State Objectives Status

Targeted Use	Standard	ACWD Compliance	
Residential Indoor	<ul style="list-style-type: none"> 55 GPCD until 2025 52.5 GPCD from 2025 until January 2030 50 GPCD beginning in 2030 	2019 estimated residential indoor GPCD = 51.3	✓
Residential Outdoor	TBD; lots of uncertainty statewide.	Too soon to tell. Measures to address this in the recommended strategy for this Plan.	?
CII Outdoor	Landscape areas associated with CII customers with dedicated landscape meters to be measured and reported on annually.	ACWD has landscape area measurements for dedicated landscape accounts and has established a measure through Waterfluence, LLC for water budgets that will directly address this standard.	✓
	Standard for water budget calculation TBD; lots of uncertainty statewide.	Too soon to tell. Measures to address this in the recommended strategy for this Plan.	?
Water Loss	Required to submit to the state validated water loss audits on October 1 of each year.	ACWD submits annually with most recent for Calendar Year 2019, submitted in 2020.	✓
	Annual water losses and compliance with water loss standards to be reported in UWMP beginning in 2021.	ACWD working to incorporate water loss into the next UWMP.	✓
CII Performance Measures	TBD; lots of uncertainty statewide.	<p>ACWD has included water use efficiency measures for CII customers, and both indoor and outdoor measures in this Plan's recommended strategy.</p> <p>ACWD is implementing an AMI system which will provide opportunities for segmenting, benchmarking, and targeting businesses, and identifying sites with mixed use meters for potential conversion to irrigation meters, if warranted.</p>	✓

ACWD is actively monitoring the state's standards development process through the state's stakeholder process. As more information becomes available, ACWD will set up a process to track state legislation metrics related to the future water use objectives.

5 WATER USE EFFICIENCY MEASURE EVALUATION

This section details the process of determining which water use efficiency measures would be analyzed as part of the project and how they were analyzed in the DSS Model.

5.1 Screening of Water Use Efficiency Measures

The measure screening process for this Plan was designed to address water use efficiency across all relevant customer categories, as ACWD's existing Water Use Efficiency Program has done for the last 25 years. It also was designed to address implementation feasibility, cost effectiveness, interests of ACWD's customers, and ACWD's water savings goals.

The screening process began with an initial list of more than 100 potential water use efficiency measures that were drawn from MWM and ACWD experience; previous planning efforts conducted by MWM through the Bay Area Water Supply and Conservation Agency (BAWSCA) in 2004, 2008, and 2014, in which ACWD participated as a member of BAWSCA; and a review of what measures other water agencies with innovative and effective programs were implementing at the time. With MWM's assistance, ACWD reduced the list to 26 measures to be further evaluated using the DSS Model.

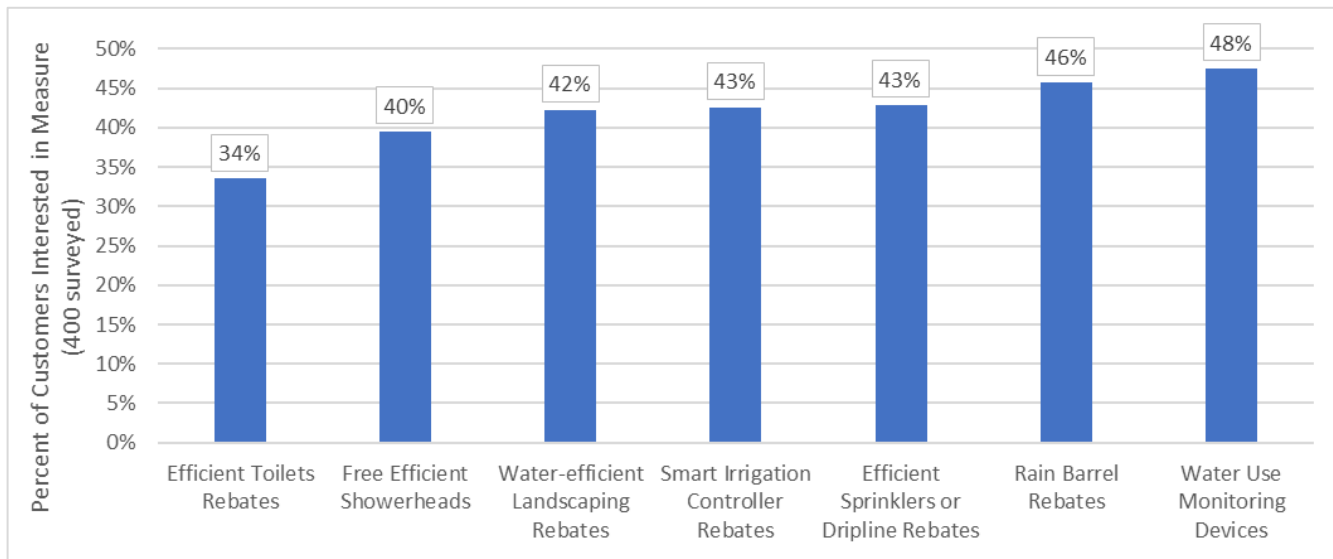
An important step in updating ACWD's Water Use Efficiency Program included identifying new measures that might be appropriate, then including these measures on ACWD's short-list for detailed evaluation (cost effectiveness). The 26 measures identified during the screening process include 13 new measures for ACWD. The remaining 13 measures were already implemented by ACWD. The evaluation process helped establish if ACWD should discontinue any existing measures or continue measures with modifications, and under which strategy these measures best fit.

During the most recent BAWSCA water supply and demand analysis effort (2014), significant stakeholder input was solicited from community members. Numerous work groups (including work groups for both indoor and outdoor measures) were established to evaluate a wide range of needs and rank measures per pre-defined and stakeholder criteria. The measure screening conducted for this Plan benefitted from the community input and coordination during the 2014 BAWSCA project.

In addition, the Community Survey that was conducted to gain a better understanding of the saturation of different types of high efficiency fixtures in ACWD's service area also provided community input on the types of measures customers were interested in. Those interests are listed in Figure 5-1.

When selecting which Water Use Efficiency measures to pursue, regional coordination and community input fosters a holistic approach that serves the greater community.

Figure 5-1. Water Use Efficiency Measure Interest from ACWD Community Survey



During development of this Plan, ACWD also conducted a website survey and hosted a virtual public information meeting, to receive additional comments on the selected measures and the recommended strategy.

ACWD carefully evaluated which measures were the most reasonable and advantageous to implement, as well as which measures were the most relevant for ACWD’s service area. ACWD took into consideration factors that were unique to its service area, such as water use characteristics, demographics, and saturation of water saving fixtures as identified through the Community Survey. Screening was both quantitative and qualitative.

During the measure screening, ACWD staff considered the criteria outlined in Figure 5-2 to determine whether a measure should be included in the DSS Model. More details on the measure screening inputs and results can be found in Appendix E.

There is a reasonable limit to how many measures can be feasibly implemented at one time. Customers can be overwhelmed by the available choices, and programs that consist of a large number of measures are historically difficult to implement successfully due to the amount of resources needed. ACWD’s modest list of 26 measures was still considered too extensive to implement all at once. The next section discusses how the 26 measures selected for analysis were further evaluated, prioritized, and grouped into water use efficiency “strategies” to prepare for implementation of a successful water use efficiency program.

Figure 5-2. Alameda County Water District Measure Screening Criteria

Measure Screening Criteria		
<p>Cost (Total & Per Unit) – Is the total cost to implement the measure reasonable? Is the cost per unit of savings less than the cost per unit for additional water supplies?</p> 	<p>Feasibility – Ease of Implementation: If not easy to implement, can it be or is it already administered on a regional level or through a third party that will make it feasible to implement?</p> 	<p>Customer Equitability – Does the measure provide water use efficiency services to all customers and demographics (low income accessible)?</p> 
<p>Saturation – Is there a need for the measure based on how many customers have already adopted this measure (e.g., clothes washers are fairly saturated so this measure may not be selected)?</p> 	<p>Staff Resources – Can existing staff run the measure? If not, would it take a lot of additional staff to run it? Or can existing staff plus other support run the measure?</p> 	<p>Legislation – Does the measure provide a greater opportunity to achieve state requirements?</p> 
<p>Service Area Match – Is the measure or related technology appropriate for the area's climate, building stock, or lifestyle?</p> 	<p>Savings Quantifiable – Are the water savings quantifiable? For example, it is more difficult to determine the amount of water saved as a result of a water wise demonstration garden compared to replacing a grass playing field.</p> 	<p>Customer Acceptance – Would customers within the service area be interested in and accepting of the conservation measure as well as willing to implement it? Can be gauged through public input from surveys/workshops.</p> 
<p>Water Savings Potential – Does the measure have the potential to save a significant amount of water per account and the ability to confidently quantify savings?</p> 	<p>Technology – Is the technology needed to implement the conservation measure, such as an irrigation control device, commercially available and supported by the local service industry?</p> 	<p>Market Influencer – Is the measure a new technology that can turn the whole market toward more efficient products?</p> 

5.2 Water Use Efficiency Measures Analyzed

Table 5-1 lists and describes 25 of the 26 measures that were selected for analysis through the measure screening process. A measure called “Billing Report Educational Tool Non-AMI,” the 26th measure evaluated, is not included in this table because during Plan development ACWD’s Board approved AMI which made this measure irrelevant. Measures are organized by customer category. However, some measures serve more than one customer category, which is noted in the description.

The list of measures includes devices, services, and programs (e.g., such as a new, ultra-high efficiency toilet installed by a contractor or multifamily residential [MFR] customer) that can be used to achieve water savings, as well as methods through which the device, service or program may be implemented.

Table 5-1. Measure Descriptions

Measure Name	Description ¹
Commercial, Industrial, and Institutional	
CII Water Survey	Provide free water surveys to CII customers to evaluate ways for the business or organization to save water and money. The surveys may target large accounts only (e.g., accounts that use more than 5,000 gallons of water per day) such as hotels, restaurants, stores, and schools. Emphasis may be on supporting the top 25 users.
CII Water Efficient Technology (WET) Rebate	Provide rebates to commercial, industrial, and institutional sites to help implement equipment changes that reduce water use. Rebate amount is based on estimated savings (per cubic feet saved annually) up to 50% of the cost of the equipment.
School Building [Survey and] Retrofit	Provide free water surveys and customized rebates for fixture replacements and irrigation upgrades at school sites. Eligible sites may include K-12 schools, colleges, and universities.
Ultra-High Efficiency Toilet Incentive	Provide an incentive for the installation of an ultra-high efficiency toilet (UHET) – toilets flushing 1.1 gallons per flush (gpf) or less to replace toilets flushing at 1.6 gpf or greater. (MFR customers also eligible.)
Large Landscape	
Large Landscape Outdoor Water Surveys	Provide free outdoor water audits to large landscape customers. MFR, CII, and any customers that irrigate large landscapes and are over their reasonable water budget would be eligible, upon request. Those with high water use are targeted and provided a customized report on how to save water. Tied to the Water Budget Program.
Large Landscape [Water Use Budgets] (Waterfluence)	Provide online service that gives feedback on landscape water use (budget vs. actual). Currently provided by Waterfluence, LLC. Available to large landscape customers with a dedicated landscape meter.
Water Efficient Landscape Rebate [Lawn Removal]	Provide a per-square-foot incentive to remove turf and replace it with low water use plants or permeable hardscape. Rebate is based on the square footage of turf removed and capped at an upper limit based on customer category. Available to all customers.
Financial Incentives for Irrigation & Landscape Upgrades	Provide incentives for substantive landscape equipment, materials, retrofits/upgrades. Available to all customers but with different types of equipment/materials and at different incentive levels to reflect differences in customer needs and costs. Financial incentives may include weather-based “smart” irrigation controllers (WBICs), efficient sprinkler nozzles, dripline materials, compost, mulch, rainwater containers, and greywater retrofits.
Require Weather[-based] Adjusting “Smart” Irrigation Controllers and/or Rain Sensors in New Development	Establish requirements for new development customers to install WBICs and/or rain sensors. Might offer training class on how to install and program the device. The WBICs have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times based on weather inputs at least weekly.

Measure Name	Description ¹
Landscape & Irrigation Codes [MWELO Plan Review/Audits]	Allocate ACWD water use efficiency staff time to assist with MWELO enforcement through plan reviews and/or audits. MWELO establishes specific outdoor water efficiency requirements for new accounts and existing accounts undergoing eligible site renovations.
Residential (SFR and MFR)²	
Residential Outdoor Water Surveys	Provide free outdoor water surveys to SFR customers. Targeted toward high water users but available to any customer, upon request. Customers are provided a customized report on how to save water. Can be combined with “Residential Indoor Water Surveys.” Could be implemented as a virtual survey to minimize costs. During a survey the surveyor may check for leaks, provide direction on appropriate irrigation scheduling, demonstrate how to set irrigation controllers, provide guidance on plant selection, and offer additional ways to increase outdoor efficiencies (car washing, pool covers, mulch, etc.). Low-cost, general-use, outdoor water use efficiency fixtures may be handed out during the survey. MFR surveys are covered under “Large Landscape Outdoor Water Surveys.”
Residential Indoor Water Surveys	Provide free indoor water surveys to residential customers. Targeted toward high water users. Customers are provided a customized report on how to save water. Can be combined with “Residential Outdoor Water Surveys” measure. Could be implemented as a virtual survey to minimize costs. During a survey, the surveyor may check for leaks, check flow rates and volumes of indoor water using fixtures and appliances and offer ways to increase indoor efficiencies. May include give-away of efficient shower heads, aerators, toilet devices.
Residential Water-Savings Devices Giveaway	Purchase high efficiency showerheads and faucet aerators in bulk and distribute to residential customers. Also available for CII customers.
Flowmeter Rebate	Provide rebates for flow measuring devices which inform customers of their water use and provide leak detection and remote shutoff with a smart phone interface. Devices are targeted to residential customers but also can be used for CII, MFR, and irrigation.
Leak Repair & Plumbing Emergency Assistance	Provide leak identification and possible rebates and/or pre-negotiated pricing with approved plumbers to assist customers in locating and repairing leaks.
Multifamily UHET Direct Install	Provide property owners and managers of multifamily housing direct installation of high efficiency toilets.
Multifamily Submetering for Existing Accounts	Provide submeters for individual units in multifamily, master metered townhomes or condos, and mobile home parks.
Developer Financed Zero Footprint New Development	Require developers of new homes (SFR and MFR) to contribute funding toward water use efficiency measures to help generate the water needed to supply their project and require that the site be developed with ultra-efficient fixtures. May also apply to non-residential customers.
Hot Water on Demand Incentive	Provide a rebate to equip homes with efficient hot water recirculating pumps (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 bath sink, wherever hot

Measure Name	Description ¹
	water waiting times are more than 1/2 minute. Requires an electrical outlet under the sink, which is not common on older home bathrooms.
Fixture Retrofit on Resale or Water Account Change [Coordination with Service Area Cities]	Provide coordination and/or support to service area cities for enforcement of existing code requiring fixture retrofit upon resale or permitted alteration. Take an active role to assist with ensuring compliance, which could include sending letters to new account holders notifying them of the requirements. Random inspections could be conducted by ACWD water use efficiency staff for accounts that do not have evidence of retrofit to promote compliance. (CII applicable, too.)
Plumber Initiated Ultra High Efficiency Toilet Retrofit Program [Water Savings Assistance for Income-Qualified Customers]	Provide installation of UHETs by a contractor for income-qualified residential customers. Licensed, pre-qualified contractors solicit customers directly. Customers receive a new UHET installed for free. (Income-qualified customers only.)
Community and Education	
ACWD Public & School Education	<p>Public and school education measure that may include, but is not limited to, many of the following outreach techniques and campaigns (for examples of past campaigns, see Appendix H):</p> <ul style="list-style-type: none"> • Recognition for Water Savings by Residences & Apartments • Recognition for Water Savings by Businesses • Outdoor Residential focused Public Awareness Information Campaign • Efficient Outdoor Use Education and Training [Landscape Workshops] • Training for Landscape Maintenance Workers (Qualified Water Efficient Landscaper Designation) • Networking with Landscaping Industry • Landscape Water Calculator • Water-Efficient Demonstration Garden • Water Use Efficiency Print Media • Water Use Efficiency Web Site/Social Media • Speakers Bureau/Event Participation • Media Campaigns (e.g., “Use Only What You Need” or “Beat the Peak”) • AMI Customer Portal • Car Wash and Other Coupons or Vouchers for Low-Flow/Water Use Efficiency Items • Shade Tree Program
Water Budget-Based Billing	Develop individualized water budgets for all customers. Water budgets are linked to a rate schedule where rates, per unit of water, increase when a customer goes above their budget, or decrease if they are below their budget. Budgets are based on size of the customer’s irrigated area and average indoor use estimates. These rates have been shown to be effective in reducing landscape irrigation demand (AWWA Research Foundation Reports). Requires a rate study and capable billing software.
AMI Portal Data Analysis	Provide a customer portal for accounts with AMI meters capable of providing continuous consumption data to customers and utility. Portal provides identification and notification of suspected customer leaks as well as improved customer service and enhanced ability to identify water theft. This is planned as part of ACWD’s AMI project.

Measure Name	Description ¹
Prohibition of Water Waste & Practices [Ordinance Enforcement]	Prohibit water waste as defined in an ordinance such as gutter flooding and failure to repair leaks in a timely manner. Residential customers shall <u>not</u> water lawns or gardens resulting in flooding or excessive run off; use water for washing sidewalks, walkways, driveways, or other hard surfaces resulting in excessive run off; or use water for washing cars, trailers, boats, or other vehicles resulting in excessive run off of water. Hoses should be equipped with shut off nozzles. Nonresidential customers shall <u>not</u> use single-pass cooling systems in new connections; use non-recirculating systems in new conveyer car wash and commercial laundry systems; use non-recycling decorative fountains; use water for watering lawns or gardens resulting in flooding or excessive runoff; or use water for washing sidewalks, walkways, driveways, and other hard surfaces in a manner that results in excessive runoff.

¹ The text in brackets [text] is meant to clarify some measures and match to existing ACWD measures with different names.

² SFR – single family residential; MFR – multifamily residential.

5.3 Measure Cost and Savings Inputs and Considerations

Major considerations for each measure that drive the overall cost and savings for the measure are as follows:

- Utility Costs (“Fixture Cost per Device”):** This is the portion of the measure that ACWD pays. The cost may be a rebate or incentive that ACWD provides to cover all or part of the cost of devices and/or fixtures, staff time or, if outsourced, contractor time, if that is the main cost to implement the measure. An appropriate incentive amount is influenced by the customer’s cost to implement the measure. The rebate or incentive must be high enough to drive a customer to participate but low enough for it to be cost effective for ACWD to implement. Most measures require some form of customer financial commitment. If the customer financial commitment is too low compared to the incentive, ACWD may run out of funding for the measure quickly. Alternatively, if it is too high ACWD will not achieve targeted participation levels. The DSS model uses Utility Costs based on ACWD’s current programs, regional efforts (such as BAWSCA or other agencies), and MWM expertise and research.
- Administration Costs:** This represents the ongoing effort (staff time) to administer a measure. This includes outreach and other day to day activities to run the measure. This is typically put into the DSS Model as a percentage of the Utility Cost. Startup costs are not included in this calculation. Startup costs are a one-time push to launch a measure. Startup costs and day to day administration costs vary significantly between measures and are dependent on the implementation method; whether the measure is administered in house or through a third party. Implementing a measure through a third party or a partnership agency, such as BAWSCA, can save a considerable amount on startup costs and provides some additional savings on administration costs. Participating in a third party administered program has saved ACWD significant staff resources. However, the largest cost savings is in the startup costs, as third-party programs still require in-house administration to cut rebate checks and/or follow up with incomplete applications. The DSS model uses customized ACWD administration costs based on staff input from real world experience implementing measures. Staff costs in the DSS Model are based on average salary range for a Water Use Efficiency Specialist I/II, with fringe and overhead.
- Targets:** This is the number of accounts/customers targeted annually for participation in the measure. Higher targets equal higher savings provided the measure does not reach a saturation point before meeting the target. Targets are also limited by customer interest, outreach, and staff ability to handle customer interest. Targets in the model are calculated based on past experience for continuing measures, MWM data from other similar agencies for new (to ACWD) measures, level of saturation, and customer interest in the measure. These last two inputs were identified through the Community Survey. Again, staff’s ability to handle the number of participants also drives the selected target in the model. A measure that targets 1,000 accounts per year requires staff time to process 1,000 rebates, incentives, or other intervention. The measure target must be considered holistically with other measures, their

staffing requirements, and the availability of staff resources. For existing measures, ACWD assumed existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor to determine appropriate targets in the DSS Model. However, new measures, especially AMI Portal Data Analysis, will ultimately require more staff to implement the measures effectively.

Other Considerations

ACWD's Community Survey provided good information on SFR customer past actions that reduced both indoor and outdoor use during the last drought. With higher saturation of some measures, targets are intentionally lower. Therefore, water savings potential is lower. For some measures in the DSS Model, the time/duration ("Measure Length") that ACWD intends to implement the measure may also be reduced by this information.


Estimates related to targets and savings, are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. There is potential for error in these inputs. Ongoing reevaluation of measure success after implementation will be critical.

All 26 measures were extensively reviewed by ACWD staff to determine inputs. Additional research was conducted when MWM baseline research was not representative of ACWD's service area.

- The **Water Efficient Landscape Rebate** measure savings information in the DSS Model ("End Use Savings for Replacement") did not support what ACWD had observed in its service area for past program participants. ACWD conducted its own internal analysis from real customer participation data and found that the savings was much higher than defaults in the DSS Model.
- The **Hot Water on Demand Incentive** measure was extensively studied to make sure the inputs that MWM provided made sense. In this case, the inputs were found to be accurate, but the measure was not included in any of the strategies due to high cost and low savings.
- The **AMI Portal Data Analysis** measure will have a tremendous impact on water use efficiency in the service area. ACWD staff spent additional time researching this measure to ensure it reflected what savings and participation ACWD could expect, especially since there is the potential for double counting savings with other measures, as AMI provides the tools to target customers for other measures.

Figure 5-3 shows a sample measure input screen from the DSS Model. Inputs discussed above are highlighted. Additional information about the DSS Model measure analysis to identify unit costs, water savings, and market penetrations can be found in Appendix D. Actual measure inputs used in the DSS Model to evaluate the water use efficiency measures that were selected for strategies can be found in Appendix E.

Figure 5-3. Sample Input Screen for Measures



Ultra-High Efficiency Toilet Incentive

Overview			
Name	Ultra-High Efficiency Toilet Incentive		
Abbr	4		
Category	Default		
Measure Type	Standard Measure		

Time Period	
First Year	2020
Last Year	2023
Measure Length	4

Measure Life	
Permanent	<input checked="" type="checkbox"/>

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
MULTI	\$70.00	\$230.00	25
BUS	\$150.00	\$250.00	4
IND	\$150.00	\$250.00	4
OTHER	\$150.00	\$250.00	4

Administration Costs	
Method:	Percent
Markup Percentage	25%

Description
This measure provides an incentive for the installation of an ultra-high efficiency toilet (UHET). Toilets flushing 1.1 gpf or less to replace toilets flushing at 1.6 gpf or higher.

Customer Classes											
RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLD	FIRE	HYD	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses											
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urinals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lavatory Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kitchen Spray Rinse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Results	
Units	MG
Average Water Savings (mgd)	0.015656
Lifetime Savings - Present Value (\$)	
Utility	\$680,610
Community	\$680,610
Lifetime Costs - Present Value (\$)	
Utility	\$269,606
Community	\$865,960
Benefit to Cost Ratio	
Utility	2.52
Community	0.79
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$1,521

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	50.0%	266.6
BUS Toilets	50.0%	142.3
IND Toilets	50.0%	159.6
OTHER Toilets	50.0%	154.0

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.500%
Only Affects New Accts	<input type="checkbox"/>

Comments
<p>> Utility Cost - Rebate amount reflects the incremental purchase cost. In Feb 2020, ACWD offers a case by case UHET toilet incentive for MF sites which is approximately \$70 per toilet replaced. In Feb 2020, ACWD offers a \$150 rebate for each high use, high volume commercial toilet replaced with a UHET at service area businesses and organizations. Sites must be pre-qualified through our survey program. www.acwd.org/145/Rebates</p> <p>> Customer Cost - Customer cost reflects the remaining fixture and installation costs.</p> <p>> Admin Cost - About 3 hours, based on a typical multifamily site, assuming 25 fixtures per account to cover pre- and post - inspection time + reporting and documentation.</p> <p>> End Use Water Savings - Savings estimates assume the difference between 0.8gpf and 1.6 gpf or 50% savings on average.</p> <p>> Targets - Target considers the 2019 Probolsky Community Survey reported ~34% of surveyed participants interested in replacing high water using toilets. Assumed could do a maximum of 40 MF accounts per year (which equates to approximately 5 sites per year. There are multiple accounts (meters) per site). Assumed less sites to be conservative.</p> <p>> Measure implementation period is based on the current and anticipated changes in plumbing codes that would negate the need for this fixture rebates. Ending this measure avoids free-ridership.</p>

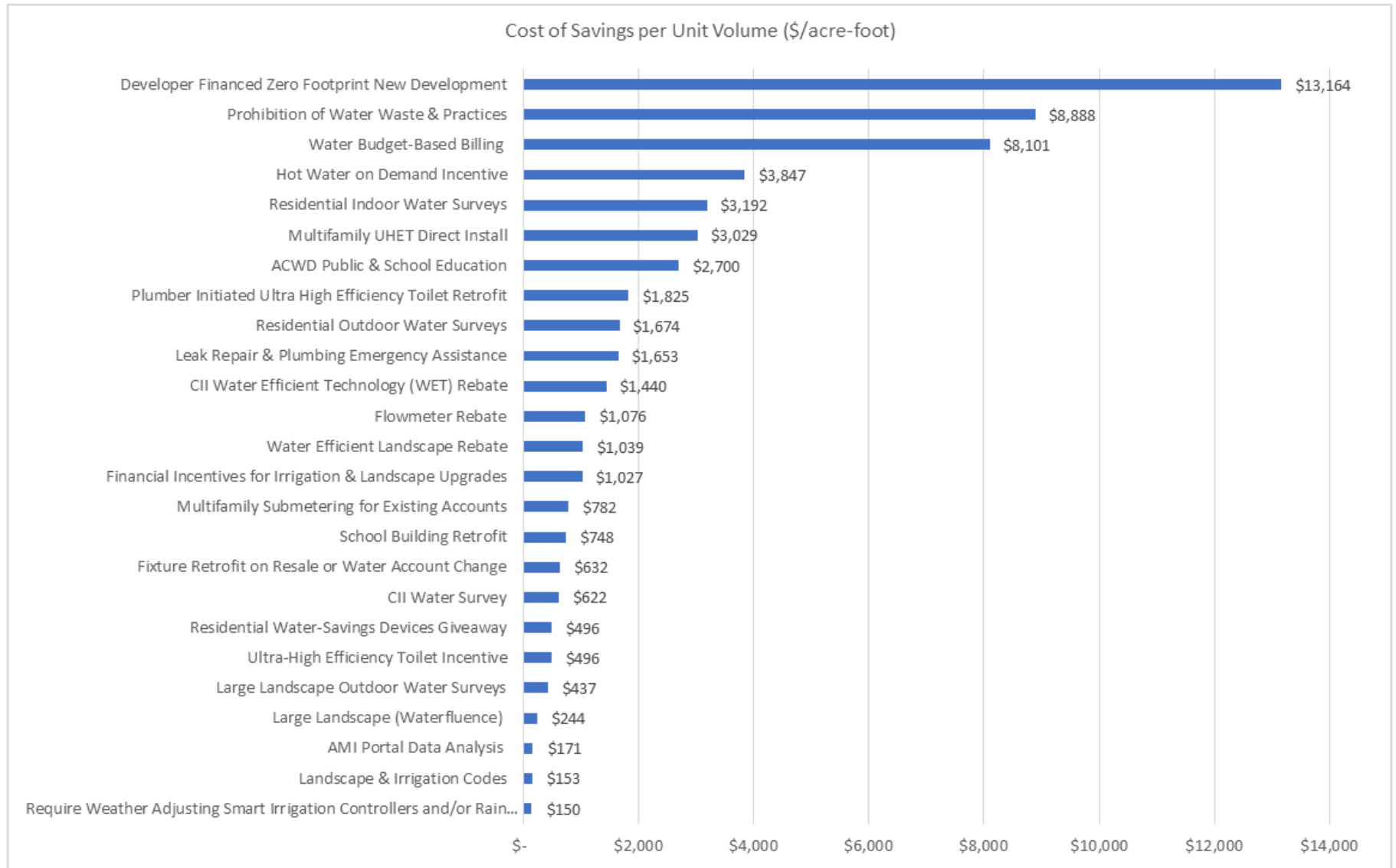
5.4 Comparison of Individual Water Use Efficiency Measures

MWM conducted an economic evaluation of each selected water use efficiency measure using the DSS Model. Appendix F presents detailed results regarding how much water each measure included in a strategy will save by year 2030 (AFY), how much the measure will cost, and the cost of saved water per unit volume if the measure were to be implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses). Dollar savings from reduced water demand was quantified annually and based on avoided costs provided by ACWD. Actual measure design parameter inputs can be found in Appendix E.

While each measure was analyzed independently, it is important to note that very few measures operate independently. For example, higher efficiency indoor fixtures go together with indoor water checkups and public education. It should be noted that the water savings from the “ACWD Public & School Education” measure are not double counted with other water use efficiency measures. As a result, the costs appear significantly higher for this measure compared to other measures due to the very minimal water savings estimated for the cost investment. However, other measures certainly would be less effective or possibly infeasible without an active outreach program. Without ACWD Public & School Education, customers would be unaware of other water use efficiency measures and participation would likely plummet.

With that in mind, Figure 5-4 presents a comparison of each measure’s cost of water saved per unit volume.

Figure 5-4. Comparison of Each Measure's Cost (Utility Cost) of Water Saved



6 WATER USE EFFICIENCY STRATEGY EVALUATION

This section provides an overview of the development of three water use efficiency strategies that incorporated analyzed measures, as well as which strategy ACWD has selected to implement for the next five years (Fiscal Years 2020/21-2024/25).

6.1 Board Priorities for Water Use Efficiency Strategies

At an ACWD Board workshop in July 2019, the Board expressed priorities and drivers to staff that helped inform the water use efficiency strategy development process.

The Board expressed the following priorities:

- ◆ Cost-effective/cost-based – a low cost per unit of water saved as compared to other supply sources
- ◆ Low income supportive/affordability
- ◆ Regionally consistent
- ◆ Responsive to customer interests
- ◆ Maximizes local control – avoids the need to look for alternative supplies that are outside of ACWD’s control
- ◆ Proactive in helping ACWD meet future state regulations

The following additional criteria were taken into consideration during strategy development:

- ◆ Existing water use efficiency measures that still have conservation potential
- ◆ Measures that are relatively easy to implement and have proven water savings
- ◆ Water use efficiency measures recommended by AWWA, CalWEP (formerly CUWCC), DWR and others
- ◆ New and innovative measures
- ◆ Measure equitability among customer categories
- ◆ Customer demographics

6.2 Water Use Efficiency Strategies

After the measure selection and analysis process, with Board priorities in mind, MWM created strategy concepts. While cost – a low cost per acre-foot saved – was a primary factor, feasibility to implement the strategy and the time at which each measure would need to be introduced to promote water use efficiency were also factors for developing strategies. The strategy concepts MWM created included existing program elements and traditional water use efficiency measures, as well as measures that had not yet been implemented or considered by ACWD. Strategies also addressed water use efficiency across all relevant customer categories.

It should be noted that there are measures that ACWD is obligated to implement under all strategies. ACWD has a responsibility to do whatever it can to address and prevent water waste in its service area. The “Prohibition of Water Waste & Practices” measure has a high cost per unit of water saved but is an important measure to implement to ensure a reliable source of high quality water for the community. The “ACWD Public & School Education” measure also has a high cost per unit saved. Savings for measures that benefit from public outreach are already accounted for under each individual measure so they cannot also be attributed to this measure. However, public outreach is essential to drive customers to participate in measures.

Strategies were developed to allow for new measures to be incorporated, as new technology is introduced, if the new measure fits within the general construct of the strategy. Each strategy has general goals and objectives that drive it. A new measure would be evaluated in terms of how well it meets those goals and objectives. Later in this section there is more discussion on how this works specific to the recommended strategy.

When strategies were analyzed, any overlap in water savings (and benefits) from individual measures was considered to provide total combined water savings (and benefits). Each strategy is described below.

Program strategies are not intended to be prescriptive but rather to be viewed as a toolbox of measures that address the Board's highest priorities and demonstrate the range in savings that could be generated if implemented concurrently.

- ◆ **Strategy A: Status Quo “Light” – Minimally Meets 2015-2020 Urban Water Management Plan Objectives.** Strategy A meets ACWD Board's #1 priority but is limited in meeting other Board priorities. It is cost effective, with all measure cost per unit of water saved at or below the current cost of production (exceptions described previously), but it is the bare minimum to meet previous UWMP planning assumptions. Strategy A has limited water use efficiency measures – one to two measures for each customer type and water use category. ACWD would likely need more measures to meet forthcoming state standards. Includes 8 measures.
- ◆ **Strategy B: Current ACWD Program “Plus” to Address State Targets.** In addition to existing efforts, Strategy B includes measures that may be required to meet new state targets, with extended measures addressing indoor, outdoor, and commercial efficiency. Includes measures up to the full cost (FY 2025/26) of SFPUC water. Includes 16 measures. **This is the Recommended Strategy; the Board was most interested in this strategy at the April 2020 Board Workshop.**
- ◆ **Strategy C: Progressive “Supercharged.”** In addition to all measures in Strategy A and B, Strategy C includes measures up to cost of new/alternative supplies. It includes measures that establish codes and regulations, measures that require developers to support water use efficiency in the service area, and rate changes. This strategy takes political will and regulation to establish and enforce. Includes 22 measures.

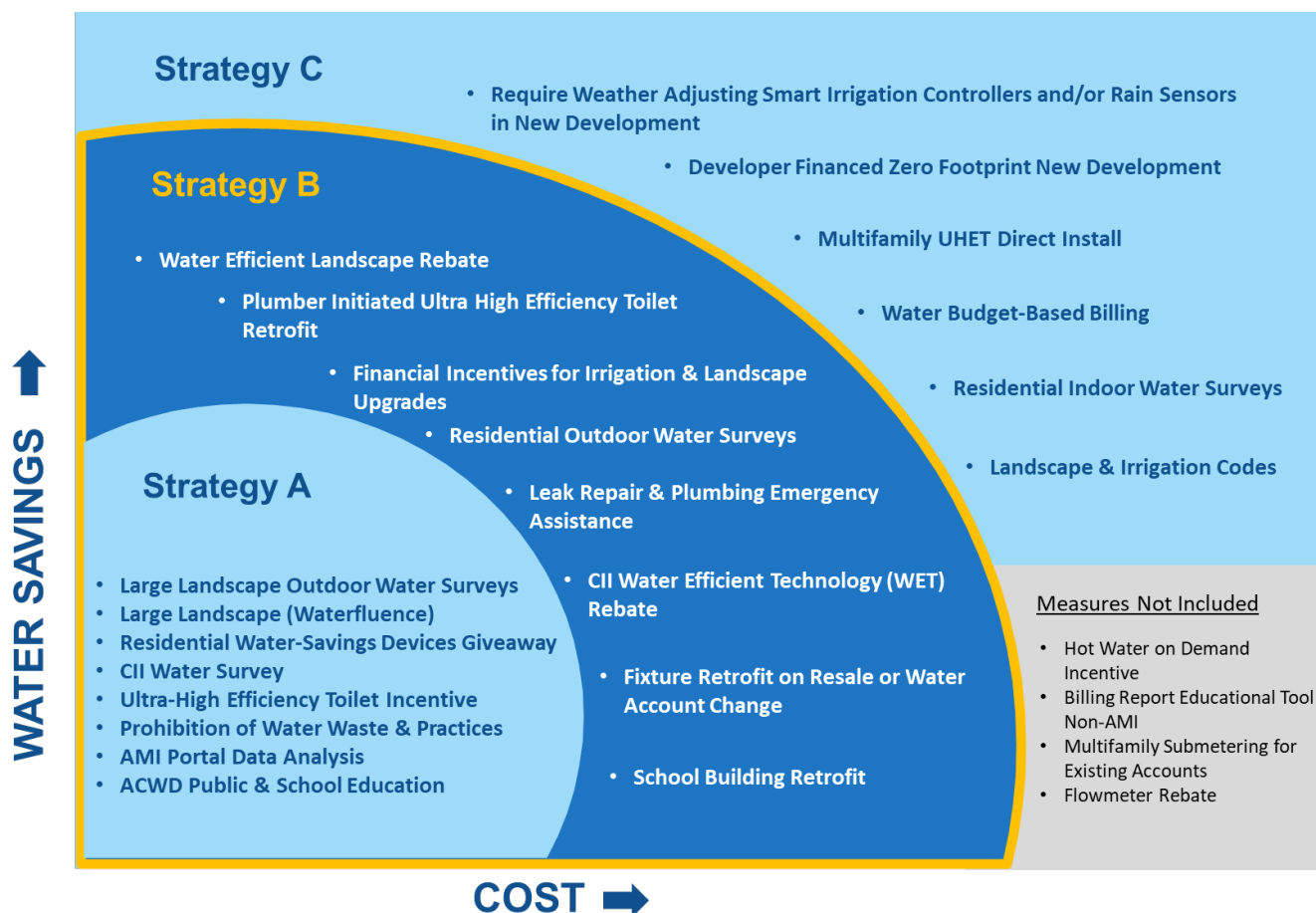
Table 6-1 illustrates how each strategy addresses the primary and secondary Board priorities, as identified at the July 2019 Board Workshop and listed in Section 6.1.

Table 6-1. Board Priorities and Strategy Comparison

Board Priority	Strategy A	Strategy B	Strategy C
#1: Cost-Effective	✓ YES	✓ YES	✓ YES
#2: Cost-Based	✓ YES (lowest)	✓ YES	✓ YES (highest)
#3: Low Income/ Affordability	Partially	✓ YES	✓ YES
#4: Regional Consistency	Partially	✓ YES	✓ YES
#4: Customer Interest	Partially	✓ YES	✓ YES
#4: Local Control	Partially	✓ YES	✓ YES (most)
#4: “Safe Bet” to Meet State Regulations	Partially	✓ YES	✓ YES

Figure 6-1 presents ACWD's water use efficiency measure strategies, indicating which measures were selected and modeled within each strategy.

Figure 6-1. Selected Water Use Efficiency Strategy Measures



Four measures that were selected for further analysis during the measure selection process were not included in any of the strategies:

- ◆ **Billing Report Educational Tool Non-AMI** – As mentioned in Section 5.2, this measure was not included in a strategy because AMI was approved during Plan development, making this measure irrelevant.
- ◆ **Flowmeter Rebate** – This measure was not included in a strategy because AMI provides the same granular water use information to customers.
- ◆ **Hot Water on Demand Incentive** – As discussed in Section 5.3, this measure was not included in a strategy because further analysis by ACWD confirmed MWM’s conclusion that it is a high-cost measure with low water savings potential.
- ◆ **Multifamily Submetering for Existing Accounts** – This measure was not included in a strategy due to potential high customer costs and implementation challenges. Installations can require extensive re-plumbing and retrofits within and outside of buildings, as well as other public works improvements. Additionally, to achieve any water savings, the user must receive their water usage information. However, ACWD staff intends to study this measure (or alternatives like point-of-use monitoring devices) further, and a similar measure could be incorporated into a strategy in the future.

Strategy Costs and Savings

Table 6-2 compares each water use efficiency strategy’s present value of water savings and utility costs, cost of water saved, and benefit-cost ratios, with plumbing code. See Appendix D for a more detailed explanation of present value.

Table 6-2. Comparison of Strategy Estimated Costs, Water Savings, and Benefit-Cost Ratios

Water Use Efficiency Strategy With Plumbing Code	Water Utility Present Value of Water Savings	Water Utility Present Value of Utility Costs	Water Utility Cost of Water Saved (\$/AF)	Benefit-Cost Ratio
Strategy A	\$31,510,000	\$10,581,000	\$381/AF	2.98
Strategy B	\$50,563,000	\$31,006,000	\$695/AF	1.63
Strategy C	\$62,762,000	\$47,958,000	\$851/AF	1.31

Notes:

1. Present value costs and savings are rounded to nearest \$1,000.
2. Costs include rebates, incentives, and staff time to implement the measures, and include fully burdened salaries that are escalated by inflation and discounted to present value.
3. Value of savings are the value of the additional water use efficiency savings above and beyond plumbing code. These savings and the cost per unit of water saved only include additional savings.
4. Present value costs and savings are based on a fixed avoided cost of water – estimated annual cost (FY 2030/31) for ACWD “blended” water (Groundwater and SFPUC) of \$1,742/AF.
5. ACWD conducted its own “Business Case” for the recommended strategy outside of the DSS Model. This analysis used estimated costs for blended water for each year during the analysis period. That data is referenced in Section 6.4.

All strategies have an average cost per acre-foot saved well under both ACWD’s avoided cost of water at \$1,742 per AF (which is the fixed avoided cost of water – estimated annual cost [FY 2030/31] for ACWD blended water [Groundwater and SFPUC]) and ACWD’s most expensive supply source (SFPUC) of \$2,436/AF in FY 2025/26. Additionally, all strategies have a benefit-cost ratio well above 1, which is based on the avoided cost input in the DSS Model. All strategies will reduce per capita water use in a cost-effective manner.

ACWD’s Avoided Cost of Water

As discussed, this Plan strives to identify the best strategy for the Water Use Efficiency Program for the short term and provide a foundation for the long term. While ACWD enjoys a highly reliable and diversified portfolio of water supplies today, those supplies are facing challenges and ACWD must continuously evaluate new, alternative supplies.

For long-term planning, and for this Plan’s analyses, ACWD uses a blended cost of the most expensive supply (SFPUC)²⁵ and its least expensive supply (treated groundwater) as a true marginal cost of production. That cost, as mentioned above, is \$1,742 per AF. Using a current cost of production for these analyses is not forward looking.

Measures were sorted into strategies based on various supply costs – Strategy A included measures up to the current cost of production (\$768/AF), Strategy B included measures up to the cost of SFPUC in FY 2025/26 (\$2,436/AF), and Strategy C included all other measures (with exceptions described previously) representing the anticipated high cost to develop new supply. This provided bookends for potential savings achievable through efficiency rather than purchasing more of ACWD’s most expensive supply or finding new, even more expensive alternative supply sources.

²⁵ ACWD rarely needs to use more than its minimum purchase requirement from the SFPUC system and only anticipates doing so during critically dry years.

Strategy Demand Impacts

Table 6-3 shows ACWD water system demands. Demand is shown in both acre-feet per year and million gallons per day (MGD), in five-year increments, over the 31-year modeling period (years 2020-2050). It includes demand with and without plumbing code and projected demand with plumbing codes and the three water use efficiency strategy scenarios for comparison.

Table 6-3. Alameda County Water District Water System Demands for Years 2020-2050

AFY/MGD	2020	2025	2030	2035	2040	2045	2050
Baseline Demands	42,354 AFY 37.8 MGD	46,500 AFY 41.5 MGD	47,628 AFY 42.5 MGD	48,785 AFY 43.5 MGD	49,966 AFY 44.6 MGD	59,691 AFY 53.3 MGD	59,735 AFY 53.3 MGD
Demands with Plumbing Code Savings	42,354 AFY 37.8 MGD	45,389 AFY 40.5 MGD	45,448 AFY 40.5 MGD	45,610 AFY 40.7 MGD	46,031 AFY 41.1 MGD	54,117 AFY 48.3 MGD	53,809 AFY 48 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy A Savings	42,269 AFY 37.7 MGD	44,910 AFY 40.1 MGD	44,703 AFY 39.9 MGD	44,641 AFY 39.8 MGD	44,877 AFY 40 MGD	52,877 AFY 47.2 MGD	52,291 AFY 46.7 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy B Savings	42,249 AFY 37.7 MGD	44,665 AFY 39.8 MGD	44,211 AFY 39.4 MGD	44,026 AFY 39.3 MGD	44,175 AFY 39.4 MGD	52,094 AFY 46.5 MGD	51,419 AFY 45.9 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy C Savings	42,240 AFY 37.7 MGD	44,580 AFY 39.8 MGD	44,035 AFY 39.3 MGD	43,785 AFY 39.1 MGD	43,857 AFY 39.1 MGD	51,139 AFY 45.6 MGD	50,471 AFY 45 MGD

Figure 6-2 presents projected water demand in AFY and MGD given multiple scenarios. See Section 3.1 for more information regarding demand forecast assumptions.

Plumbing code elements include current local, state, and federal plumbing code standards for retrofits of items such as toilets, urinals, showerheads, faucets, and clothes washers. More information regarding the plumbing code can be found in Appendix C.

Figure 6-2. Alameda County Water District Historical and Forecasted Demand

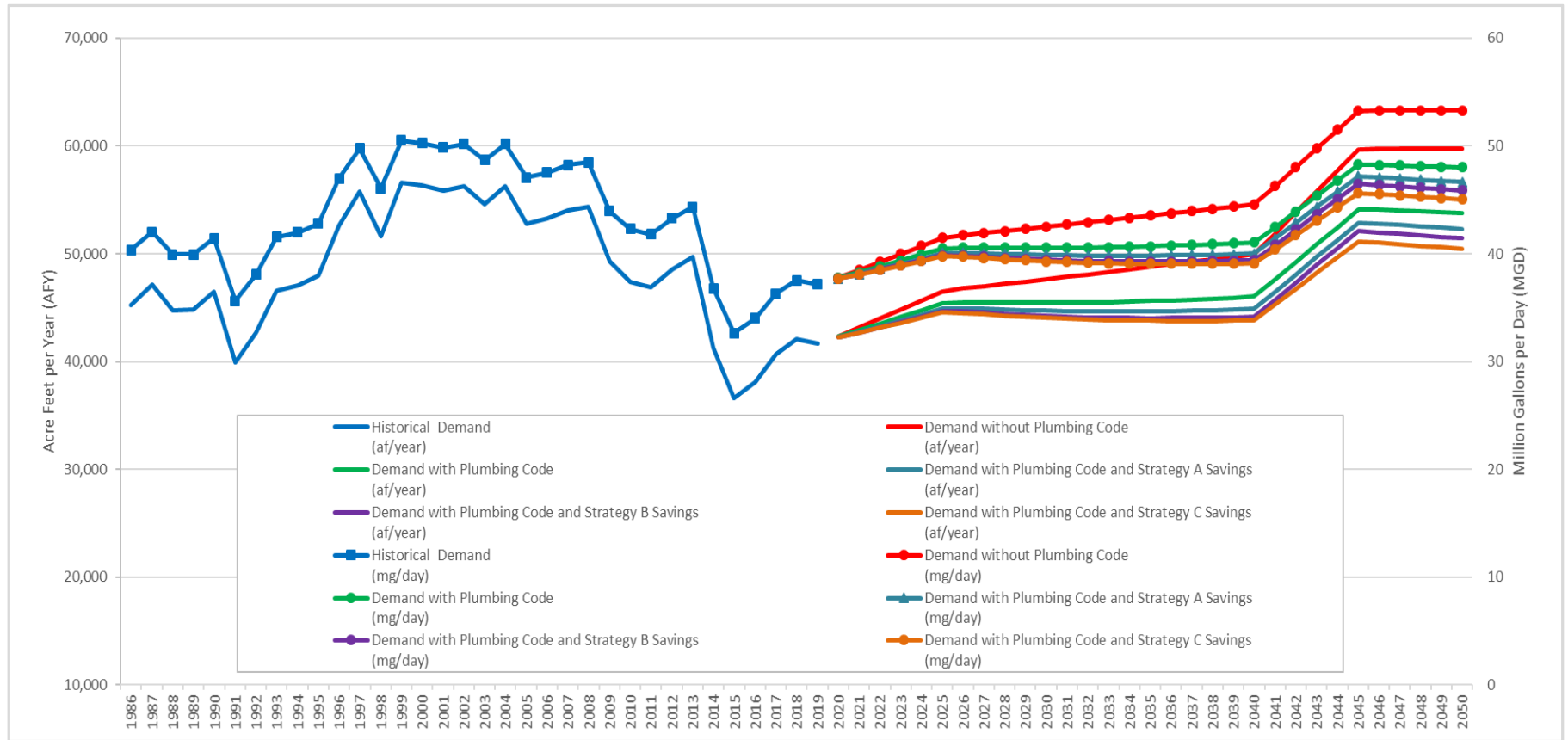
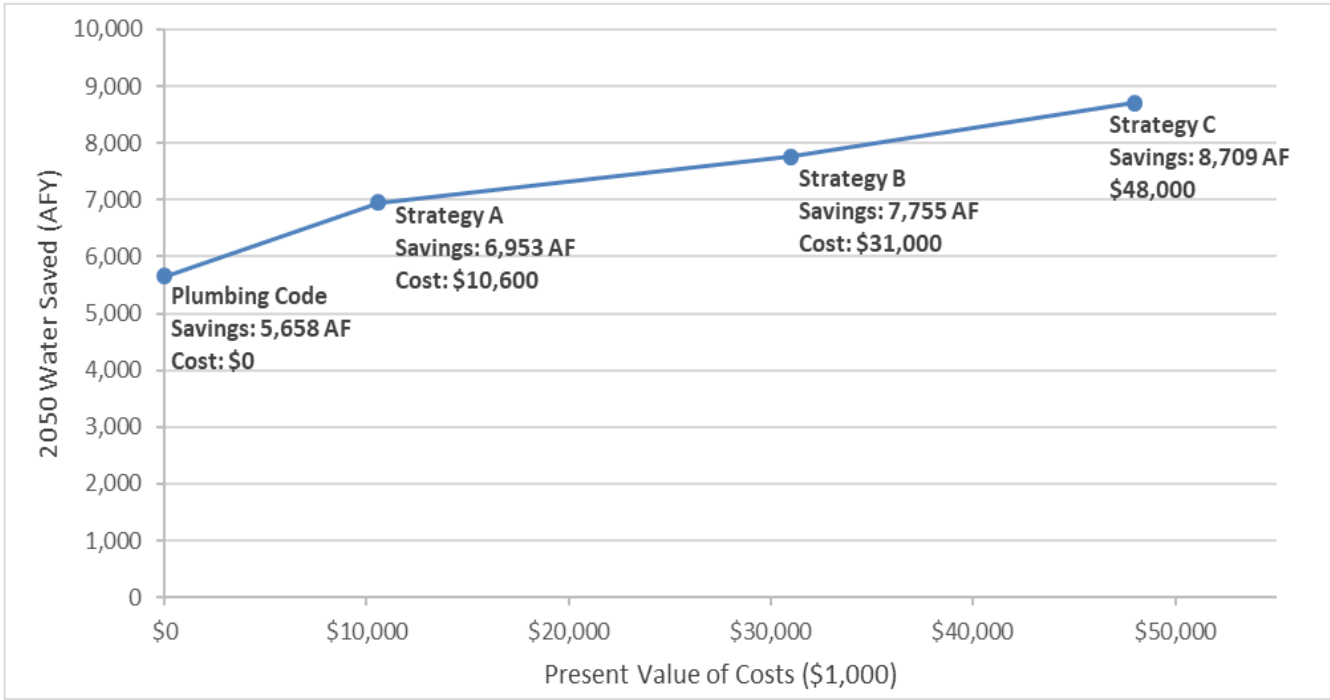


Figure 6-3 illustrates how marginal returns change as more money is spent to achieve water savings in AFY in 2050. A cost-effectiveness curve displays the results of the present value of each strategy’s costs versus the cumulative water savings at the end of the planning period. This curve is helpful in determining how far to push the “water use efficiency envelope” as the point of diminishing economic returns is evident. Note that there is a small increase in savings when moving from Strategy B to Strategy C.

Figure 6-3. Present Value of Utility Costs versus Water Saved in 2050



6.3 Estimated Budgets for Water Use Efficiency Strategies

The estimated 3-year (2020-2022) average annual cost to ACWD to implement Strategy A, B, or C, as described in this Plan, is displayed in Table 6-4. The cost includes staff time and expenses (materials, rebates, giveaways, etc.). Opportunities to fund strategies outside of ACWD’s water use efficiency budget exist through grant funding and/or cost sharing with other utilities (energy, sewer, or neighboring water utilities).

Table 6-4. Estimated 3-Year Average Annual Costs Per Strategy

Conservation Program With Plumbing Code	Estimated 3-Year (2020-2022) Average Annual Cost
Strategy A	\$413,000
Strategy B	\$911,000
Strategy C	\$936,000

Note: Average 3-year annual costs are rounded to nearest \$1,000.

6.4 Recommended Water Use Efficiency Strategy

ACWD's Board, seeing the need for more up-to-date and expansive measures to further reduce demands, has selected Strategy B for the short term (next five years) and will use the analysis included in this Plan to inform ACWD's strategy out to 2050.

Strategy B is the most forward-thinking, comprehensive option because it:

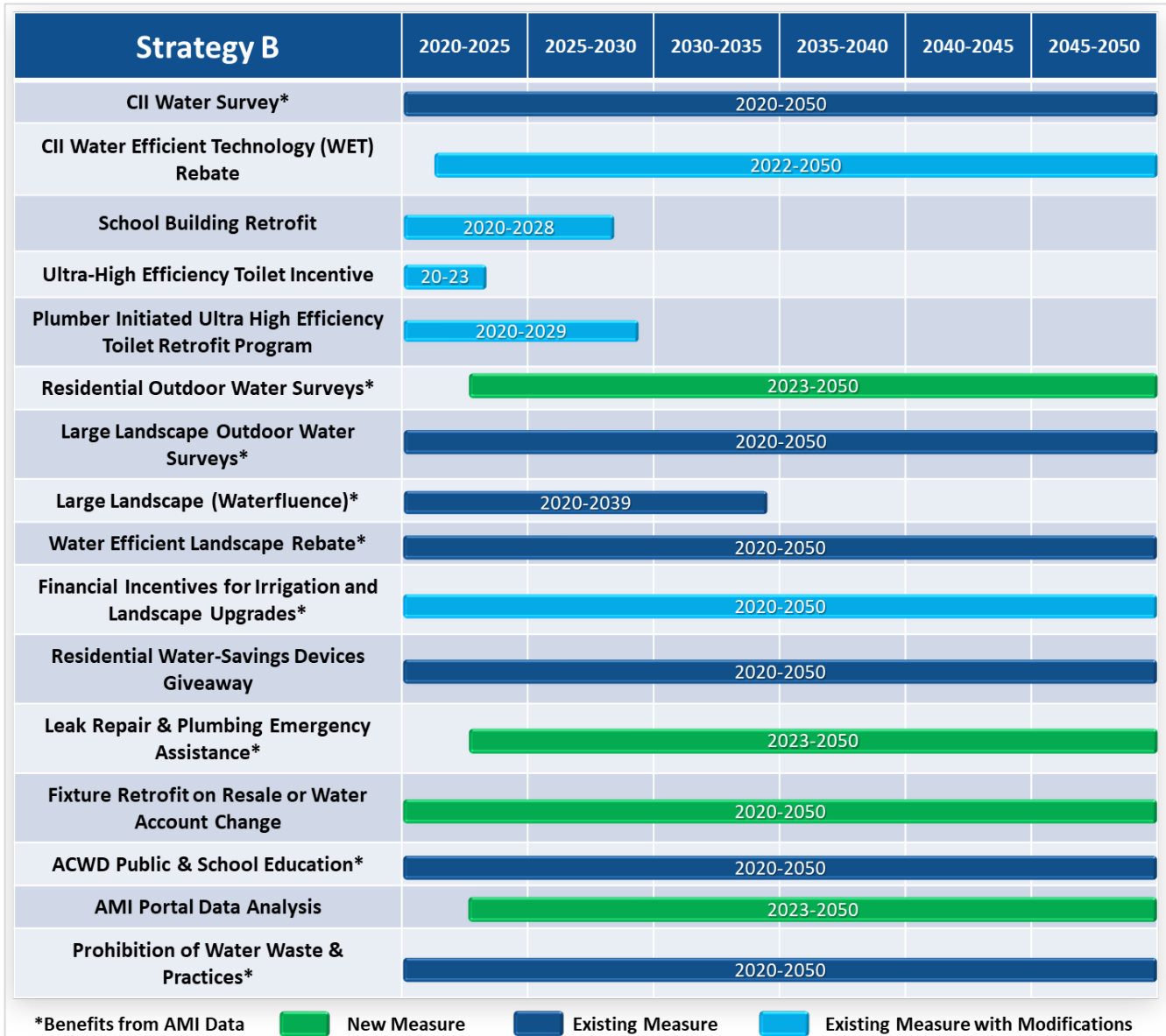
- ◆ Achieves the Board's number one priority of cost effectiveness with a weighted average cost per acre-foot saved of \$695/AF, which is less than ACWD's avoided cost of water (\$1,742/AF).²⁶
- ◆ Encompasses all other Board priorities.
- ◆ Is future-ready and a "safe bet" for addressing forthcoming state legislation.
- ◆ Is relatively easy to implement immediately as it has many existing measures and just a few new measures that can be implemented over the next several years.
- ◆ Includes measures that provide water use efficiency services to lower income communities.
- ◆ Allows ACWD to increase its comfort zone when looking at the difference between supply and demand, especially during dry years, and store water use efficiency as savings during wet years.

Additionally, measures in this strategy are more likely to be deemed eligible for funding and outside partnerships. Strategy B provides the full range of measures, builds goodwill with institutional partners, and provides benefits for all categories of ACWD customers.

Figure 6-4 lists all the measures in Strategy B, including whether each is a new or existing measure, when it will start (if it is new), and when it will end (if applicable).

²⁶ Additional analysis done by ACWD staff demonstrates that the true cost per acre-foot saved is \$694/AF and the benefit-cost ratio is 2.59. ACWD staff used anticipated annual increases in SFPUC water over the same period vs. a fixed avoided cost for this business case analysis.

Figure 6-4. Strategy B Measures



Strategy B is comprised of four (4) new measures and 12 measures that ACWD already implements. New measures include AMI Portal Data Analysis, Leak Repair & Plumbing Emergency Assistance, Fixture Retrofit on Resale, and Residential Outdoor Water Surveys. These measures were selected because they addressed ACWD Board priorities and project objectives/drivers.

Five of the existing measures will require some modifications. Modifications include new eligibility requirements such as providing a rebate for more efficient fixtures and broadening eligibility requirements. For example, toilet rebates will only be available when existing fixtures are replaced with ultra-high efficiency toilets with flush volumes of 1.1 gpf or less. A previous measure provided rebates for 1.28 gpf or less toilets. Some measures will include new devices as part of a group of devices that are eligible for incentives. The School Building Retrofit measure will include incentives for high efficiency sprinklers and dripline equipment, in addition to toilets and

weather-based irrigation controllers. Modifications were recommended to increase water savings, expand participation while reducing free riders,²⁷ and increase adoption of new technologies.

Some existing measures are ending. For example, ACWD will no longer offer individual rebates for high efficiency clothes washers. Due to successful rebate programs and vast improvements in water-efficient technology in clothes washers over the last ten years, most clothes washers in the residential, coin operated, and laundromat settings in ACWD's service area are high efficiency models. However, CII customers may still be eligible to receive an incentive to replace an old clothes washer if it is identified as a water use efficiency improvement during a site survey. This is part of the CII Water Efficient Technology (WET) measure. ACWD will no longer be providing indoor surveys to multifamily sites but will still offer free devices and toilet rebates and will collect data to estimate the water savings achieved through these programs. The surveys are resource intensive and do not provide much additional savings. Existing measures that are continuing unchanged are measures that have proven successful, are easy to continue running, and still have water use efficiency potential.

Not all 16 measures in Strategy B will be implemented throughout the planning horizon. Measure timing is staggered for implementation ease and to address specific needs (legislation requirements) when appropriate. Also, some measures run for a short period of time due to limited conservation potential – most of the toilet measures end within 3-9 years due to anticipated high levels of saturation of efficient fixtures from plumbing code changes at the end of that period. More details about each measure in Strategy B are included in Appendix E.

As mentioned previously, the strategies were developed to allow for new measures to be incorporated as new technology is introduced. Strategy B has the following general goals and objectives that drive it. Any new measures will be evaluated in terms of how well it meets these goals and objectives.

- ◆ The measure's cost of water saved is at or below ACWD's avoided cost of water (approximately \$1,742/AF) – see section 6.2 for a discussion on this.
- ◆ The measure serves one or more of ACWD's Board priorities as listed in Section 6.1.
- ◆ The measure is feasible for ACWD to implement with existing ACWD staff resources and budget, or more resources and budget can be made available.
- ◆ The measure targets a water end use with water use efficiency potential.
- ◆ The measure is proven through studies and is recommended by the industry.
- ◆ The measure does not disrupt equitability among customer categories, or it provides water use efficiency to an underserved customer category.

²⁷ It is important to note that in water use efficiency program management the "free rider effect" occurs when a customer applies for and receives a rebate on a targeted high efficiency fixture that they would have purchased even without a rebate. In this case, the rebate was not the incentive for their purchase but a "bonus." Rebate measures are designed to target those customers needing financial incentive to install the more efficient fixture.

Figure 6-5 illustrates the decision workflow that will assist staff when evaluating new measures.

Figure 6-5. Decision Workflow for Evaluation of New Water Use Efficiency Measures



The estimated 3-year (2020-2022) average annual cost to ACWD to implement the Recommended Strategy (Strategy B) is approximately \$911,000 per year, per Table 6-4. The budget includes staff time and expenses (materials, rebates, giveaways, etc.).

Existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor are at sufficient levels to run this strategy for the first one to two years. However, new programs such as "AMI Portal Data Analysis" will ultimately require more staff to implement effectively.

Approximately 65% of ACWD's service area water use is associated with residential water use. Consequently, residential water use efficiency measures will produce the most savings under this strategy (as well as other strategies). At around 23% of overall water use, ACWD's service area does not include extensive commercial activity. Therefore, the water use efficiency potential for the commercial sector is not as high. In addition to plumbing code savings, the Recommended Strategy saves an additional 4% of projected demand in 2050.

7 NEXT STEPS AND CONCLUSIONS

Current conditions have encouraged ACWD to choose Strategy B as the Recommended Strategy to implement over the next five years, with the intention to revisit this approach during the development of the Water Supply Master Plan. Strategy B has measures that are clearly defined, as well as water saving objectives and customer target goals that are measurable. ACWD can track quantifiable performance goals at both the measure and overall strategy level during implementation.

7.1 Adaptive Management

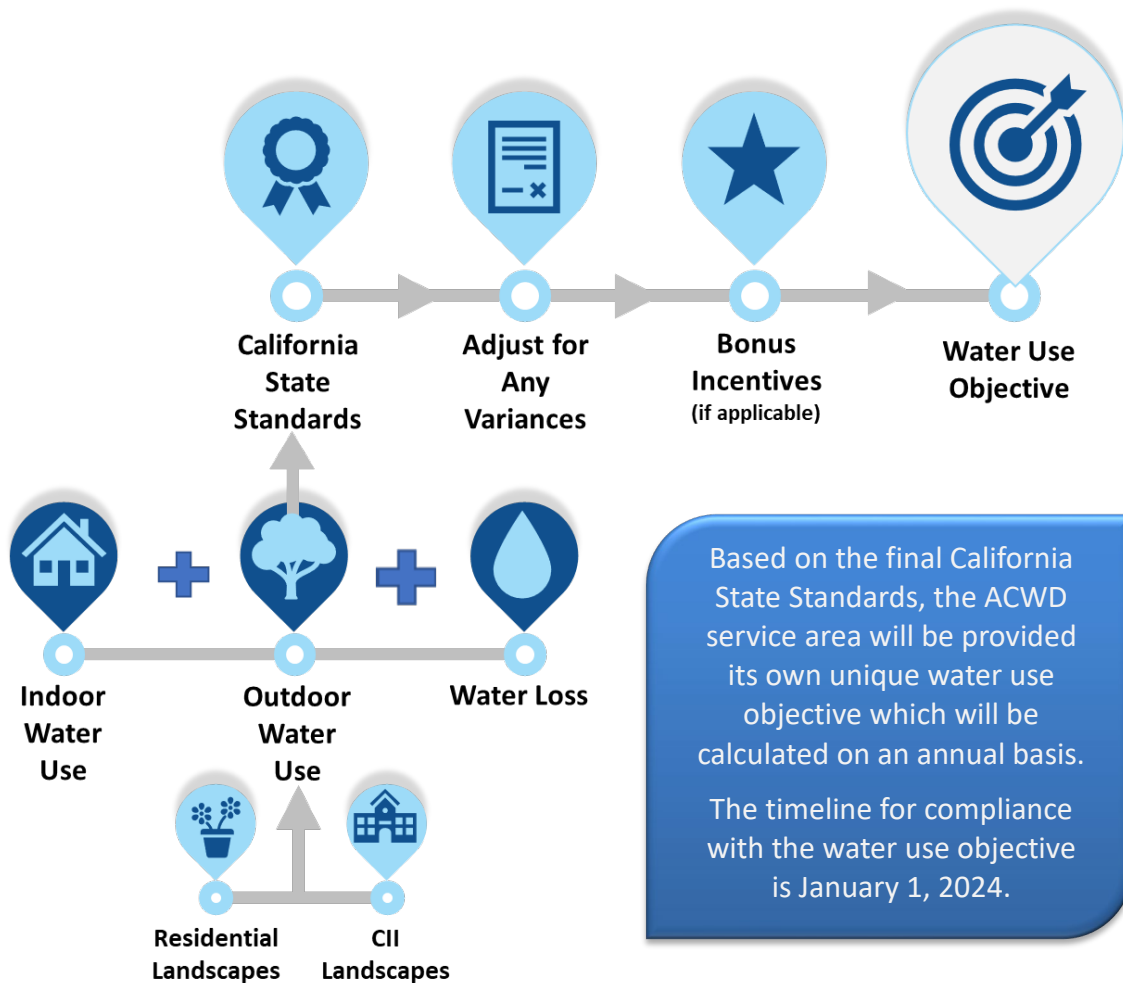
ACWD's approach to developing this Plan included the understanding that the field of water use efficiency program administration is in constant flux, as are water use trends, which are very dynamic in response to changes in population, economy, weather, efficiency of devices, and industry. This Plan has been developed and approved with this in mind.

Strategy B is a WUE Program framework, a starting point, and is meant to be adaptively managed. As mentioned in Section 6, ACWD has developed a method to identify new measures that fit into the strategy. New measures may be added to ACWD's WUE Program to replace existing measures within the Program. ACWD may also alter its strategy by augmenting or scaling back various strategy components and measures to increase efficiency, while continuing to meet strategy objectives. ACWD may adopt better technology or methods of implementation and/or may alter its strategy to meet budget and staffing resource limitations or expansion.

Whether additional measures become necessary would be dependent on several factors, including future water supply restrictions, drought conditions, compliance with the annual aggregate water use objectives as provided by the state, and ACWD's ability to support new innovative measures.

The strategy will be revisited when ACWD updates its Water Supply Master Plan estimated to be completed in 2025. ACWD may even decide to pursue one of the other strategies evaluated in this Plan if its needs are better served through that strategy. Additionally, water use efficiency measures identified in this plan will be modified, if necessary, to align with forthcoming water use standards that will be established in accordance with Assembly Bill 1668 and Senate Bill 606 (see Figure 7-1).

Figure 7-1. State Regulations Timeline and Methodology



ACWD can use the DSS model to track progress of ACWD’s selected strategy by tracking its impact on demand reductions, along with the strategy’s implementation costs and associated budgets.

Ongoing monitoring and reporting of ACWD’s water supply status will also be conducted through annual reports and regular five-year updates of ACWD’s Urban Water Management Plan. The DSS model can assist ACWD with understanding when to make any changes as described above.

7.2 Implementation

The following list contains actions ACWD will take to ensure successful implementation of Strategy B:

- Review current staff resources in terms of implementing Strategy B and determine if new staff is necessary to adequately support implementation of the strategy. Ensuring adequate staff to administer water use efficiency measures is important so that customer participation in water use efficiency is well-supported and therefore successful. Since both the implementation of this Plan and meeting state mandates are largely driven by voluntary customer changes in equipment and behaviors that need to be permanent (despite drought conditions), strong staffing support in this area will allow for a higher potential success rate.
- Establish a budget for the selected water use efficiency strategy at an average annual cost of approximately \$911,000 to cover the cost of implementing the strategy measures. The average annual cost includes administrative costs and staff labor (burdened) but does not include new program startup

costs (staff time to set up all the elements of running a program.) The Water Use Efficiency Program’s annual work plan development process will continue to be done in concert with the budget planning process.

- ◆ Prioritize measures for implementation, with the highest priority for implementation given to those that contribute the most to meeting water savings goals and can be implemented with relative ease. To launch implementation of the Water Use Efficiency Program, ACWD will consider these key questions to determine measure priorities, budgets, and schedules:
 - What level of support will be required from staff to implement the selected measures – when and how much is needed?
 - Can all or some of the support needed to run a measure be outsourced?
 - Are there economies of scale to partnering with other agencies to run a measure (BAWSCA, CalWEP, etc.)?
 - Is there additional funding available through grants or cost-share to support the measure?
- ◆ Develop implementation plans that describe in detail how to implement each measure, including any necessary Board Committee review or Board Meeting action, budget processes, legal processes, Rates and Fees schedule inclusion, outreach planning and materials development.
- ◆ Develop outreach and marketing plans as part of each measure’s implementation plan. Identify measure and general program outreach techniques that really engage customers. For example, use of actual customer experience testimonials in outreach materials and presentations.
- ◆ Determine how to utilize AMI to increase effectiveness of outreach and targeting of customers that would most benefit from a measure.
- ◆ Continue to foster partnerships with service area cities; other agencies, utilities, and their representatives; regional and statewide groups; community organizations; industry and other stakeholders to support measure implementation.
- ◆ Market water use efficiency measures through accredited program membership lists as a low-cost means to spread the word to other professionals in the water industry (e.g., StopWaste, Master Gardeners, Green Plumbers, WaterSense Partners, Irrigation Association Certified Professionals, Qualified Water Efficient Landscapers, etc.).
- ◆ Seek funding sources, such as Proposition 1E²⁸, 84²⁹, Cap & Trade³⁰, the California Department of Water Resources Water-Energy Grant Program,³¹ and/or U.S. Bureau of Reclamation funds, to support Plan budget needs. Grant and cost-share funds help balance out the higher cost measures and reduce the overall cost of implementing the water use efficiency strategy.
- ◆ Develop and utilize a Water Use Efficiency Database to store, manage, and report on measure participation, costs, and other implementation data. Setting up a method to store and manage this data is important to measure success and identify areas that need improvement.
- ◆ Review Plan goals in the DSS Model annually and compare with water use to ensure the strategy is on track to meet water use reduction goals, then identify updates or changes to measure elements and/or

²⁸ <http://bondaccountability.resources.ca.gov/p1e.aspx>

²⁹ <http://bondaccountability.resources.ca.gov/p84.aspx>

³⁰ <https://www.edf.org/climate/how-cap-and-trade-works>

³¹ <https://www.water.ca.gov/Work-With-Us/Grants-And-Loans/Water-Energy-Grant-Programs>

the strategy, if not on track. This may include amending targets, budgets, staffing, and schedule, or switching to another strategy altogether, to stay on track with ACWD water use efficiency needs.

- Engage in state processes to establish the standards for water use efficiency objectives which are part of the state’s implementation of the Water Conservation legislation. ACWD will participate in public workshops and stakeholder workgroups to review state recommendations, evaluate their impact on ACWD, present key information to stakeholders, receive feedback, and submit written comments as needed.

Staffing Needs for Strategy B

As mentioned in Section 6.4, existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor are sufficient levels for initial implementation of this strategy for the first one to two years (FY20/21–FY21/22). However, with the implementation of AMI, through a Proof of Concept in the spring/summer of 2021, and a full deployment roll out between mid to late 2021 and 2023, it is anticipated that additional staff will be needed to effectively support a successful roll out of AMI, the AMI Portal Data Analysis measure, and associated measures. Several other measures start up in 2023 to address state legislation, including a Residential Outdoor Water Surveys measure; these also may require additional staffing or contracted resources. Staffing needs will continue to be evaluated through the AMI and state legislation implementation periods to identify appropriate needs and timing for consideration of additional staff and/or resources in a holistic manner that takes into account all of ACWD’s priorities in future budget processes.

Table 7-1 lists staff estimates to implement Strategy B based on the current measure implementation schedule.

Table 7-1. Estimated Staffing Needs for Strategy B

FTEs	Title	Explanation
1	WC Specialist	Potentially hire between 2021-2023 to support AMI Portal Data Analysis. AMI is expected to be fully deployed by the end of 2023.
1	WC Specialist	Potentially hire between 2023-2024 to support new programs for state legislation objective compliance (CII Water Efficient Technology Rebates, Leak Repair & Plumbing Emergency Assistance, Residential Outdoor Water Surveys – admin support).
2	WC Specialists (or a Contractor*)	Potentially hire between 2023-2024 to support the Residential Outdoor Water Surveys and other measures to ensure state legislation objective compliance.

*Hiring a contractor for the Residential Outdoor Water Surveys may be the best option and will be evaluated when ACWD staff is preparing the implementation plan for this measure in 2023.

Funding Opportunities, Partnerships, and Stakeholder Group Participation

ACWD has received and/or been awarded over \$2.7 million in grant and cost-share funding for water use efficiency measures over the past 20 years. ACWD currently has strong partnerships with other regional public agencies, neighboring utilities, and regional stakeholder groups that provide cost-sharing or in-kind program support, such as support for outreach, building customer awareness, and maximizing participation. ACWD will continue to actively pursue future state and federal grants and cost share opportunities as well as maintain these existing partnerships.

Each measure in the recommended water use efficiency strategy has both common and unique funding sources and partnership opportunities, as well as potential implementation obstacles, including legal barriers. In some cases, these matters can be identified in advance, but some cannot.

Partnership and funding sources may include the following:

- ◆ ACWD water use efficiency and public outreach budgets
- ◆ Existing and new regional, county, and statewide partnerships such as waste management authorities and Green Business Certification organizations
- ◆ State and federal grants
- ◆ Service area cities
- ◆ Local schools/university students or student organizations
- ◆ Local community organizations with an interest in water efficiency such as resource conscious gardening groups/advocates and green jobs advocates
- ◆ Partnerships with energy and sewer utilities

Tracking and Monitoring

ACWD will continue to track the level of participation in water use efficiency measures to monitor the effectiveness of the water use efficiency strategy. To enhance ACWD's current tracking efforts, a water use efficiency database is in development. This tracking database will filter data for reporting purposes and can be updated and reviewed in real time to reflect overall Water Use Efficiency Program participation and strategy success.

The tracking database will incorporate the following data for existing and new measures:

- ◆ Customer information – name, address, account number, customer type (e.g., CII customers)
- ◆ Location information – location number, meter information, site address, site type
- ◆ Water Use Efficiency (WUE) measure or device – type (including make and model), quantity, unit water savings, date of measure installation, life expectancy
- ◆ Cost information – rebate amount, grant information (if applicable), cost-share
- ◆ Other documentation or data as appropriate (i.e., survey reports)

These elements will allow ACWD to track and monitor water savings over time for each measure as well as overall WUE Program water savings. ACWD will measure the success of the water use efficiency strategy through quarterly reviews of measure participation data with management and annual reviews of estimated savings with the ACWD Board. Measure tracking will also inform ACWD's annual budget process.

7.3 Conclusions

Through this analysis, the following conclusions were made:

- ◆ **Water use efficiency is the least expensive means of addressing ACWD's service area future water demands.** The implementation of Strategy B's water use efficiency measures as identified in this Plan will reduce per capita water use and will enable ACWD to maintain its practice of storing excess water during wet years to close the gap between supply and demand during dry years, as well as defer the need for infrastructure expansion to address future water demands. While some of the water use efficiency measures identified have a significant cost, the cost of not implementing these measures, and instead addressing increased demands through additional purchased water and engineering solutions, is even higher. Furthermore, with climate change, long-term drought, and environmental restrictions on the delivery of imported water, additional water supplies may not be readily available to meet future increases in demands without water use efficiency.
- ◆ **This Plan will inform other ACWD planning efforts.** Through the DSS Model analysis, ACWD identified appropriate measures for its service area, details related to implementing each measure (fixture costs, applicable customer classes, period of implementation, measure life, administrative costs, end uses),

reasonable targets, and estimated savings associated with targeted end uses to determine Water Use Efficiency Program savings projections for the next 31 years. This thorough analysis will be used in ACWD's 2020 Urban Water Management Plan demand forecast and will help inform the 2025 Water Supply Master Planning process. In addition, the DSS Model can be used to help identify areas with the most reduction potential to inform development of ACWD's Water Shortage Contingency Plan.

- ◆ **This Plan will help ACWD meet new state water use efficiency objectives.** The governor signed SB 606 and AB 1668 into state law to create permanent water use efficiency standards as part of implementing "Making Water Conservation a California Way of Life" legislation. ACWD may be required to meet new mandates and this Plan provides a framework for addressing these new requirements. The Plan is based on what was known at the time it was finalized. ACWD may need to update its water use efficiency strategy to comply with mandates developed in the future.
- ◆ **This Plan supports ACWD's AMI Initiative.** Strategy B has numerous measures that will benefit from AMI water use data. Granular water use data will help inform measures that target overirrigation, leaks, and water waste, as well as help ACWD target programs more effectively, improving public outreach and marketing.

In summary, expanding ACWD water use efficiency efforts through the implementation of the recommended Strategy B is a feasible and cost-effective approach to continuing sustainable operations with existing water supplies, supporting other future planning efforts, addressing droughts and other water supply uncertainties, meeting the water use objectives outlined in SB 606 and AB 1668, and fully utilizing ACWD's new AMI initiative.

7.4 Future Analysis

ACWD anticipates that it will continue to use the DSS Model created for this Plan for analysis to support future planning initiatives. As mentioned previously in this Plan, the Water Supply Master Plan is one of those initiatives. During development of the Water Supply Master Plan, ACWD may maximize targets for all measures in the DSS Model to see what a "Strategy E" (E for everything) alternative would look like. This alternative would maximize savings without consideration of staffing or budget limits. However, it would need to consider limits such as saturation of efficient fixtures and customer response. Ramping up targets to maximize water use efficiency would help ACWD identify the true water use efficiency potential and limits of water use efficiency programming (demand hardening) in its service area, which would be useful when looking at water supply limitations down the road. ACWD could also conduct similar analyses that maximize savings for a few measures – those with the greatest water use efficiency potential. In all cases, the economic impact (utility cost and customer cost) of these scenarios would need to be evaluated as well.

ACWD has concerns related to demand hardening from an aggressive WUE Program and how that could impact operations during a severe drought. If service area water use efficiency potential was maxed out, what actions could ACWD take during a drought to reduce water use? While this is a very unlikely scenario in the short term, it could materialize in the long term. ACWD will utilize these DSS Model analyses to plan for future droughts and other water supply uncertainties as it continues to pursue all cost-effective means to reduce demand and serve its mission of providing a reliable source of water to customers in the service area.

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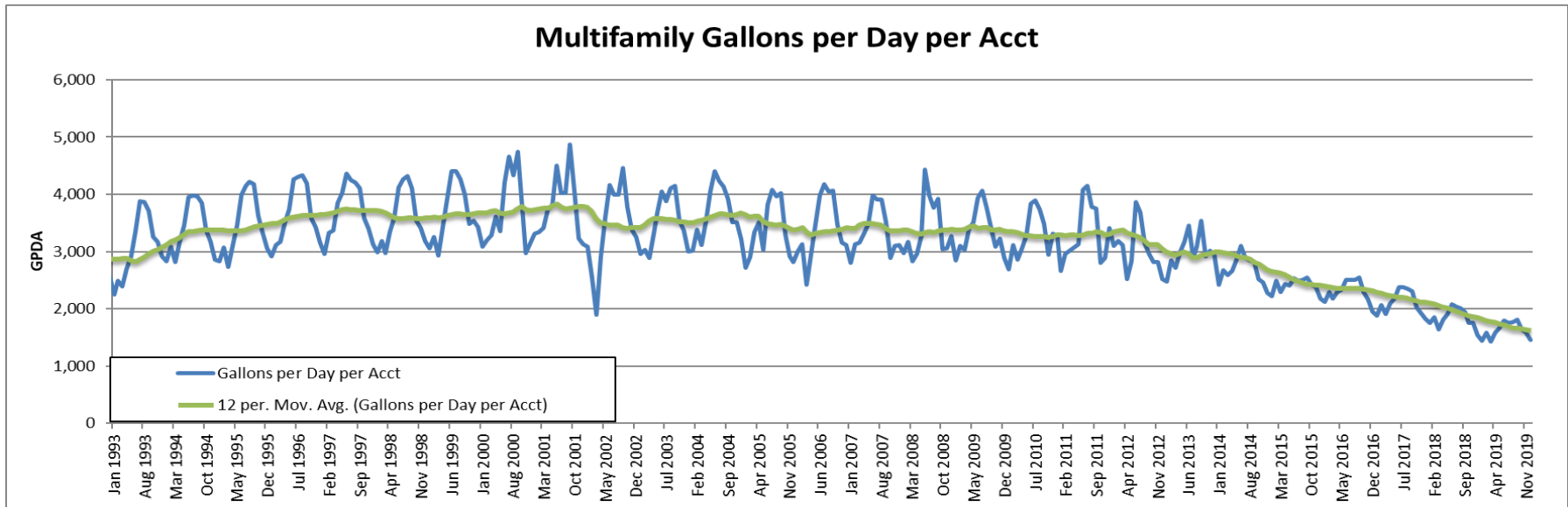
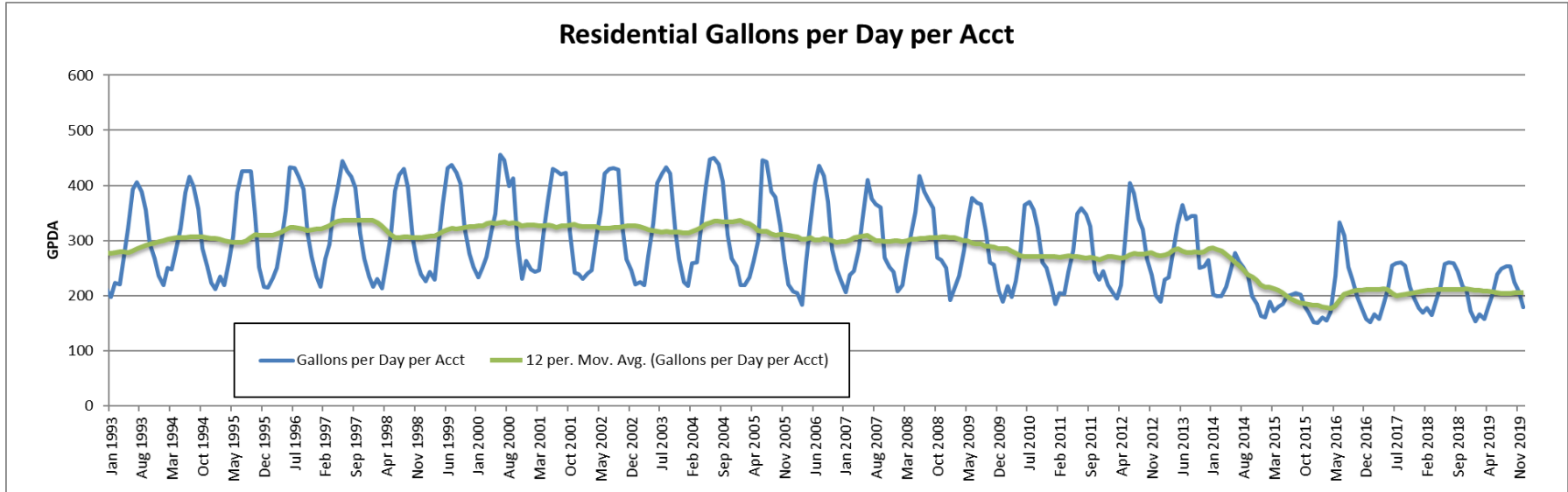
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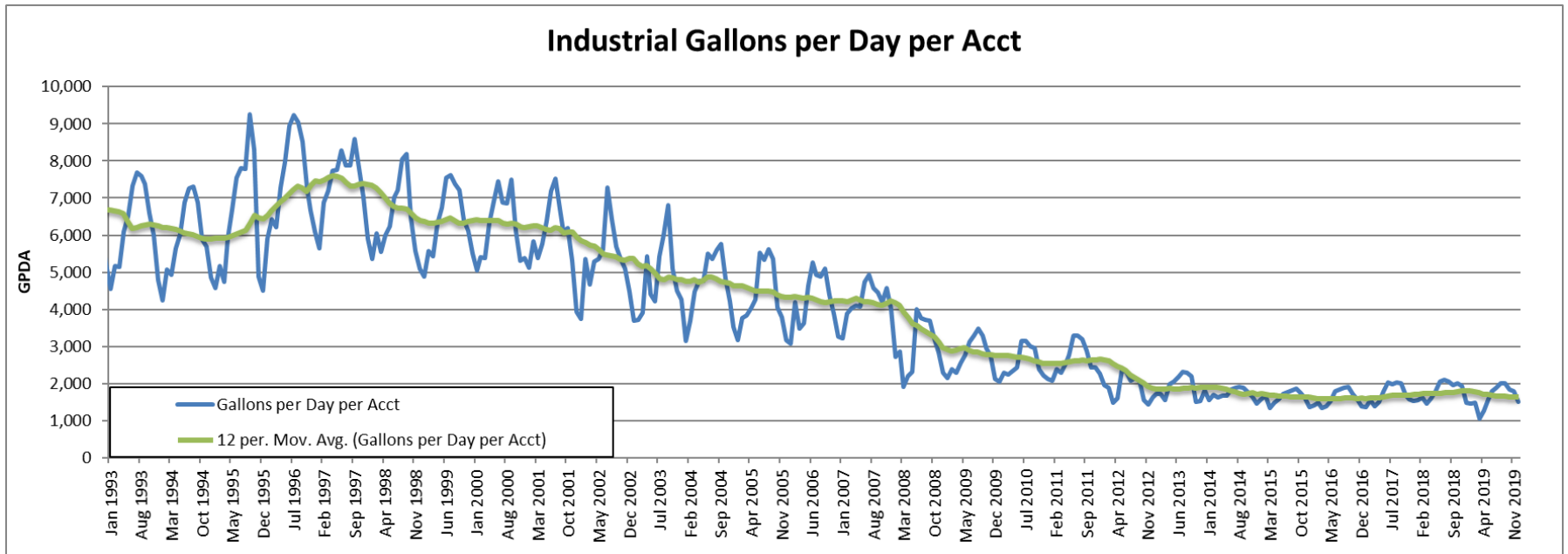
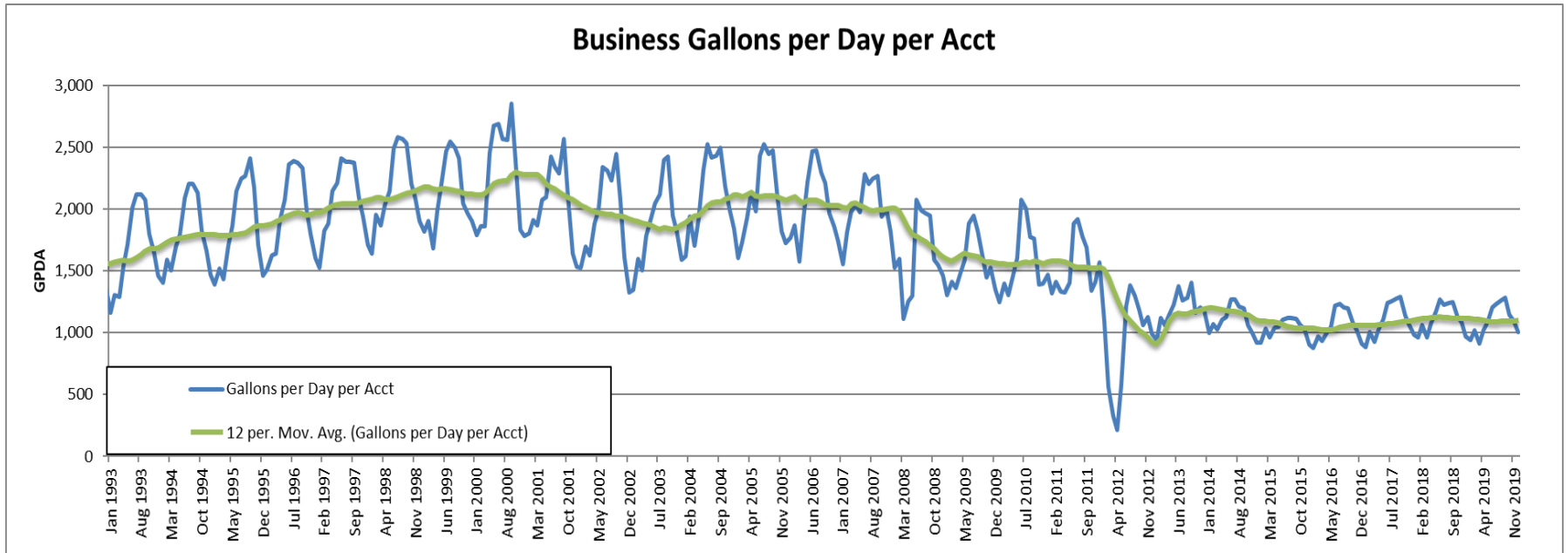
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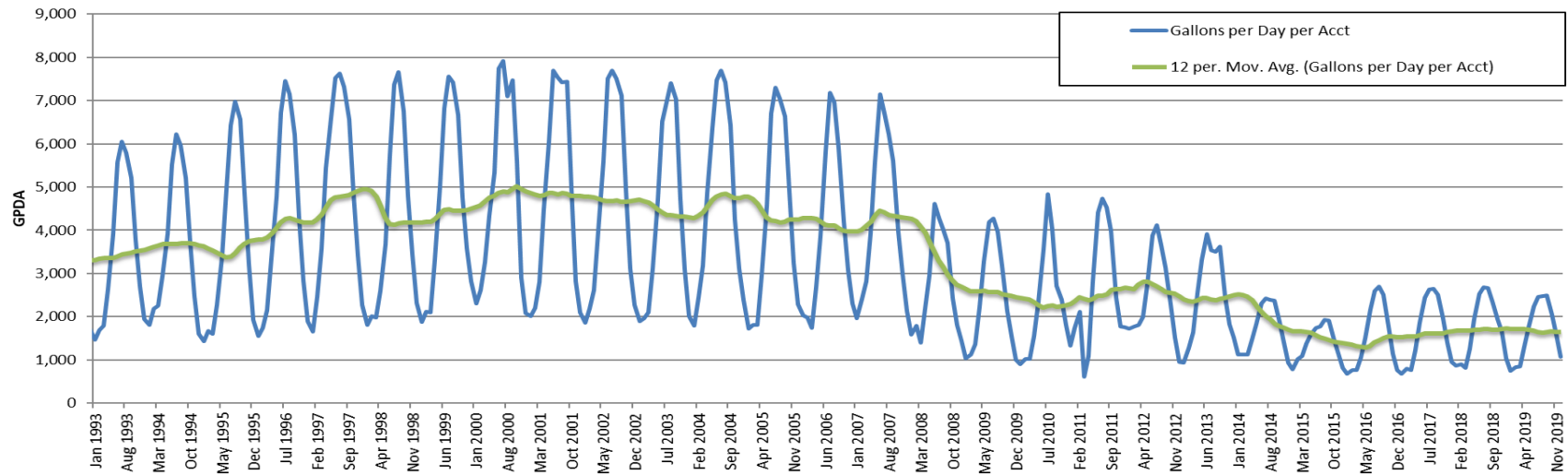
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APPENDIX A – HISTORICAL MONTHLY WATER USE PER ACCOUNT TYPE

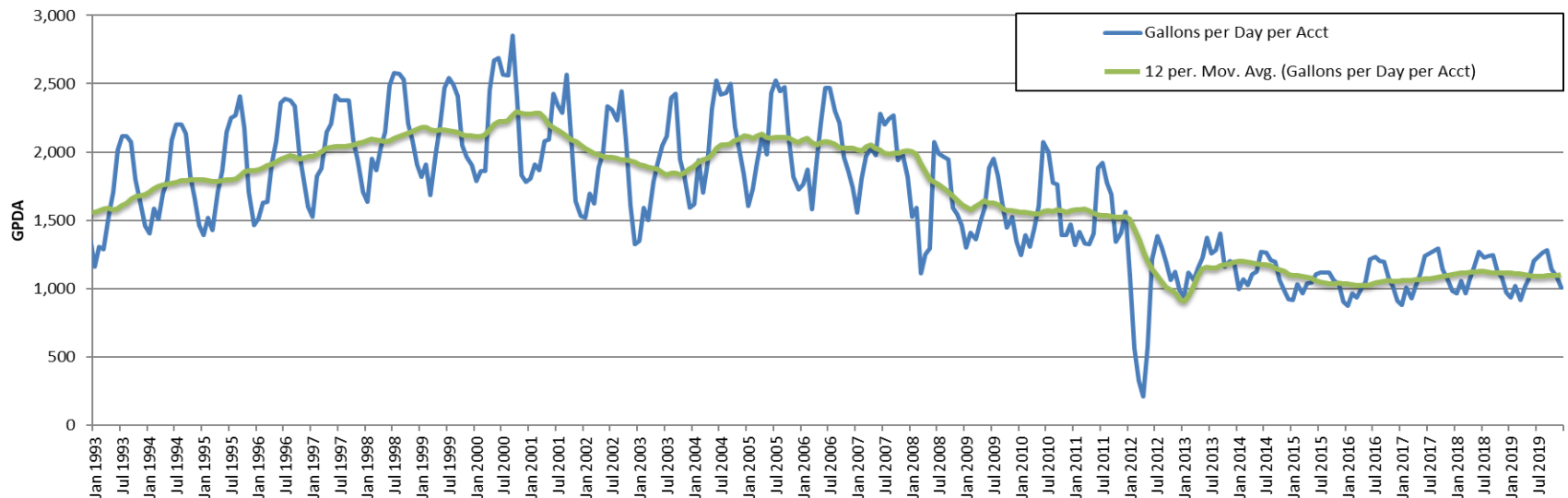




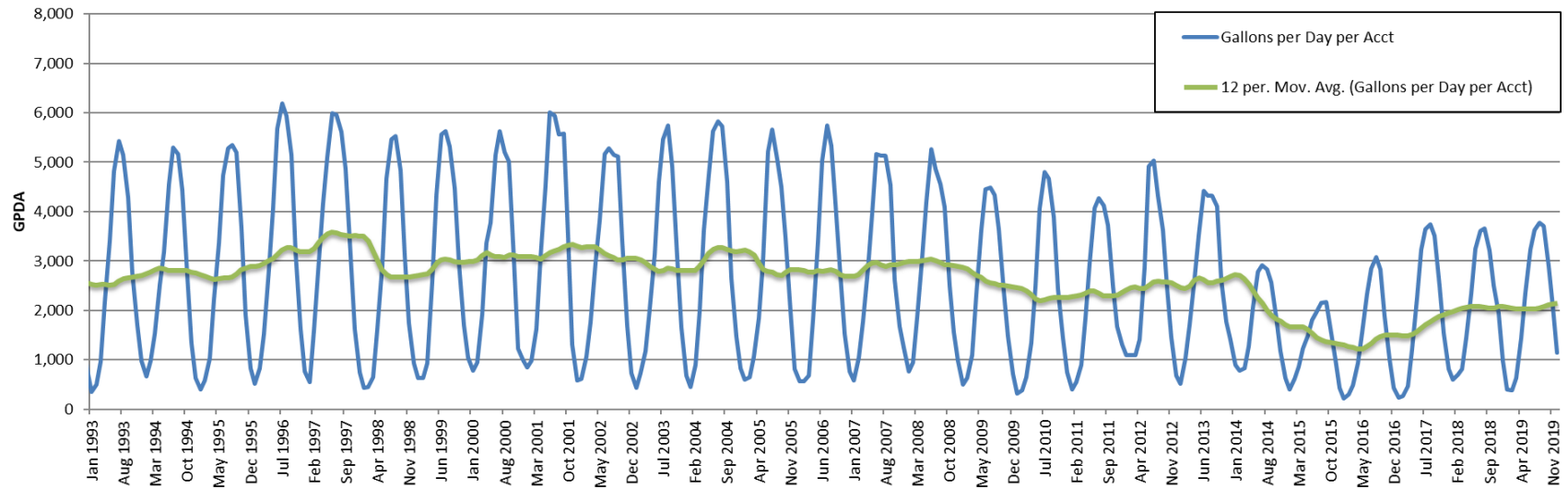
Institutional and Other Gallons per Day per Acct



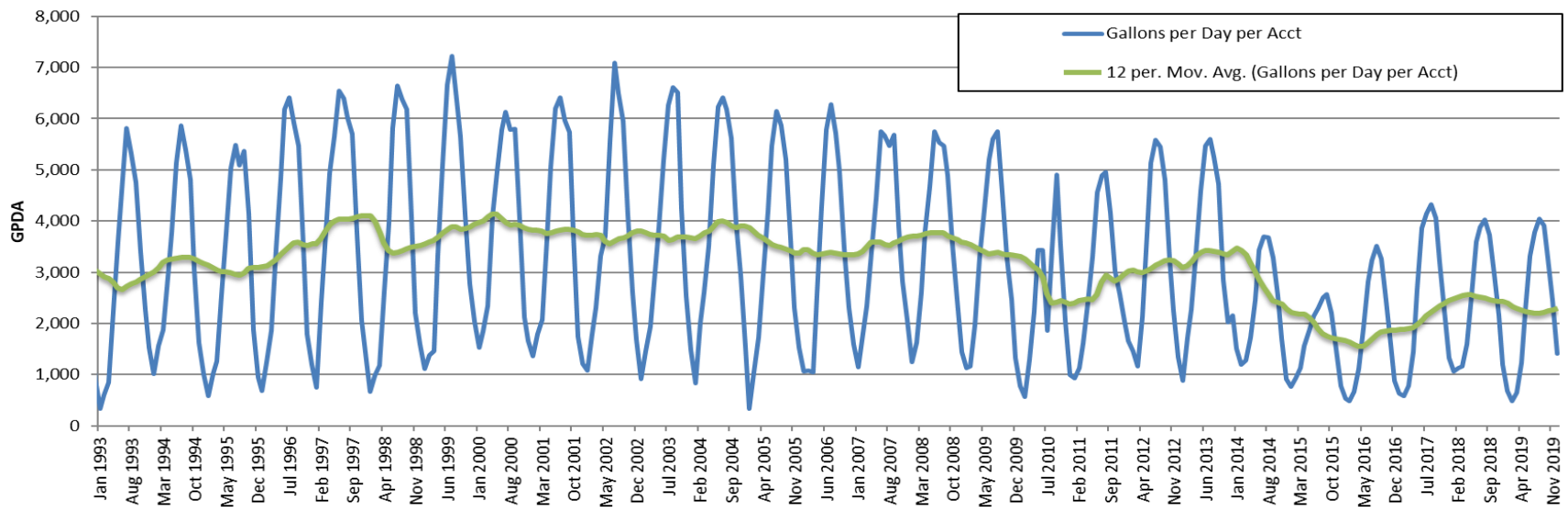
Business Landscape Gallons per Day per Acct



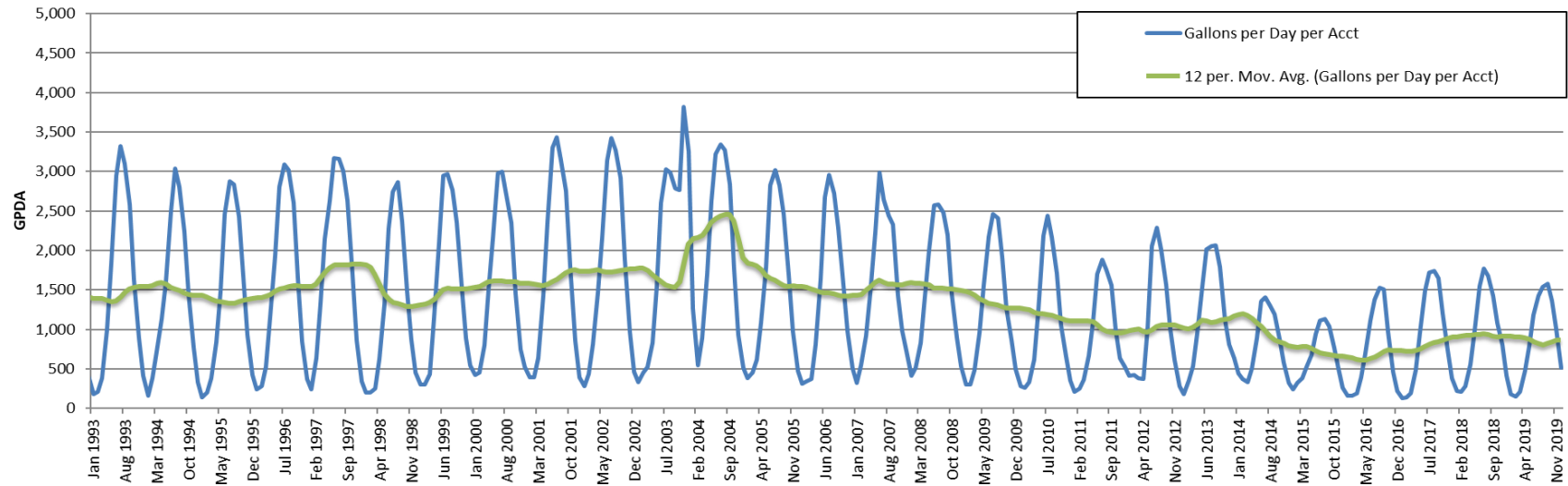
Multifamily Landscape Gallons per Day per Acct



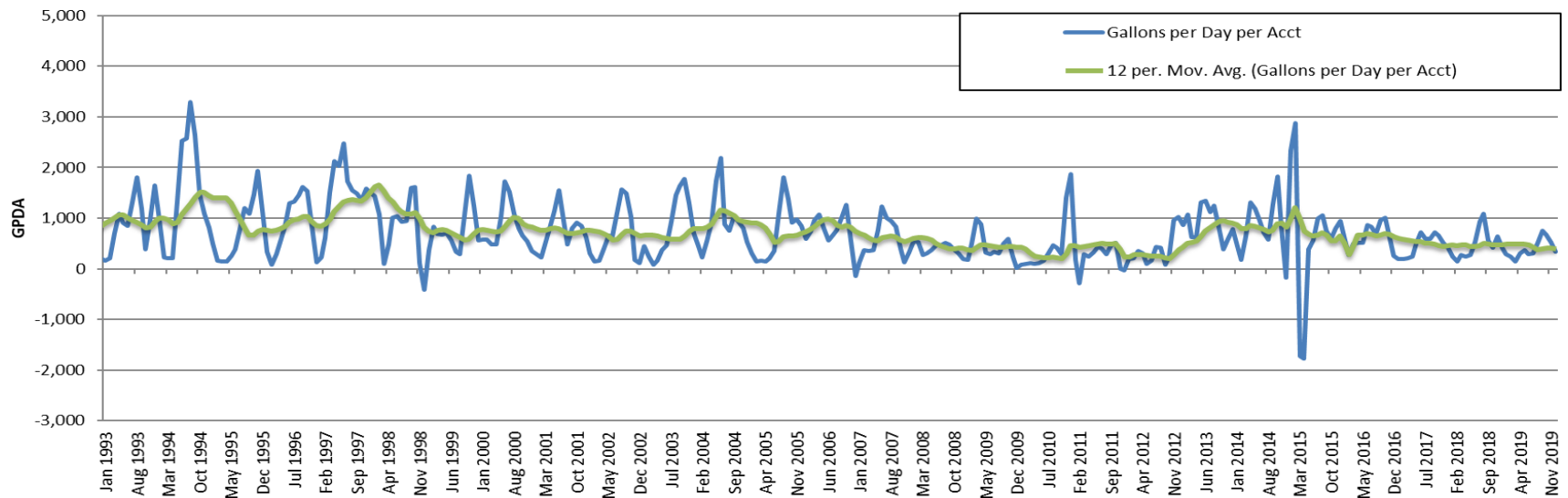
Industrial Landscape Gallons per Day per Acct

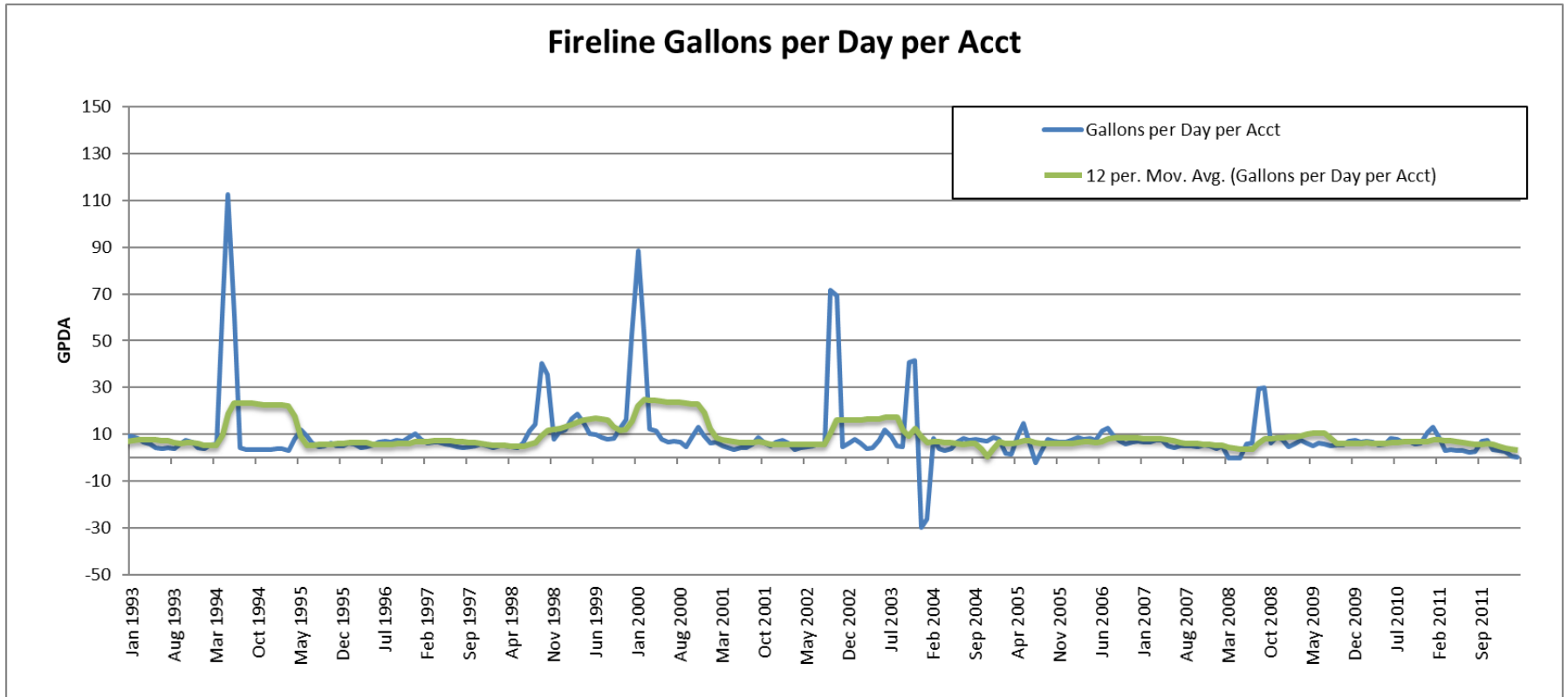


Institutional and Other Landscape Gallons per Day per Acct



Hydrant Gallons per Day per Acct





Note: Anomalies in the data can be attributed to implementation of a new billing system in 2012 when Fireline accounts were consolidated into their parent classes (i.e., Business, Residential, Industrial, etc.).

APPENDIX B – DSS MODEL OVERVIEW



Figure B-1. DSS Model Main Page

standards are modeled by customer category. These fixtures and plumbing codes can be added to, edited, or deleted by the user. This process yields two demand forecasts, one with plumbing codes and one without plumbing codes.

DSS Model Overview: The Least Cost Planning Decision Support System Model (DSS Model) is used to prepare 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 and to provide a rigorous and defensible modeling approach necessary for projects subject to regulatory or environmental review.

Originally developed in 1999 and continuously updated, 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, such as plumbing fixtures and appliances. 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.

Demand Forecast Development and Model Calibration: To forecast urban water demands using the DSS Model, customer demand data is obtained from the water agency being modeled. Demand data is reconciled with available demographic data to characterize water usage for each customer category in terms of number of users per account and per capita water use. Data is 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 is 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., flushes per person per day) are not exceeded or drop below reasonable use limits.

Passive Water Savings Calculations: The DSS Model is used to forecast service area water fixture use. Specific end-use type, average water use, and lifetime are compiled for each fixture. Additionally, state, and national plumbing codes and appliance

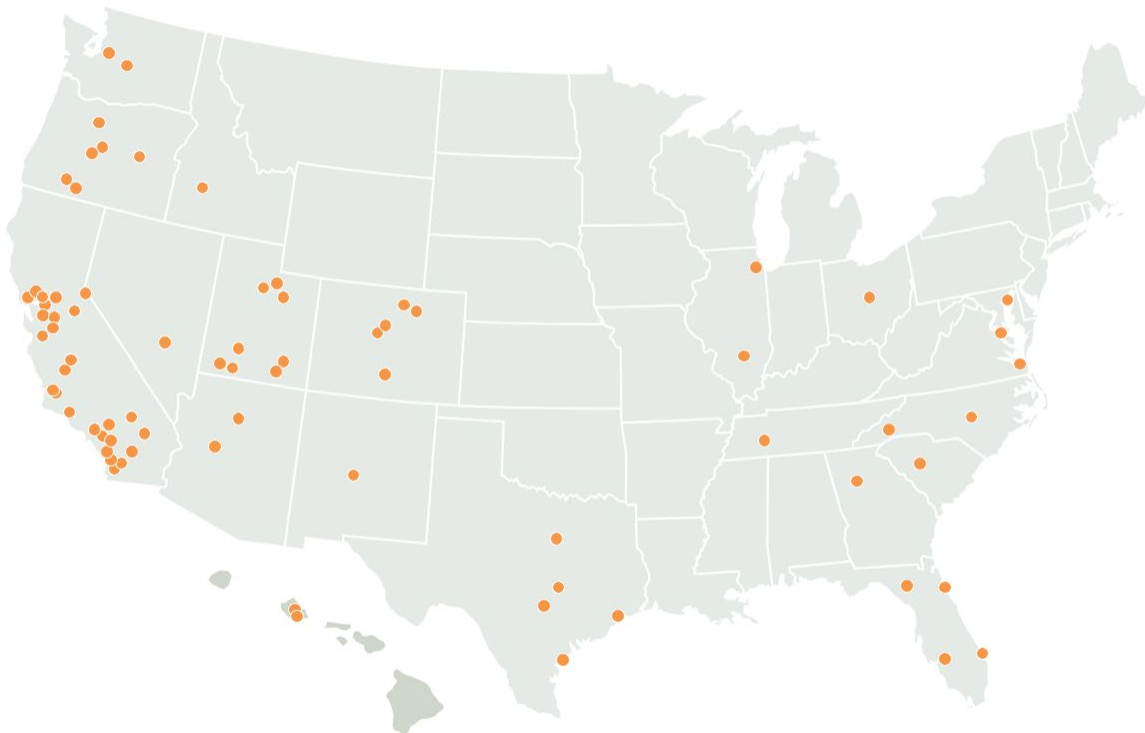
Active Conservation Measure Analysis Using Benefit-Cost Analysis: The DSS Model evaluates active conservation measures using benefit-cost analysis with the present value of the cost of water saved (\$/Million Gallons or \$/Acre-Feet). Benefits are based on savings in water and wastewater facility operations and maintenance (O&M) and any deferred capital expenditures. The figures on the previous page illustrate the processes for forecasting conservation water savings, including the impacts of fixture replacement due to existing plumbing codes and standards.

Figure B-2. Sample Benefit-Cost Analysis Summary

Conservation Measures Benefit Cost Analysis											
<div> <div>Review Data</div> <div> <div>Benefit Cost Analysis</div> <div> <div>Util Cost Five Year Start Year</div> <div>2020</div> </div> <div> <div>Water Savings Year</div> <div>2030</div> </div> <div> <div>Units</div> <div>AF</div> </div> </div> </div>											
Benefit Cost Analysis	Measure		Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2025	Water Savings in 2030 (afy)	Cost of Savings per Unit Volume (\$/af)
	AMI	Full AMI Implementation	\$3,976,434	\$16,635,194	\$1,566,069	\$5,893,340	2.54	2.82	\$320,000	133.764878	\$324
	RESH	Residential Rebates for HECW	\$139,312	\$365,447	\$95,879	\$200,665	1.45	1.82	\$50,325	5.124572	\$824
	WC	Water Checkup	\$7,648,165	\$30,288,419	\$6,005,949	\$7,665,564	1.27	3.95	\$1,382,995	239.652915	\$877
	IRRE	Irrigation Evaluations	\$1,589,488	\$1,589,488	\$1,918,184	\$4,332,779	0.83	0.37	\$443,824	98.051821	\$646
	CIIRel	CIIRel Water Survey Level 2 and Customized Rebate	\$910,720	\$3,313,109	\$915,904	\$2,581,185	0.99	1.28	\$193,725	18.753753	\$1,055
	NOZZ	Free Sprinkler Nozzle Program	\$277,886	\$277,886	\$329,386	\$455,933	0.84	0.61	\$103,145	23.005687	\$680
	MULQ	Mulch Program	\$80,739	\$80,739	\$287,676	\$287,676	0.28	0.28	\$66,932	4.554625	\$2,000
	LDS	Water Conserving Landscape and Irrigation Codes	\$1,055,819	\$1,055,819	\$350,316	\$7,979,608	3.01	0.13	\$78,568	46.098525	\$161
	PRV	Pressure Reduction Valve Rebate	\$102,170	\$193,972	\$49,161	\$132,223	2.08	1.47	\$37,818	8.503521	\$425
	LEAK	Leak Detection Device Rebate	\$174,130	\$847,416	\$306,843	\$1,288,743	0.57	0.66	\$80,053	6.065394	\$1,895
	UHET	Ultra-High Efficiency Toilet Rebate	\$538,624	\$538,624	\$405,529	\$761,556	1.33	0.71	\$362,736	16.287780	\$921

Model Use and Validation: The DSS Model has been used for over 20 years for practical applications of conservation planning in over 300 service areas representing 60 million people, including extensive efforts nationally and internationally in Australia, New Zealand, and Canada.

Figure B-3. DSS Model Analysis Locations in the US



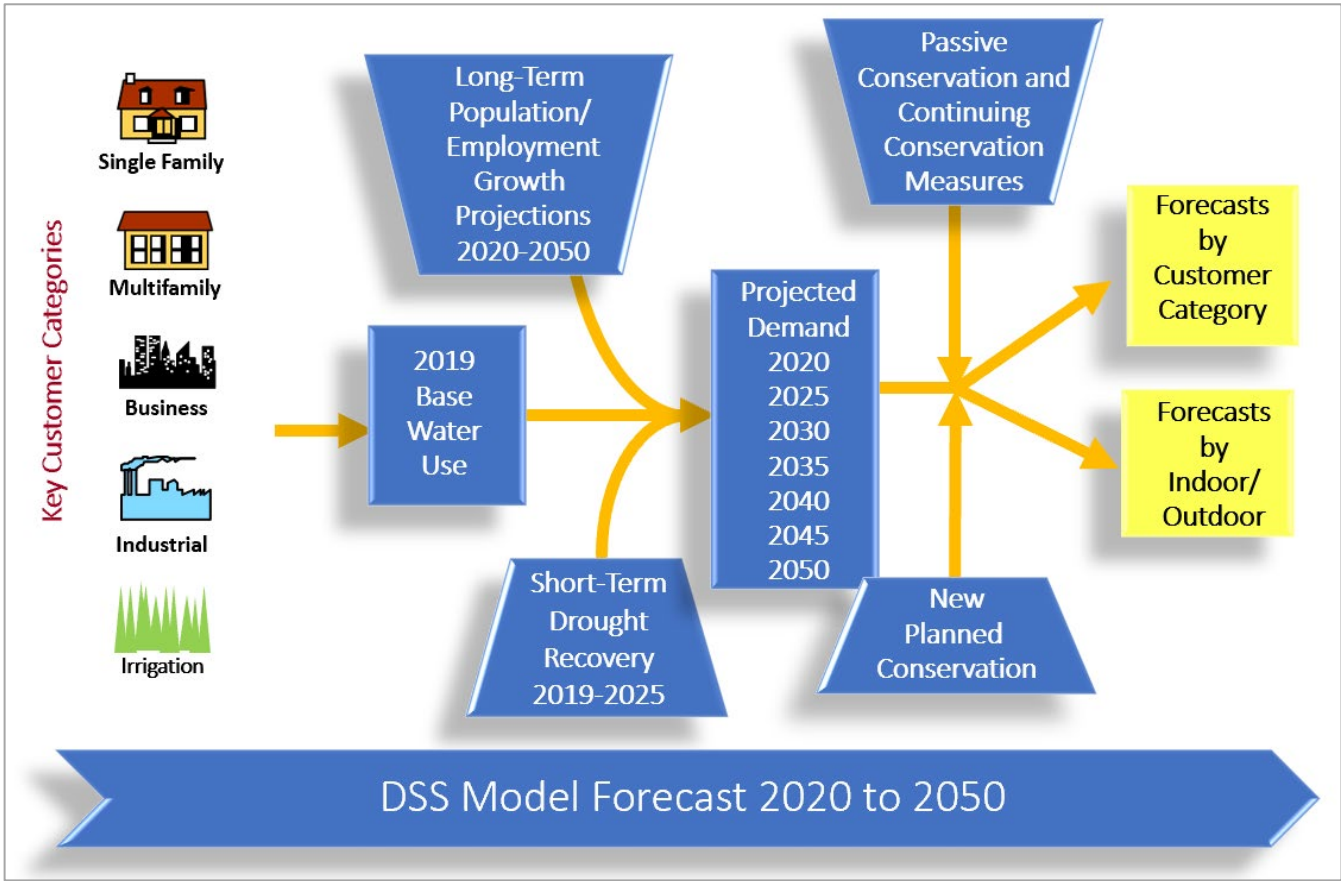
The California Water Efficiency Partnership, or CalWEP (formerly the CUWCC), has peer reviewed and endorsed the model since 2006. It is offered to all CalWEP members for use to estimate water demand, plumbing code, and conservation program savings. ACWD’s model is a fully customized version of the DSS Model using service area-specific information.

The DSS Model can use one of the following: (1) a statistical approach to forecast demands (e.g., an econometric model); (2) a forecasted increase in population and employment; (3) predicted future demands; or (4) a demand projection entered into the model from an outside source.

For ACWD, baseline demand was developed based on an increase in residential population and employment based on the latest information from the Association of Bay Area Governments - Plan Bay Area 2050: Regional Growth Forecast, then ACWD staff used the Community Survey (Appendix G) to identify a drought rebound. The survey asked questions about customer landscape changes pre- and post-drought and this was converted into a projected return of 2.75 MGD over 5 years (2020-2025).

The following figure presents the flow of information in the DSS Model Analysis.

Figure B-4. DSS Model Analysis Flow



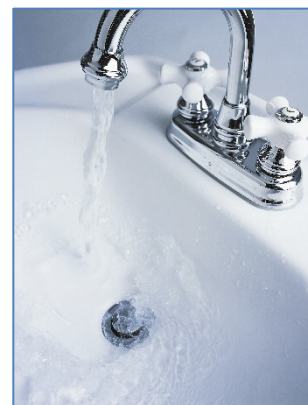
APPENDIX C – DSS MODEL DEMAND ASSUMPTIONS

This appendix presents the methodology used to determine the Alameda County Water District's passive water savings, information regarding national and state plumbing codes, and key inputs and assumptions used in the DSS Model including fixture replacement and estimates. Note: The DSS Model does not assess passive water savings for outdoor use. It focuses on plumbing code change impacts on indoor fixtures. However, ACWD intends to incorporate impacts of outdoor code changes, such as MWELO updates, into future analyses. Past actions that impact outdoor use were assessed through ACWD's Community Survey, which asked questions to identify changes over time to outdoor use based on the change out of turf for more water-efficient plants and the installation of efficient irrigation. This information was used to determine permanent savings from the last drought and to project post-drought demand rebound.

C.1 National Plumbing Code

The Federal Energy Policy Act of 1992, as amended in 2005, mandates that only fixtures (as listed below) 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 pounds per square inch (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 manufacturers to dramatically reduce the amount of water these machines use. Generally, front-loading washing machines use 30-50% less water than conventional (top-loading) models, which are still available but are becoming more water efficient.

In this 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 machine 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 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 6.5 (equates to approximately 19 gallons per load based on an average 2.9 cubic ft. tub). The water factor equals the number of gallons used per cycle per cubic foot of capacity.

Water Factor (WF) = gallons per load/tub volume

OR

washer capacity (cubic ft.)/average tub volume

Prior to the year 2000, the water factor for a typical new residential clothes washer was around 12 (equates to approximately 35 gallons per load based on an average 2.9 cubic ft. tub). 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 was 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 U.S. Environmental Protection Agency estimated that Energy Star washers comprised more than 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.



C.2 State Plumbing Code

This section describes California state codes applicable to ACWD's water use.

C.2.1 California State Law – 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 toilets (ULFTs) using 1.6 gpf, urinals using 1 gpf, and low-flow showerheads and faucets. AB 715 led to an update to California Code of Regulations Title 20 (see Section C.2.3) mandating that all toilets and urinals sold and installed in California as of January 1, 2014 must be high efficiency versions having flush ratings that do not exceed 1.28 gpf (toilets) and 0.5 gpf (urinals).

C.2.2 California State Laws – SB 407 and SB 837

SB 407 addresses plumbing fixture retrofits on resale or remodel. The DSS Model carefully considers 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 in 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. Additionally, SB 407 conditions issuance of building permits for major improvements and renovations upon retrofit of non-compliant plumbing fixtures. SB 837 (enacted in 2011) requires that sellers of real estate property disclose on their Real Estate Transfer Disclosure Statement whether their property complies with these requirements. Both laws are 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.

C.2.3 2019 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 2019 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 apply 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 the effects these standards have on showerheads, faucet aerators, urinals, toilets, and clothes washers.

- ◆ Showerheads – July 2016: 2.0 gallons per minute (gpm); July 2018: 1.8 gpm
- ◆ Wall Mounted Urinals – January 2016: 0.125 gpf (pint)
- ◆ 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 AB 715, requiring high efficiency toilets of 1.28 gpf sold in California beginning in 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 2018, the maximum water factor for standard top-loading machines was reduced to 6.5.

Showerhead flow rates are 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 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 likewise have been 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 faucets/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.

C.3 Key Baseline Potable Demand Inputs, Passive Savings Assumptions, and Resources

The following tables present the key assumptions and references that are used in the DSS Model in determining projected demands with plumbing code savings. The assumptions having the most dramatic effect on future demands are the natural replacement rate of fixtures, how residential or commercial future use is projected, and the percent of estimated real water losses.

Table C-1. List of Key Assumptions

Parameter	Model Input Value, Assumptions, and Key References				
Model Start Year for Analysis	2020				
Water Demand Factor Year (Base Year)	2019				
Population Projection Source	Plan Bay Area 2050				
Employment Projection Source	Plan Bay Area 2050				
Avoided Cost of Water	\$5,347/MG				
Potable Water System Base Year Water Use Profile					
Customer Categories	Start Year Accounts	Total Water Use Distribution	Demand Factors (gpd/account)	Indoor Use %	2019 Residential Indoor Water Use (GPCD)
Residential	74,129	45%	212	76%	51
Multifamily	4,274	19%	1,566	86%	47
Business	4,013	13%	1,123	84%	36
Industrial	1,190	6%	1,694	66%	29
Institutional and Other	736	4%	1,706	45%	N/A
Business Landscape	484	3%	2,099	0%	N/A
Multifamily Landscape	706	4%	2,144	0%	N/A
Industrial Landscape	354	2%	2,372	0%	N/A
Institutional and Other Landscape	992	3%	897	0%	N/A
Hydrant	393	0%	409	0%	N/A
Total/Avg	87,271	100%	N/A	68%	N/A

Table C-2. Key Assumptions Resources

Parameter	Resource
Residential End Uses	<p>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).</p> <p>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/assets/files/PERC%20Report_Final_Phase%20One_Nov%202011_v1.1.pdf</p> <p>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.</p>
Non-Residential End Uses, percent	<p>Key Reference: AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use).</p> <p>Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008.</p> <p>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.</p>
Efficiency Residential Fixture Current Installation Rates	<p>U.S. Census, housing age by type of dwelling plus natural replacement plus rebate program (if any).</p> <p>Key Reference: GMP Research, Inc. (2019). 2019 U.S. WaterSense Market Penetration Industry Report.</p> <p>Key Reference: Consortium for Efficient Energy (www.cee1.org).</p> <p>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures.</p>
Water Savings for Fixtures, gal/capita/day	<p>Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).</p> <p>Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study" (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses).</p> <p>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.</p> <p>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model.</p>
Non-Residential Fixture Efficiency Current Installation Rates	<p>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.</p> <p>California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.</p> <p>Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008.</p> <p>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures.</p>

Residential Frequency of Use Data, Toilets, Showers, Faucets, Washers, Uses/user/day	<p>Key Reference: AWWARF Report “Residential End Uses of Water, Version 2 - 4309” (DeOreo, 2016). Summary values can be found in the full report: https://www.waterrf.org/research/projects/residential-end-uses-water-version-2</p> <p>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.</p> <p>Key Reference: Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016.</p> <p>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.</p>
Non-Residential Frequency of Use Data, Toilets, Urinals, and Faucets, Uses/user/day	<p>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).</p> <p>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.</p> <p>Fixture uses over a 5-day work week are prorated to 7 days.</p> <p>Non-residential 0.5gpm 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, 2012. http://www.map-testing.com/assets/files/PERC%20Report_Final_Phase%20One_Nov%202011_v1.1.pdf</p> <p>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.</p>
Natural Replacement Rate of Fixtures (percent per year)	Residential Toilets 2%-4%
	Non-Residential Toilets 2%-3%
	Residential Showers 4% (corresponds to 25-year life of a new fixture)
	Residential Clothes Washers 10% (based on 10-year washer life).
	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). 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 2013.
	Model Input Value is found in the “Codes and Standards” green section on the “Fixtures” worksheet of the DSS Model.
Residential Future Water Use	Increases Based on Population Growth and Demographic Forecast
Non-Residential Future Water Use	Increases Based on Employment Growth and Demographic Forecast

C.3.1 Fixture Estimates

Determining the current level of efficient fixtures in a service area while evaluating the passive savings in the DSS Model is part of the standard process and is called “initial fixture proportions.” As described earlier in Section 3, MWM reconciled water-efficient fixtures and devices installed within the Alameda County Water District service area and estimated the number of outstanding inefficient fixtures.

MWM used the DSS Model to perform a saturation analysis for toilets, urinals, showerheads, faucets, and clothes washers. The process included a review of age of buildings from census data, number of rebates per device, and assumed natural replacement rates. MWM presumed the fixtures that were nearing saturation and worth analysis would include residential toilets and residential clothes washers, as both have been included in recommended water use efficiency practices for over two decades.

In 2014, the Water Research Foundation updated its 1999 Residential End Uses of Water Study (REUWS). Water utilities, industry regulators, and government planning agencies consider it the industry benchmark for single family home indoor water use. This Plan incorporates recent study results that reflect the change to the water use profile in residential homes including adoption of more water-efficient fixtures over the 15 years that transpired from 1999 to 2014. REUWS results were combined with ACWD historical rebate and billing data to enhance and verify assumptions made for all customer accounts, including saturation levels on the above-mentioned plumbing fixtures. A Community Survey that asked questions to reveal saturation levels of these same fixtures were incorporated into these estimations (see Appendix G).

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD’s service area. These proportions were calculated by:

- ◆ Using standards in place at the time of building construction,
- ◆ Taking the initial proportions of homes by age (corresponding to fixture efficiency levels),
- ◆ Adding the net change due to natural replacement,
- ◆ Adding the change due to rebate measure minus the “free rider effect,” and
- ◆ Adding information gained from ACWD’s Community Survey.

Further adjustments were made to initial proportions to account for the reduction in fixture use due to lower occupancy and based on field observations. The projected fixture proportions do **not** include any future active water use efficiency measures implemented by ACWD. More information about the development of initial and projected fixture proportions can be found in the DSS Model “Codes and Standards” section.

The DSS Model is capable of modeling multiple types of fixtures, including fixtures with different designs. For example, currently toilets can be purchased that flush at a rate of 0.8 gpf, 1.0 gpf or 1.28 gpf. The 1.6 gpf and higher 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 fixture replacement rates to determine what type of fixture should be used for a new construction installation or replacement. The replacement of the fixtures is listed as a percentage within the DSS Model. A value of 100% would indicate that all the toilets installed 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. All the Fixture Model information and assumptions were carefully reviewed and accepted by ACWD staff.

The DSS Model provides inputs and analysis of the number, type, and replacement rates of fixtures for each customer category (e.g., single family toilets, commercial toilets, residential clothes washing machines.). For example, the DSS Model incorporates the effects of the 1992 Federal Energy Policy Act and AB 715 on toilet fixtures. A DSS Model feature determines the “saturation” of 1.6 gpf toilets as the 1992 Federal Energy Policy Act was in effect from 1992-2014 for 1.6 gpf toilet replacements. AB 715 now applies for the replacement of toilets at 1.28 gpf. Further consideration and adjustments were made to replacement rates to account for the reduction in fixture use and wear, due to lower occupancy and based on field observations.

APPENDIX D – DSS MODEL MEASURE ANALYSIS, METHODOLOGY, PERSPECTIVES, AND ASSUMPTIONS

This appendix presents an overview of the water reduction methodology, benefit-cost perspectives, present value analysis, and costs and savings assumptions for the measure analysis.

D.1 Water Reduction Methodology

Each water use efficiency 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; and so forth. 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 water use efficiency 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 water use efficiency measure occupies the potential market. Essentially, the market penetration goal identifies how many fixtures, rebates, surveys, and so forth that ACWD would have to offer or conduct over time to reach its water savings goal for that water use efficiency measure. This is often expressed in terms of the number of fixtures, rebates, or surveys offered or conducted per year.

The potential for error in market penetration goal estimates for each measure can be significant because the estimates 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 reevaluation 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 different 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.

ACWD is constantly examining when a measure might reach saturation. This is also important for assessing demand response limitations in terms drought response. Baseline surveys are the best approach to having the most accurate information on market saturation.

D.2 Present Value Analysis and Perspectives on Benefits and Costs

The determination of the economic feasibility of water use efficiency strategies involves comparing the costs of the strategies to the benefits provided using the DSS Model, which calculates the cost effectiveness of water use efficiency 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.

Present value analysis using present day dollars and a real discount rate of 2.4% is used to discount costs and benefits to the base year. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in strategies, 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 strategy 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 strategies for utilities, 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 measures are considered, as well as benefits received in terms of reduced energy bills (from water heating costs) and wastewater savings (except for single-family residential as they are charged a flat amount regardless of water consumption), among others. Water bill savings are not a customer benefit in aggregate for reasons described previously. 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 over 30 years is often used because costs and benefits that occur beyond these 30 years (beyond the year 2050 in this Plan) 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) at the real interest rate of 2.4%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 5.47%) by the assumed rate of inflation (3.0%).

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.

D.3 Measure Cost and Water Savings Assumptions

Appendix E presents more detail on the assumptions and inputs used in ACWD’s DSS Model to evaluate each water use efficiency measure. Assumptions regarding the following variables 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, ACWD staff time, 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 most 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 water use efficiency team staff time, general expenses, and overhead, but does not include measure startup costs.

Costs are determined for each of the measures based on industry knowledge, past experience, and data provided by ACWD. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the cost to staff the measures and to obtain and maintain equipment. The set-up cost for measure design by staff or consultants, any required pilot testing, and preparation of materials that are used to market the measure are not included in the model because they vary greatly from measure to measure and are hard to capture. Measure costs are estimated each year through 2050. Costs are 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 water use efficiency measures evaluated herein generally take effect over a long span of time. This span is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations and savings on variable costs such as energy and chemicals.


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 for 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:

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

Data necessary to forecast water savings of measures include specifics 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 3 to 10 years after the start of implementation, depending upon the implementation schedule.

For every water use efficiency 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 water use efficiency measures stay in place and continue to save water. It is assumed that measures implemented because of codes, standards, or ordinances (e.g., toilets) 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 primarily behavior-based, such as residential surveys, are assumed to need to be repeated on an ongoing basis to retain the water savings (e.g., homeowners move away, and the new homeowners may have less efficient water using practices). Surveys typically have a measure life on the order of five years.

APPENDIX E – INDIVIDUAL WATER USE EFFICIENCY MEASURE DESIGN INPUTS AND RESULTS



Overview
Name: CII Water Survey
Abbr: 1
Category: Default
Measure Type: Standard Measure

Time Period
First Year: 2020
Last Year: 2050
Measure Length: 31

Measure Life
Permanent: ☐
Years: 10
Repeat: ☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUS	\$1,000.00	\$500.00	1
IND	\$1,000.00	\$500.00	1
OTHER	\$1,000.00	\$500.00	1

Administration Costs
Method: Percent
Markup Percentage: 15%

Description

Program provides free water surveys to CII customers to evaluate ways for the business to save water and money. The surveys may target large accounts (e.g., accounts that use more than 5,000 gallons of water per day) only such as hotels, restaurants, stores and schools. Emphasis may be on supporting the top 25 users for each individual water agency.

Customer Classes

	RES	MULT	BUS	IND	OTHER	BUSL	RELS	INDL	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses

	RES	MULT	BUS	IND	OTHER	BUSL	RELS	INDL	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

> Utility Costs: Survey cost is ~\$500-\$1,500 in-house staff or \$2,000-\$10,000 if contracted out. Utility cost is \$60 for fixtures + 2-3 hours staff time for survey. ~\$1000 AVERAGE [6 HRS for all aspects of a survey] per survey for Utility cost. Utility costs represent fixture giveaway number distributed and costs (1.5 spray valves \$50/ea., 5 aerators @ \$2/ea.). Approx. 1.5 nozzles can be found per CII account per Tso & Koeller 2005 report "Pre-rinse Spray Valve Programs: How are they really doing?"

> Customer Costs: reflects cost/time to install fixtures and address survey recommendations.

> End Use Water Saving: BAWSCA Phase 1 study on Making Conservation a California Way of Life found savings of 10-15% per site. Assume 15% per site and include giveaways. Giveaways assume 1.15 gpm pre-rinse spray valve replace 2.5 gpm, 0.5 gpm aerators replace 2.2 gpm in lavatories, and 1.8 gpm replace aerators replace 2.2 gpm in non-lavatory settings (kitchens, utility rooms, etc.). This is an indoor survey only. Irrigation and landscaping will not be evaluated as part of the survey. Cooling systems will be evaluated in surveys.

> Targets: Per ACWD's direction, target 0.22% accounts/year.

Results

Units	MG
Average Water Savings (mgd)	0.017700
Lifetime Savings - Present Value (\$)	
Utility	\$718,528
Community	\$1,542,562
Lifetime Costs - Present Value (\$)	
Utility	\$382,432
Community	\$548,707
Benefit to Cost Ratio	
Utility	1.88
Community	2.81
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$1,908

End Use Savings Per Replacement

Method:	Percent	% Savings/Acct	Avg GPD/Acct
BUS Toilets	15.0%	142.3	
IND Toilets	15.0%	159.6	
OTHER Toilets	15.0%	154.0	
BUS Urinals	15.0%	48.4	
IND Urinals	15.0%	44.6	
OTHER Urinals	15.0%	46.2	
BUS Lavatory Faucets	15.0%	36.1	
IND Lavatory Faucets	15.0%	32.4	
OTHER Lavatory Faucets	15.0%	66.5	
BUS Showers	15.0%	94.9	
IND Showers	15.0%	44.6	
OTHER Showers	15.0%	77.0	
BUS Dishwashers	15.0%	66.4	
IND Dishwashers	15.0%	55.8	
OTHER Dishwashers	15.0%	46.2	
BUS Clothes Washers	15.0%	151.8	
IND Clothes Washers	15.0%	89.3	
OTHER Clothes Washers	15.0%	107.8	
BUS Process	15.0%	132.8	
IND Process	15.0%	357.1	
BUS Kitchen Spray Rinse	15.0%	47.4	
OTHER Kitchen Spray Rinse	15.0%	38.5	
BUS Internal Leakage	15.0%	104.4	
IND Internal Leakage	15.0%	127.2	
OTHER Internal Leakage	15.0%	77.0	
BUS Other	15.0%	63.6	
IND Other	15.0%	125.0	
OTHER Other	15.0%	100.1	
BUS Non-Lavatory/Kitchen Faucets	15.0%	60.7	
IND Non-Lavatory/Kitchen Faucets	15.0%	80.3	
OTHER Non-Lavatory/Kitchen Faucets	15.0%	56.7	
OTHER Pools	15.0%	46.8	
BUS Cooling	15.0%	26.2	
IND Cooling	15.0%	115.5	
OTHER Cooling	15.0%	140.4	

Targets

Target Method:	Percentage
% of Accts Targeted/Yr	0.220%
Only Affects New Accts	<input type="checkbox"/>

Costs


View:	Summary	Utility	Customer	Total
2020		\$15,026	\$6,533	\$21,559
2021		\$15,111	\$6,570	\$21,681
2022		\$15,196	\$6,607	\$21,804
2023		\$15,281	\$6,644	\$21,925
2024		\$15,365	\$6,681	\$22,046
2025		\$15,449	\$6,717	\$22,166
2026		\$15,537	\$6,755	\$22,293
2027		\$15,626	\$6,794	\$22,419
2028		\$15,713	\$6,832	\$22,545
2029		\$15,801	\$6,870	\$22,671
2030		\$15,889	\$6,908	\$22,797
2031		\$15,995	\$6,955	\$22,950
2032		\$16,102	\$7,001	\$23,103
2033		\$16,209	\$7,047	\$23,256
2034		\$16,315	\$7,094	\$23,409
2035		\$16,422	\$7,140	\$23,562
2036		\$16,530	\$7,187	\$23,717
2037		\$16,638	\$7,234	\$23,871
2038		\$16,745	\$7,281	\$24,026
2039		\$16,853	\$7,327	\$24,181
2040		\$16,961	\$7,374	\$24,335
2041		\$18,083	\$7,862	\$25,946
2042		\$19,205	\$8,350	\$27,556
2043		\$20,328	\$8,838	\$29,166
2044		\$21,450	\$9,326	\$30,776
2045		\$22,572	\$9,814	\$32,386
2046		\$22,572	\$9,814	\$32,386
2047		\$22,572	\$9,814	\$32,386
2048		\$22,572	\$9,814	\$32,386
2049		\$22,572	\$9,814	\$32,386
2050		\$22,572	\$9,814	\$32,386

Targets

View	Accounts	BUS	IND	OTHER	Total
2020		9	3	2	13
2021		9	3	2	13
2022		9	3	2	13
2023		9	3	2	13
2024		9	2	2	13
2025		9	2	2	13
2026		9	2	2	14
2027		10	2	2	14
2028		10	2	2	14
2029		10	2	2	14
2030		10	2	2	14
2031		10	2	2	14
2032		10	2	2	14
2033		10	2	2	14
2034		10	2	2	14
2035		10	2	2	14
2036		10	2	2	14
2037		10	2	2	14
2038		10	2	2	15
2039		10	2	2	15
2040		11	2	2	15
2041		11	3	2	16
2042		12	3	2	17
2043		13	3	2	18
2044		14	3	2	19
2045		14	3	2	20
2046		14	3	2	20
2047		14	3	2	20
2048		14	3	2	20
2049		14	3	2	20
2050		14	3	2	20

Water Savings

Units	mgd
Total Savings (mgd)	
2020	0.001975
2021	0.003939
2022	0.005895
2023	0.007844
2024	0.009786
2025	0.011723
2026	0.013655
2027	0.015584
2028	0.017510
2029	0.019435
2030	0.019462
2031	0.019492
2032	0.019528
2033	0.019570
2034	0.019618
2035	0.019672
2036	0.019732
2037	0.019797
2038	0.019867
2039	0.019943
2040	0.020023
2041	0.020152
2042	0.020417
2043	0.020812
2044	0.021336
2045	0.021985
2046	0.022671
2047	0.023344
2048	0.024003
2049	0.024649
2050	0.025281



School Building Retrofit

Overview	
Name	School Building Retrofit
Abbr	3
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year 2020	Permanent <input checked="" type="checkbox"/>
Last Year 2028	
Measure Length 9	

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
OTHER	\$5,000.00	\$5,000.00	1

Administration Costs	
Method: Percent	
Markup Percentage	25%

Description
Program provides site audits and customized rebates for fixture replacements and irrigation upgrades at school sites. Eligible sites may include K-12 schools as well as colleges and universities.

Customer Classes											
	RES	MULT	BUS	IND	OTHER	BUSL	RELO	INDL	INSTL	FIRE	HYD
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

End Uses											
	RES	MULT	BUS	IND	OTHER	BUSL	RELO	INDL	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
External Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments
> Utility Costs - \$5,000 utility cost assumes replacement of high use toilets and some irrigation system improvement (where applicable).
> Admin Cost = 8 Hours (8*\$150 = \$1,200). 25% of \$5,000 = \$1,250.
Assume staff avg fully burdened Rate with fringe and overhead is \$150/hr., (ACWD Water Conservation Rate is \$55/hr. for base rate with fringe and overhead add 1.68%).
> Customer Costs - Assumes cost of installation and remainder of devices.
> End Use Water Savings - Savings similar to CII survey and incentive measures combined.
> Targets - Assumes 3% of institutional accounts targeted each year. Target the schools that do not have irrigation meters as they typically are not tracking landscape water use as closely with the mixed use meter data.

Results	
Units	MGD
Average Water Savings (mgd)	
0.044113	
Lifetime Savings - Present Value (\$)	
Utility	\$1,822,323
Community	\$2,806,516
Lifetime Costs - Present Value (\$)	
Utility	\$1,146,287
Community	\$2,063,317
Benefit to Cost Ratio	
Utility	1.59
Community	1.36
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$2,295


End Use Savings Per Replacement		
Method: Percent		
	% Savings/Acct	Avg GPD/Acct
OTHER Toilets	15.0%	154.0
OTHER Urinals	15.0%	46.2
OTHER Lavatory Faucets	15.0%	66.5
OTHER Showers	15.0%	77.0
OTHER Dishwashers	15.0%	46.2
OTHER Clothes Washers	15.0%	107.8
OTHER Kitchen Spray Rinse	15.0%	38.5
OTHER Internal Leakage	15.0%	77.0
OTHER Other	15.0%	100.1
OTHER Non-Lavatory/Kitchen	15.0%	56.7
OTHER Irrigation	15.0%	683.2
OTHER Pools	15.0%	46.8
OTHER External Leakage	15.0%	65.5
OTHER Cooling	15.0%	140.4

Targets	
Target Method: Percentage	
% of Accts Targeted/Yr	3.000%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View: Summary			
	Utility	Customer	Total
2020	\$138,000	\$110,400	\$248,400
2021	\$138,421	\$110,737	\$249,157
2022	\$138,841	\$111,073	\$249,915
2023	\$139,262	\$111,410	\$250,672
2024	\$139,683	\$111,746	\$251,429
2025	\$140,104	\$112,083	\$252,187
2026	\$140,525	\$112,419	\$252,944
2027	\$140,946	\$112,756	\$253,702
2028	\$141,367	\$113,092	\$254,459
2029	\$141,788	\$113,429	\$255,216
2030	\$142,209	\$113,765	\$255,973
2031	\$142,630	\$114,102	\$256,730
2032	\$143,051	\$114,438	\$257,487
2033	\$143,472	\$114,775	\$258,244
2034	\$143,893	\$115,111	\$259,001
2035	\$144,314	\$115,448	\$259,758
2036	\$144,735	\$115,784	\$260,515
2037	\$145,156	\$116,121	\$261,272
2038	\$145,577	\$116,457	\$262,029
2039	\$146,000	\$116,794	\$262,786
2040	\$146,421	\$117,130	\$263,543
2041	\$146,842	\$117,467	\$264,300
2042	\$147,263	\$117,803	\$265,057
2043	\$147,684	\$118,140	\$265,814
2044	\$148,105	\$118,476	\$266,571
2045	\$148,526	\$118,813	\$267,328
2046	\$148,947	\$119,149	\$268,085
2047	\$149,368	\$119,486	\$268,842
2048	\$149,789	\$119,822	\$269,599
2049	\$150,210	\$120,159	\$270,356
2050	\$150,631	\$120,495	\$271,113

Targets		
View	Accounts	Total
	OTHER	
2020	22	22
2021	22	22
2022	22	22
2023	22	22
2024	22	22
2025	22	22
2026	23	23
2027	23	23
2028	23	23
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0
2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.005558
2021	0.011133
2022	0.016725
2023	0.022334
2024	0.027960
2025	0.033603
2026	0.039273
2027	0.044970
2028	0.050693
2029	0.050693
2030	0.050693
2031	0.050693
2032	0.050693
2033	0.050693
2034	0.050693
2035	0.050693
2036	0.050693
2037	0.050693
2038	0.050693
2039	0.050693
2040	0.050693
2041	0.050693
2042	0.050693
2043	0.050693
2044	0.050693
2045	0.050693
2046	0.050693
2047	0.050693
2048	0.050693
2049	0.050693
2050	0.050693



Ultra-High Efficiency Toilet Incentive

Overview	
Name	Ultra-High Efficiency Toilet Incentive
Abbr	4
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year: 2020	Permanent <input checked="" type="checkbox"/>
Last Year: 2023	
Measure Length: 4	

Fixture Cost per Device			
Utility	Customer	Fix/Acct	
MULTI	\$70.00	\$230.00	25
BUS	\$150.00	\$250.00	4
IND	\$150.00	\$250.00	4
OTHER	\$150.00	\$250.00	4

Administration Costs	
Method: Percent	
Markup Percentage	25%

Description

This measure provides an incentive for the installation of an ultra-high efficiency toilet (UHET). Toilets flushing 1.1 gpf or less to replace toilets flushing at 1.6 gpf or higher.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLD	PRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urinals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lavatory Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kitchen Spray Rinse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses	
	RES
Toilets	<input checked="" type="checkbox"/>
Urinals	<input type="checkbox"/>
Lavatory Faucets	<input type="checkbox"/>
Showers	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>
Process	<input type="checkbox"/>
Kitchen Spray Rinse	<input type="checkbox"/>
Internal Leakage	<input type="checkbox"/>
Baths	<input type="checkbox"/>
Other	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>
Pools	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>
Cooling	<input type="checkbox"/>

Comments

> Utility Cost - Rebate amount reflects the incremental purchase cost. In Feb 2020, ACWD offers a case by case UHET toilet incentive for MF sites which is approximately \$70 per toilet replaced. In Feb 2020, ACWD offers a \$150 rebate for each high use, high volume commercial toilet replaced with a UHET at service area businesses and organizations. Sites must be pre-qualified through our survey program. www.acwd.org/145/Rebates

> Customer Cost - Customer cost reflects the remaining fixture and installation costs.

> Admin Cost - About 3 hours, based on a typical multifamily site, assuming 25 fixtures per account to cover pre- and post- inspection time + reporting and documentation.

> End Use Water Savings - Savings estimates assume the difference between 0.8gpf and 1.6 gpf or 50% savings on average.

> Targets - Target considers the 2019 Probolsky Community Survey reported ~34% of surveyed participants interested in replacing high water using toilets. Assumed could do a maximum of 40 MF accounts per year (which equates to approximately 5 sites per year. There are multiple accounts (meters) per site). Assumed less sites to be conservative.

> Measure implementation period is based on the current and anticipated changes in plumbing codes that would negate the need for this fixture rebates. Ending this measure avoids free-ridership.

Results	
Units	MG
Average Water Savings (mgd)	0.015656
Lifetime Savings - Present Value (\$)	
Utility	\$680,610
Community	\$680,610
Lifetime Costs - Present Value (\$)	
Utility	\$269,606
Community	\$865,960
Benefit to Cost Ratio	
Utility	2.52
Community	0.79
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$1,521


End Use Savings Per Replacement		
Method: Percent		
	% Savings/Account	Avg GPD/Account
MULTI Toilets	50.0%	266.6
BUS Toilets	50.0%	142.3
IND Toilets	50.0%	159.6
OTHER Toilets	50.0%	154.0

Targets	
Target Method: Percentage	
% of Accounts Targeted/Yr	0.500%
Only Affects New Accounts	<input type="checkbox"/>

Costs			
View: Summary			
	Utility	Customer	Total
2020	\$69,018	\$152,573	\$221,591
2021	\$69,561	\$153,836	\$223,397
2022	\$70,104	\$155,098	\$225,202
2023	\$70,645	\$156,359	\$227,005
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
2036	\$0	\$0	\$0
2037	\$0	\$0	\$0
2038	\$0	\$0	\$0
2039	\$0	\$0	\$0
2040	\$0	\$0	\$0
2041	\$0	\$0	\$0
2042	\$0	\$0	\$0
2043	\$0	\$0	\$0
2044	\$0	\$0	\$0
2045	\$0	\$0	\$0
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets					
View	Accounts				
	MULTI	BUS	IND	OTHER	Total
2020	21	20	6	4	51
2021	22	20	6	4	51
2022	22	21	6	4	52
2023	22	21	6	4	52
2024	0	0	0	0	0
2025	0	0	0	0	0
2026	0	0	0	0	0
2027	0	0	0	0	0
2028	0	0	0	0	0
2029	0	0	0	0	0
2030	0	0	0	0	0
2031	0	0	0	0	0
2032	0	0	0	0	0
2033	0	0	0	0	0
2034	0	0	0	0	0
2035	0	0	0	0	0
2036	0	0	0	0	0
2037	0	0	0	0	0
2038	0	0	0	0	0
2039	0	0	0	0	0
2040	0	0	0	0	0
2041	0	0	0	0	0
2042	0	0	0	0	0
2043	0	0	0	0	0
2044	0	0	0	0	0
2045	0	0	0	0	0
2046	0	0	0	0	0
2047	0	0	0	0	0
2048	0	0	0	0	0
2049	0	0	0	0	0
2050	0	0	0	0	0

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.004953
2021	0.009797
2022	0.014539
2023	0.019188
2024	0.018931
2025	0.018685
2026	0.018433
2027	0.018192
2028	0.017959
2029	0.017736
2030	0.017520
2031	0.017308
2032	0.017105
2033	0.016909
2034	0.016721
2035	0.016540
2036	0.016365
2037	0.016197
2038	0.016035
2039	0.015880
2040	0.015729
2041	0.015572
2042	0.015406
2043	0.015245
2044	0.015085
2045	0.014925
2046	0.014765
2047	0.014605
2048	0.014445
2049	0.014285
2050	0.014125



Plumber Initiated Ultra High Efficiency Toilet and/or Urinal Retrofit Program

Overview	
Name	Plumber Initiated Ultra High Efficiency
Abbr	5
Category	Default
Measure Type	Standard Measure

Time Period	
First Year	2023
Last Year	2029
Measure Length	7

Measure Life	
Permanent	<input checked="" type="checkbox"/>

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$350.00	\$25.00	1
MULTI	\$350.00	\$25.00	25

Administration Costs	
Method:	Percent
Markup Percentage	15%

Description
Utility would subsidize installation cost of a new HET/ urinals purchased in bulk 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, California program that replaced over 5,000 toilets in several communities in about six months.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLL	FIRE	HYD
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses											
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lavatory/Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kitchen Spray/Rinse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments
> Utility Cost: Covers cost of toilets and urinals purchased in bulk and the cost of the plumber to install toilets.
> Customer Cost: Minimal customer cost
> End Use Water Savings: Savings estimates assume the difference between 0.8 gpf and 1.6 gpf or 50% savings on average.
> Targets: Assumes 0.25% of accounts targeted per year

Results		
Units	MG	
Average Water Savings (mgd)		
		0.018074
Lifetime Savings - Present Value (\$)		
Utility		\$735,289
Community		\$735,289
Lifetime Costs - Present Value (\$)		
Utility		\$1,146,038
Community		\$1,217,220
Benefit to Cost Ratio		
Utility		0.64
Community		0.60
Cost of Savings per Unit Volume (\$/mg)		
Utility		\$5,600


End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
RES Toilets	50.0%	26.3
MULTI Toilets	50.0%	266.6

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.250%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$184,982	\$11,490	\$196,472
2024	\$185,940	\$11,549	\$197,489
2025	\$186,897	\$11,609	\$198,505
2026	\$188,412	\$11,703	\$200,114
2027	\$189,927	\$11,797	\$201,724
2028	\$191,442	\$11,891	\$203,333
2029	\$192,957	\$11,985	\$204,942
2030	\$0	\$0	\$0
2031	\$0	\$0	\$0
2032	\$0	\$0	\$0
2033	\$0	\$0	\$0
2034	\$0	\$0	\$0
2035	\$0	\$0	\$0
2036	\$0	\$0	\$0
2037	\$0	\$0	\$0
2038	\$0	\$0	\$0
2039	\$0	\$0	\$0
2040	\$0	\$0	\$0
2041	\$0	\$0	\$0
2042	\$0	\$0	\$0
2043	\$0	\$0	\$0
2044	\$0	\$0	\$0
2045	\$0	\$0	\$0
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets			
View	Accounts		
	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	185	11	196
2024	185	11	196
2025	185	11	196
2026	185	11	197
2027	185	11	197
2028	185	12	197
2029	185	12	197
2030	0	0	0
2031	0	0	0
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	0	0	0
2036	0	0	0
2037	0	0	0
2038	0	0	0
2039	0	0	0
2040	0	0	0
2041	0	0	0
2042	0	0	0
2043	0	0	0
2044	0	0	0
2045	0	0	0
2046	0	0	0
2047	0	0	0
2048	0	0	0
2049	0	0	0
2050	0	0	0

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.003690
2024	0.007303
2025	0.010843
2026	0.014314
2027	0.017723
2028	0.021074
2029	0.024369
2030	0.024104
2031	0.023849
2032	0.023604
2033	0.023368
2034	0.023141
2035	0.022922
2036	0.022711
2037	0.022507
2038	0.022311
2039	0.022121
2040	0.021939
2041	0.021674
2042	0.021434
2043	0.021213
2044	0.021008
2045	0.020818
2046	0.020691
2047	0.020568
2048	0.020448
2049	0.020331
2050	0.020217



Residential Outdoor Water Surveys

Overview

Name: Residential Outdoor Water Surveys
Abbri: 6
Category: Default
Measure Type: Standard Measure

Time Period

First Year: 2023
Last Year: 2050
Measure Length: 28

Measure Life

Permanent: ☐
Years: 10
Repeat: ☐

Fixture Cost per Device

	Utility	Customer	FixAcct
RES	\$384.00	\$50.00	1

Administration Costs

Method: Percent
Markup Percentage: 25%

Description

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. Residential customers would be eligible for free landscape water surveys upon request. Typically during the surveys, the surveyor will check for leaks, provide direction on appropriate irrigation scheduling, demonstrate how to set irrigation controllers, provide guidance on plant selection and offer additional ways to increase outdoor efficiencies (car washing, pool covers, mulch etc.). Low-cost, general-use, outdoor efficiency fixtures assumed to be handed out during the survey as needed.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLT	RELD	INDL	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>										
Urinals	<input type="checkbox"/>										
Lavatory/Faucets	<input type="checkbox"/>										
Showers	<input type="checkbox"/>										
Dishwashers	<input type="checkbox"/>										
Clothes Washers	<input type="checkbox"/>										
Process	<input type="checkbox"/>										
Kitchen Spray Rinse	<input type="checkbox"/>										
Internal Leakage	<input type="checkbox"/>										
Baths	<input type="checkbox"/>										
Other	<input type="checkbox"/>										
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>										
Irrigation	<input checked="" type="checkbox"/>										
Pools	<input type="checkbox"/>										
Wash Down	<input checked="" type="checkbox"/>										
Car Washing	<input checked="" type="checkbox"/>										
External Leakage	<input checked="" type="checkbox"/>										
Outdoor	<input type="checkbox"/>										
Cooling	<input type="checkbox"/>										

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLT	RELD	INDL	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>										
Urinals	<input type="checkbox"/>										
Lavatory/Faucets	<input type="checkbox"/>										
Showers	<input type="checkbox"/>										
Dishwashers	<input type="checkbox"/>										
Clothes Washers	<input type="checkbox"/>										
Process	<input type="checkbox"/>										
Kitchen Spray Rinse	<input type="checkbox"/>										
Internal Leakage	<input type="checkbox"/>										
Baths	<input type="checkbox"/>										
Other	<input type="checkbox"/>										
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>										
Irrigation	<input checked="" type="checkbox"/>										
Pools	<input type="checkbox"/>										
Wash Down	<input checked="" type="checkbox"/>										
Car Washing	<input checked="" type="checkbox"/>										
External Leakage	<input checked="" type="checkbox"/>										
Outdoor	<input type="checkbox"/>										
Cooling	<input type="checkbox"/>										

Comments

> Utility Costs - Time estimates includes field time, drive time, scheduling, and data entry. Assume staff avg fully burdened Rate with fringe and overhead is \$150/hr., (ACWD Water Conservation Rate is \$55/hr. for base rate with fringe and overhead add 1.68%). Utility fixture costs assume all surveyed accounts receive a kit with \$9 of supplies including a rain gauge, an auto shut-off hose nozzle, and a soil moisture sensor. Utility Cost = ((150*2.5 hours per survey) + (\$9 supplies))=\$384* 25% admin markup.

> Customer Costs - Assumed costs to fix discovered leaks.

> Administration Costs - Based on Big Bear, CA program, administration time assumes 75 min/audit (primarily 70% staff, 30% supervisor).

> End Use Water Savings - Savings based off of California Urban Water Agencies water Savings Study (4/13/15); Outdoor Residential Water Surveys saved on average 21 gpd per audit. Assumed 10% savings on outdoor end uses and 5% selected on pools to be conservative which total up to an approximate average savings of 21 gpd per residential audit.

> Targets - WCWDB FY16/17 & FY17/18 ~11 BAWSCA agencies reported. 0.8% SF survey participation.

Results

Units: MG
Average Water Savings (mgd)
0.094407
Lifetime Savings - Present Value (\$)
Utility: \$3,732,798
Community: \$3,732,798
Lifetime Costs - Present Value (\$)
Utility: \$5,490,246
Community: \$6,062,147
Benefit to Cost Ratio
Utility: 0.68
Community: 0.62
Cost of Savings per Unit Volume (\$/mg)
Utility: \$5,136

End Use Savings Per Replacement

Method: Fixed

	Savings GPD/Acct	Avg GPD/Acct
RES Irrigation	18.0	42.0
RES Wash Down	0.5	2.0
RES Car Washing	0.5	2.0
RES External Leakage	2.0	3.5

Targets

Target Method: Percentage
% of Accts Targeted/Yr: 0.800%
Only Affects New Accts: ☐

Costs

View: Summary

	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$284,655	\$29,652	\$314,307
2024	\$284,655	\$29,652	\$314,307
2025	\$284,655	\$29,652	\$314,307
2026	\$284,655	\$29,652	\$314,307
2027	\$284,655	\$29,652	\$314,307
2028	\$284,655	\$29,652	\$314,307
2029	\$284,655	\$29,652	\$314,307
2030	\$284,655	\$29,652	\$314,307
2031	\$284,655	\$29,652	\$314,307
2032	\$284,655	\$29,652	\$314,307
2033	\$284,655	\$29,652	\$314,307
2034	\$284,655	\$29,652	\$314,307
2035	\$284,655	\$29,652	\$314,307
2036	\$284,655	\$29,652	\$314,307
2037	\$284,655	\$29,652	\$314,307
2038	\$284,655	\$29,652	\$314,307
2039	\$284,655	\$29,652	\$314,307
2040	\$284,655	\$29,652	\$314,307
2041	\$284,655	\$29,652	\$314,307
2042	\$284,655	\$29,652	\$314,307
2043	\$284,655	\$29,652	\$314,307
2044	\$284,655	\$29,652	\$314,307
2045	\$284,655	\$29,652	\$314,307
2046	\$284,655	\$29,652	\$314,307
2047	\$284,655	\$29,652	\$314,307
2048	\$284,655	\$29,652	\$314,307
2049	\$284,655	\$29,652	\$314,307
2050	\$284,655	\$29,652	\$314,307

Targets


View: Accounts

	RES	Total
2020	0	0
2021	0	0
2022	0	0
2023	593	593
2024	593	593
2025	593	593
2026	593	593
2027	593	593
2028	593	593
2029	593	593
2030	593	593
2031	593	593
2032	593	593
2033	593	593
2034	593	593
2035	593	593
2036	593	593
2037	593	593
2038	593	593
2039	593	593
2040	593	593
2041	593	593
2042	593	593
2043	593	593
2044	593	593
2045	593	593
2046	593	593
2047	593	593
2048	593	593
2049	593	593
2050	593	593

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.012454
2024	0.024907
2025	0.037361
2026	0.049815
2027	0.062268
2028	0.074722
2029	0.087176
2030	0.099629
2031	0.112083
2032	0.124537
2033	0.124537
2034	0.124537
2035	0.124537
2036	0.124537
2037	0.124537
2038	0.124537
2039	0.124537
2040	0.124537
2041	0.124537
2042	0.124537
2043	0.124537
2044	0.124537
2045	0.124537
2046	0.124537
2047	0.124537
2048	0.124537
2049	0.124537
2050	0.124537



Overview

Name: Large Landscape Outdoor Water Surveys

Abbr: 7

Category: Default

Measure Type: Standard Measure

Time Period

First Year: 2020

Last Year: 2050

Measure Length: 31

Measure Life

Permanent: ☐

Years: 10

Repeat: ☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUSLDS	\$1,500.00	\$1,000.00	1
RELDS	\$1,500.00	\$500.00	1
INDLDS	\$1,500.00	\$1,000.00	1
INSTLDS	\$1,500.00	\$1,000.00	1

Administration Costs

Method: Percent

Markup Percentage: 25%

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

	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	FIRE	HYD
Toilets											
Urinals											
Lavatory/Fountains											
Showers											
Dishwashers											
Clothes Washers											
Pools											
Kitchen Sponges/Rinses											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Fountains											
Irrigation											
Ponds											
Wash Down											
Car Washing											
External Leakage											
Outdoor											
Cooling											

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	FIRE	HYD
Toilets											
Urinals											
Lavatory/Fountains											
Showers											
Dishwashers											
Clothes Washers											
Pools											
Kitchen Sponges/Rinses											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Fountains											
Irrigation											
Ponds											
Wash Down											
Car Washing											
External Leakage											
Outdoor											
Cooling											

Results

Units: MGD

Average Water Savings (mgd): 0.078776

Lifetime Savings - Present Value (\$):

Utility: \$3,178,530

Community: \$3,178,530

Lifetime Costs - Present Value (\$):

Utility: \$1,196,179

Community: \$1,737,943

Benefit to Cost Ratio:

Utility: 2.66

Community: 1.83

Cost of Savings per Unit Volume (\$/mg):

Utility: \$1,341

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUSLDS Irrigation	20.0%	1,994.2
RELDS Irrigation	20.0%	2,036.9
INDLDS Irrigation	20.0%	2,253.5
INSTLDS Irrigation	20.0%	852.6
BUSLDS External Leakage	10.0%	105.0
RELDS External Leakage	10.0%	107.2
INDLDS External Leakage	10.0%	118.6
INSTLDS External Leakage	10.0%	44.9

Comments

> Utility Costs - Assumes all large landscape accounts can apply. Assume 3 acres cost \$500/Acre, \$1,500 per site.

> Customer Costs - Assumes cost to review/update controller programming or fix minor leaks to align water use to an appropriate level for the amount and type of landscaping at the site.

> Admin 2.5 Hours

> End Use Water Savings - Savings based off of California Urban Water Agencies water savings study (4/13/15) of 326 gpa, average of 15% for CII landscape accounts; distributed between irrigation and external leakage. The actual savings for the DSS Model is directly tied to service area irrigation characteristics for COM or IRR accounts based on billing categories and will vary by service area. The actual water savings of 20% of irrigation and 10% of leakage is conservative but yields representative end use water savings for this measure.

> Targets - Customer participation based on BAWSCA Water Conservation Data Base measure record.

Targets

Target Method: Percentage

% of Accts Targeted/Yr: 1.000%

Only Affects New Accts: ☐

Costs

View: Summary

	Utility	Customer	Total
2020	\$47,550	\$21,830	\$69,380
2021	\$47,745	\$21,903	\$69,648
2022	\$47,942	\$21,976	\$69,918
2023	\$48,139	\$22,050	\$70,190
2024	\$48,338	\$22,125	\$70,462
2025	\$48,537	\$22,199	\$70,737
2026	\$48,852	\$22,318	\$71,170
2027	\$49,168	\$22,436	\$71,604
2028	\$49,484	\$22,555	\$72,038
2029	\$49,800	\$22,674	\$72,474
2030	\$50,117	\$22,793	\$72,910
2031	\$50,434	\$22,912	\$73,346
2032	\$50,751	\$23,031	\$73,782
2033	\$51,068	\$23,150	\$74,218
2034	\$51,385	\$23,269	\$74,654
2035	\$51,702	\$23,388	\$75,090
2036	\$52,019	\$23,507	\$75,526
2037	\$52,336	\$23,626	\$75,962
2038	\$52,653	\$23,745	\$76,398
2039	\$52,970	\$23,864	\$76,834
2040	\$53,287	\$23,983	\$77,270
2041	\$53,604	\$24,102	\$77,706
2042	\$53,921	\$24,221	\$78,142
2043	\$54,238	\$24,340	\$78,578
2044	\$54,555	\$24,459	\$79,014
2045	\$54,872	\$24,578	\$79,450
2046	\$55,189	\$24,697	\$79,886
2047	\$55,506	\$24,816	\$80,322
2048	\$55,823	\$24,935	\$80,758
2049	\$56,140	\$25,054	\$81,194
2050	\$56,457	\$25,173	\$81,630

Targets


View: Accounts

	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	5	7	4	10	25
2021	5	7	3	10	25
2022	5	7	3	10	26
2023	5	7	3	10	26
2024	5	7	3	10	26
2025	5	7	3	10	26
2026	5	7	3	10	26
2027	5	8	3	10	26
2028	5	8	3	10	26
2029	5	8	3	10	27
2030	5	8	3	10	27
2031	5	8	3	10	27
2032	5	8	3	10	27
2033	5	8	3	10	27
2034	6	8	3	10	27
2035	6	8	3	11	28
2036	6	8	3	11	28
2037	6	9	3	11	28
2038	6	9	3	11	28
2039	6	9	3	11	28
2040	6	9	3	11	29
2041	6	9	4	11	30
2042	7	10	4	11	32
2043	7	11	4	12	33
2044	7	11	4	12	35
2045	8	12	5	12	37
2046	8	12	5	12	37
2047	8	12	5	12	37
2048	8	12	5	12	37
2049	8	12	5	12	37
2050	8	12	5	12	37

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.008172
2021	0.016377
2022	0.024615
2023	0.032887
2024	0.041193
2025	0.049534
2026	0.057930
2027	0.066383
2028	0.074891
2029	0.083456
2030	0.083906
2031	0.084390
2032	0.084910
2033	0.085465
2034	0.086050
2035	0.086671
2036	0.087306
2037	0.087957
2038	0.088621
2039	0.089301
2040	0.089994
2041	0.091209
2042	0.092945
2043	0.095203
2044	0.097981
2045	0.101281
2046	0.104510
2047	0.107669
2048	0.110756
2049	0.113773
2050	0.116719



Large Landscape (Waterfluence) Program

Overview	
Name	Large Landscape (Waterfluence) Program
Abbr	8
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year 2020	Permanent <input type="checkbox"/>
Last Year 2039	Years 5
Measure Length 20	Repeat <input type="checkbox"/>

Fixture Cost per Device			
Utility	Customer	Fix/Acct	
BUSLDS	\$22.00	\$0.00	1
RELDS	\$22.00	\$0.00	1
INDLDS	\$22.00	\$0.00	1
INSTLDS	\$22.00	\$0.00	1

Administration Costs	
Method: Percent	
Markup Percentage	25%

Description

Website provides feedback on irrigation water use (budget vs. actual). Current Water Fluence Program.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	PRE	HYD
Toilets											
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation											
Pools											
Wash Down											
Car Washing											
External Leakage											
Outdoor											
Cooling											

End Uses	
	RES
Toilets	
Urinals	
Lavatory Faucets	
Showers	
Dishwashers	
Clothes Washers	
Process	
Kitchen Spray Rinse	
Internal Leakage	
Baths	
Other	
Non-Lavatory/Kitchen Faucets	
Irrigation	
Pools	
Wash Down	
Car Washing	
External Leakage	
Outdoor	
Cooling	

Comments

> Utility Costs - Per ACWD's direction, Utility cost is \$22/ customer class to reach a total utility cost of ~\$60k/year. Staff worked this into the annual Water Fluence costs.

> Administrative Costs - represents staff time and an annual service fee to administer the program.

> Customer Costs - No cost to customers as these are mostly adjustments to existing controller programming or change in landscape maintenance practices.

> End Use Water Savings - Savings is estimated based on past experience with other utilities. Also accounts for behavior and watering schedule changes. 1.5% savings per year spread over 20 years, for a total savings of 30% over 20 years, split between irrigation and external leakage.

> Targets - Per ACWD's direction, targeting 85% of accounts per year.

Results		
Units	MG	
Average Water Savings (mgd)		0.118422
Lifetime Savings - Present Value (\$)		
Utility		\$5,484,743
Community		\$5,484,743
Lifetime Costs - Present Value (\$)		
Utility		\$1,002,658
Community		\$1,002,658
Benefit to Cost Ratio		
Utility		5.47
Community		5.47
Cost of Savings per Unit Volume (\$/mg)		
Utility		\$748


End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GP D/Acct
BUSLDS Irrigation	1.0%	1,994.2
RELDS Irrigation	1.0%	2,036.9
INDLDS Irrigation	1.0%	2,253.5
INSTLDS Irrigation	1.0%	852.6
BUSLDS External Leakage	0.5%	105.0
RELDS External Leakage	0.5%	107.2
INDLDS External Leakage	0.5%	118.6
INSTLDS External Leakage	0.5%	44.9

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	85.000%
Only Affects New Accts	<input type="checkbox"/>

Costs			
Year	Utility	Customer	Total
2020	\$59,279	\$0	\$59,279
2021	\$59,523	\$0	\$59,523
2022	\$59,768	\$0	\$59,768
2023	\$60,014	\$0	\$60,014
2024	\$60,261	\$0	\$60,261
2025	\$60,510	\$0	\$60,510
2026	\$60,902	\$0	\$60,902
2027	\$61,296	\$0	\$61,296
2028	\$61,690	\$0	\$61,690
2029	\$62,084	\$0	\$62,084
2030	\$62,479	\$0	\$62,479
2031	\$62,924	\$0	\$62,924
2032	\$63,370	\$0	\$63,370
2033	\$63,815	\$0	\$63,815
2034	\$64,260	\$0	\$64,260
2035	\$64,706	\$0	\$64,706
2036	\$65,164	\$0	\$65,164
2037	\$65,622	\$0	\$65,622
2038	\$66,081	\$0	\$66,081
2039	\$66,539	\$0	\$66,539
2040	\$0	\$0	\$0
2041	\$0	\$0	\$0
2042	\$0	\$0	\$0
2043	\$0	\$0	\$0
2044	\$0	\$0	\$0
2045	\$0	\$0	\$0
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets					
Year	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	411	600	301	843	2,156
2021	416	605	297	848	2,164
2022	421	611	293	848	2,173
2023	426	616	290	851	2,182
2024	430	621	286	853	2,191
2025	435	627	283	856	2,200
2026	439	635	280	860	2,215
2027	443	644	278	864	2,229
2028	447	652	275	868	2,243
2029	451	661	273	872	2,258
2030	456	669	271	876	2,272
2031	459	677	272	880	2,288
2032	463	685	273	884	2,304
2033	466	693	274	888	2,321
2034	470	700	275	891	2,337
2035	473	708	276	895	2,353
2036	477	716	278	899	2,370
2037	480	724	280	903	2,386
2038	483	732	282	906	2,403
2039	486	739	284	910	2,420
2040	0	0	0	0	0
2041	0	0	0	0	0
2042	0	0	0	0	0
2043	0	0	0	0	0
2044	0	0	0	0	0
2045	0	0	0	0	0
2046	0	0	0	0	0
2047	0	0	0	0	0
2048	0	0	0	0	0
2049	0	0	0	0	0
2050	0	0	0	0	0

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.034730
2021	0.069601
2022	0.104614
2023	0.139770
2024	0.175072
2025	0.175788
2026	0.176602
2027	0.177512
2028	0.178517
2029	0.179617
2030	0.180812
2031	0.182057
2032	0.183354
2033	0.184699
2034	0.186094
2035	0.187538
2036	0.188994
2037	0.190462
2038	0.191942
2039	0.193434
2040	0.155349
2041	0.116963
2042	0.078276
2043	0.039289
2044	0.000000
2045	0.000000
2046	0.000000
2047	0.000000
2048	0.000000
2049	0.000000
2050	0.000000



Water Efficient Landscape Rebate Program

Overview

Name: Water Efficient Landscape Rebate Program

Abbr: 9

Category: Default

Measure Type: Standard Measure

Time Period

First Year: 2020

Last Year: 2050

Measure Length: 31

Measure Life

Permanent: ☐

Years: 20

Repeat: ☐

Fixture Cost per Device

	Utility	Customer	FixAcct
RES	\$850.00	\$2,000.00	1
MULTI	\$2,500.00	\$20,000.00	1
BUSLDS	\$2,500.00	\$20,000.00	1
RELDS	\$2,500.00	\$20,000.00	1
INDLDS	\$2,500.00	\$20,000.00	1
INSTLDS	\$2,500.00	\$20,000.00	1

Administration Costs

Method: Percent

Markup Percentage: 35%

Description

Provide a per square foot incentive for to remove turf and replace with low water use plants or permeable hardscape. Landscape conversion includes conversion of turf to lower-water-using turf varieties. Rebate based on dollars per square foot removed, and capped at an upper limit for single family residence, multifamily residence and/or commercial account.

Customer Classes

	RES	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	PF	IF	IFWD
Tollets									
Urinals									
Luxury Faucets									
Showers									
Dishwashers									
Clothes Washers									
Process									
Kitchen Spray Rinse									
Internal Leakage									
Baths									
Other									
Non-Leakery/Other Faucets									
Irrigation									
Pools									
Wash Down									
Car Washing									
External Leakage									
Outdoor									
Cooling									

End Uses

	RES	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	PF	IF	IFWD
Tollets									
Urinals									
Luxury Faucets									
Showers									
Dishwashers									
Clothes Washers									
Process									
Kitchen Spray Rinse									
Internal Leakage									
Baths									
Other									
Non-Leakery/Other Faucets									
Irrigation									
Pools									
Wash Down									
Car Washing									
External Leakage									
Outdoor									
Cooling									

Comments

> Utility Costs - Assume rebate of \$1/sq. foot of turf removed which equates to approximately 25% of total project cost. Assume MF/CII costs of \$2,500 and SF costs of \$850. Assume large sites have more than one meter. Therefore large sites can qualify for multiple rebates to make it a worthwhile effort with a higher total site incentive value.

> Customer Cost - Per 2013 BAWSCA effort MF/CII costs of \$20,000/customer and SF cost of \$2,000/customer.

> End Use Water Savings - Water savings based on ACWD landscape study. ACWD conducted a study that indicated a 60% reduction off irrigation uses could be attributed to Water Efficient Landscape Rebates. This appears to be a conservative number based on analysis of past participants. ACWD studied 151 residential sites between 2013 and 2019, and the savings was 32 gallons per day for participants when adjusted for drought response.

> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 0.13%.

> 15 BAWSCA agencies reported. Includes SF, MF and CII customer categories combined.

Results

Units: mgd

Average Water Savings (mgd): 0.069964

Lifetime Savings - Present Value (\$): \$3,502,367

Utility: \$3,502,367

Community: \$3,502,367

Lifetime Costs - Present Value (\$): \$3,247,800

Utility: \$3,247,800

Community: \$3,247,800

Benefit to Cost Ratio: 1.08

Utility: 1.08

Community: 0.29

Cost of Savings per Unit Volume (\$/mg): \$3.188

Utility: \$3.188

End Use Savings Per Replacement

Method	Percent	% Savings/Act	Avg GPD/Act
RES Irrigation	60.0%		42.0
MULTI Irrigation	60.0%		182.6
BUSLDS Irrigation	60.0%		1,994.2
RELDS Irrigation	60.0%		2,036.9
INDLDS Irrigation	60.0%		2,253.5
INSTLDS Irrigation	60.0%		852.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr: 0.130%

Only Affects New Accts: ☐

Costs

Year	Utility	Customer	Total
2020	\$140,461	\$369,795	\$510,256
2021	\$140,674	\$371,056	\$511,729
2022	\$140,886	\$372,318	\$513,204
2023	\$141,100	\$373,581	\$514,681
2024	\$141,313	\$374,846	\$516,159
2025	\$141,527	\$376,112	\$517,639
2026	\$141,868	\$378,114	\$519,979
2027	\$142,209	\$380,118	\$522,320
2028	\$142,541	\$382,121	\$524,662
2029	\$142,879	\$384,126	\$527,005
2030	\$143,217	\$386,131	\$529,348
2031	\$143,546	\$388,076	\$531,622
2032	\$143,874	\$390,021	\$533,895
2033	\$144,202	\$391,966	\$536,168
2034	\$144,530	\$393,911	\$538,442
2035	\$144,859	\$395,856	\$540,715
2036	\$145,187	\$397,803	\$542,991
2037	\$145,516	\$399,751	\$545,266
2038	\$145,844	\$401,698	\$547,542
2039	\$146,173	\$403,645	\$549,818
2040	\$146,502	\$405,593	\$552,094
2041	\$146,894	\$419,768	\$566,662
2042	\$151,286	\$433,943	\$585,229
2043	\$153,678	\$448,119	\$601,797
2044	\$156,070	\$462,294	\$618,364
2045	\$158,462	\$476,470	\$634,932
2046	\$158,462	\$476,470	\$634,932
2047	\$158,462	\$476,470	\$634,932
2048	\$158,462	\$476,470	\$634,932
2049	\$158,462	\$476,470	\$634,932
2050	\$158,462	\$476,470	\$634,932

Targets

Year	RES	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	96	6	1	1	0	1	105
2021	96	6	1	1	0	1	105
2022	96	6	1	1	0	1	105
2023	96	6	1	1	0	1	105
2024	96	6	1	1	0	1	105
2025	96	6	1	1	0	1	106
2026	96	6	1	1	0	1	106
2027	96	6	1	1	0	1	106
2028	96	6	1	1	0	1	106
2029	96	6	1	1	0	1	106
2030	96	6	1	1	0	1	106
2031	96	6	1	1	0	1	106
2032	96	6	1	1	0	1	106
2033	96	6	1	1	0	1	106
2034	96	6	1	1	0	1	106
2035	96	7	1	1	0	1	107
2036	96	7	1	1	0	1	107
2037	96	7	1	1	0	1	107
2038	96	7	1	1	0	1	107
2039	96	7	1	1	0	1	107
2040	96	7	1	1	0	1	107
2041	96	7	1	1	0	1	108
2042	96	8	1	1	0	1	108
2043	96	8	1	1	1	2	109
2044	96	9	1	1	1	2	110
2045	96	9	1	2	1	2	111
2046	96	9	1	2	1	2	111
2047	96	9	1	2	1	2	111
2048	96	9	1	2	1	2	111
2049	96	9	1	2	1	2	111
2050	96	9	1	2	1	2	111

Water Savings

Year	Total Savings (mgd)
2020	0.06080
2021	0.012199
2022	0.018325
2023	0.024469
2024	0.030632
2025	0.036813
2026	0.043024
2027	0.049264
2028	0.055534
2029	0.061835
2030	0.068165
2031	0.074528
2032	0.080926
2033	0.087357
2034	0.093821
2035	0.100319
2036	0.106852
2037	0.113419
2038	0.120022
2039	0.126658
2040	0.127239
2041	0.128081
2042	0.129182
2043	0.130542
2044	0.132163
2045	0.134013
2046	0.135893
2047	0.137714
2048	0.139504
2049	0.141265
2050	0.142996

Financial Incentives for Irrigation & Landscape Upgrades

Overview	
Name	Financial Incentives for Irrigation & Landscape Upgrades
Abbr	10
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2021	Permanent	
Last Year	2050	Years	10
Measure Length	30	Repeat	

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$200.00	\$100.00	1
MULTI	\$500.00	\$100.00	1
BUSLDS	\$500.00	\$500.00	1
RELDLS	\$500.00	\$500.00	1
INDLDS	\$500.00	\$500.00	1
INSTLDS	\$500.00	\$500.00	1

Administration Costs	
Method:	Percent
Markup Percentage	25%

Description	
<p>For customers with landscape, provide incentives for substantive landscape retrofits or installation of water efficient equipment upgrades; Rebates can also contribute towards the purchase and installation of water-wise plants, compost, mulch and selected types of irrigation equipment upgrades.</p> <p>> Rebate for residential accounts and up to 50% more for commercial customers.</p> <p>> Financial incentives for: WBICs, rotating sprinkler nozzles, rainwater containers (barrels and cisterns), and greywater retrofits</p> <p>> Landscape conversion and turf removal is not part of this measure.</p>	

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDLS	INDLDS	INSTLDS	PRE	HYD
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

End Uses											
	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDLS	INDLDS	INSTLDS	PRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
External Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments	
<p>> Utility Costs - \$200 for SF accounts. \$500 utility cost is per non-residential and MFR account. Large sites will have more than one account and qualify for a larger total rebate per site. EBMUD and Valley Water programs offer up to \$2,000-\$3,000 for residential customers and up to \$15,000-\$60,000 for commercial customers.</p> <p>> Customer Costs - Customer costs per account will vary significantly based on devices.</p> <p>> End Use Water Savings - The water savings are based on the following from the 2018 Landscape Rebate Water Savings Study from Valley Water:</p> <p>> The annual water savings for replacing timer-based automatic irrigation controllers with weather-based irrigation controllers with rain shut-off devices were statistically significant each year following conversion, incrementally increased each year following conversion, and were on average 9 gal/t2/yr or an average of 27%.</p> <p>> The annual water savings for replacing old sprinklers with high-efficiency nozzles were 1,243 gal/unit/yr on average, or an average of 15.3%.</p> <p>> Annual savings for replacing old sprinklers with high-efficiency nozzles including pressure regulation and/or check valves were significant in the first year following conversion, saving 1,661 gal/unit/yr on average, or an average of 18%.</p> <p>> Total average irrigation savings is 20.1%.</p> <p>> Soil moisture sensor savings may be 20% of irrigation use is based on more than 10 California site water use reports conducted over multiple months in years 2015-2017 as provided by Brian Holland www.sustainablewatersavings.com. Studies show a range of 20%-60% savings for trained soil moisture sensor device installation and site management. A lower savings estimate is assumed for layperson usage and non-drought normal planning years. The manufacturer claims device batteries last 10-12 years.</p> <p>> Targets: 0.5% to keep total utility budget and staff time for this program to reasonable levels.</p>	

Results		
Units	MG	
Average Water Savings (mgd)		
0.070273		
Lifetime Savings - Present Value (\$)		
Utility		\$2,816,980
Community		\$2,816,980
Lifetime Costs - Present Value (\$)		
Utility		\$2,508,113
Community		\$3,503,784
Benefit to Cost Ratio		
Utility		1.12
Community		0.80
Cost of Savings per Unit Volume (\$/mg)		
Utility		\$3.152

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
RES Irrigation	20.1%	42.0
MULTI Irrigation	20.1%	182.6
BUSLDS Irrigation	20.1%	1,994.2
RELDLS Irrigation	20.1%	2,036.9
INDLDS Irrigation	20.1%	2,253.5
INSTLDS Irrigation	20.1%	852.6

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.500%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$114,094	\$45,587	\$159,681
2022	\$114,246	\$45,632	\$159,877
2023	\$114,398	\$45,677	\$160,075
2024	\$114,550	\$45,723	\$160,272
2025	\$114,702	\$45,768	\$160,470
2026	\$114,854	\$45,814	\$160,668
2027	\$115,006	\$45,860	\$160,866
2028	\$115,158	\$45,906	\$161,064
2029	\$115,310	\$45,952	\$161,262
2030	\$115,462	\$46,000	\$161,462
2031	\$115,614	\$46,048	\$161,662
2032	\$115,766	\$46,096	\$161,862
2033	\$115,918	\$46,144	\$162,062
2034	\$116,070	\$46,192	\$162,262
2035	\$116,222	\$46,240	\$162,462
2036	\$116,374	\$46,288	\$162,662
2037	\$116,526	\$46,336	\$162,862
2038	\$116,678	\$46,384	\$163,062
2039	\$116,830	\$46,432	\$163,262
2040	\$116,982	\$46,480	\$163,462
2041	\$117,134	\$46,528	\$163,662
2042	\$117,286	\$46,576	\$163,862
2043	\$117,438	\$46,624	\$164,062
2044	\$117,590	\$46,672	\$164,262
2045	\$117,742	\$46,720	\$164,462
2046	\$117,894	\$46,768	\$164,662
2047	\$118,046	\$46,816	\$164,862
2048	\$118,198	\$46,864	\$165,062
2049	\$118,350	\$46,912	\$165,262
2050	\$118,502	\$46,960	\$165,462

Targets							
View:	Accounts						
	RES	MULTI	BUSLDS	RELDLS	INDLDS	INSTLDS	Total
2020	0	0	0	0	0	0	0
2021	371	22	2	4	2	5	405
2022	371	22	2	4	2	5	405
2023	371	22	3	4	2	5	405
2024	371	22	3	4	2	5	406
2025	371	22	3	4	2	5	406
2026	371	23	3	4	2	5	406
2027	371	23	3	4	2	5	407
2028	371	23	3	4	2	5	407
2029	371	24	3	4	2	5	407
2030	371	24	3	4	2	5	408
2031	371	24	3	4	2	5	408
2032	371	24	3	4	2	5	409
2033	371	25	3	4	2	5	409
2034	371	25	3	4	2	5	409
2035	371	25	3	4	2	5	410
2036	371	25	3	4	2	5	410
2037	371	26	3	4	2	5	410
2038	371	26	3	4	2	5	411
2039	371	26	3	4	2	5	411
2040	371	27	3	4	2	5	412
2041	371	29	3	5	2	6	414
2042	371	30	3	5	2	6	417
2043	371	32	3	5	2	6	420
2044	371	34	4	6	2	6	422
2045	371	36	4	6	2	6	425
2046	371	36	4	6	2	6	425
2047	371	36	4	6	2	6	425
2048	371	36	4	6	2	6	425
2049	371	36	4	6	2	6	425
2050	371	36	4	6	2	6	425

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.000000
2021	0.007870
2022	0.015764
2023	0.023681
2024	0.031621
2025	0.039585
2026	0.047587
2027	0.055628
2028	0.063707
2029	0.071824
2030	0.079980
2031	0.080310
2032	0.080659
2033	0.081028
2034	0.081417
2035	0.081825
2036	0.082240
2037	0.082662
2038	0.083089
2039	0.083523
2040	0.083963
2041	0.084717
2042	0.085787
2043	0.087171
2044	0.088870
2045	0.090884
2046	0.092853
2047	0.094777
2048	0.096657
2049	0.098492
2050	0.100283



Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Development

Overview	
Name	Require Weather Adjusting Smart Irrigation
Abbr	11
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year 2023	Permanent <input checked="" type="checkbox"/>
Last Year 2050	
Measure Length 28	

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
BUSLDS	\$136.00	\$3,000.00	3
RELDS	\$136.00	\$3,000.00	3
INDLDS	\$136.00	\$3,000.00	3
INSTLDS	\$136.00	\$3,000.00	3

Administration Costs	
Method: Percent	
Markup Percentage	30%

Description

Measure would require new development customers to install weather adjusting smart irrigation controllers and/or rain sensors. Might offer training class on how to install and program the device. The WBICs have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	FIRE	HYD
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses											
	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	FIRE	HYD
Toilets											
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Pools											
Wash Down											
Car Washing											
External Leakage						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Outdoor											
Cooling											

Comments

> Utility Cost: Assumes 1-2 staff hours as requested by new account / developer to cover double checking the code is followed correctly. Assume staff avg fully burdened Rate with fringe and overhead is \$150/hr. (ACWD Water Conservation Rate is \$55/hr. for base rate with fringe and overhead add 1.68%) . Admin time + Utility Cost is ~3.5 hours per site.

> Customer Cost: Includes device and installation.

> End Use Water Savings: CII WBIC 10% savings based on Valencia Water Company recent experience.

> Targets: Assumes 90% of all new accounts will install weather WBIC and/or Rain Sensors

Results	
Units	MG
Average Water Savings (mgd)	
0.065755	
Lifetime Savings - Present Value (\$)	
Utility	\$2,311,992
Community	\$2,311,992
Lifetime Costs - Present Value (\$)	
Utility	\$342,678
Community	\$6,157,354
Benefit to Cost Ratio	
Utility	6.75
Community	0.38
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$460

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
BUSLDS Irrigation	10.0%	1,994.2
RELDS Irrigation	10.0%	2,036.9
INDLDS Irrigation	10.0%	2,253.5
INSTLDS Irrigation	10.0%	852.6

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	90.000%
Only Affects New Accts	<input checked="" type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$7,068	\$119,939	\$127,008
2024	\$7,034	\$119,363	\$126,397
2025	\$7,002	\$118,812	\$125,814
2026	\$9,402	\$159,537	\$168,939
2027	\$9,385	\$159,243	\$168,628
2028	\$9,368	\$158,959	\$168,327
2029	\$9,352	\$158,685	\$168,037
2030	\$9,336	\$158,420	\$167,757
2031	\$9,098	\$154,369	\$163,467
2032	\$9,096	\$154,347	\$163,443
2033	\$9,095	\$154,324	\$163,419
2034	\$9,094	\$154,302	\$163,396
2035	\$9,092	\$154,280	\$163,372
2036	\$9,360	\$158,830	\$168,190
2037	\$9,360	\$158,830	\$168,190
2038	\$9,360	\$158,830	\$168,191
2039	\$9,360	\$158,831	\$168,191
2040	\$9,360	\$158,831	\$168,191
2041	\$76,083	\$1,291,002	\$1,367,086
2042	\$76,083	\$1,291,002	\$1,367,086
2043	\$76,083	\$1,291,002	\$1,367,086
2044	\$76,083	\$1,291,002	\$1,367,086
2045	\$76,083	\$1,291,002	\$1,367,086
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets					
View	Accounts	BUSLDS	RELDS	INDLDS	INSTLDS
2020		0	0	0	0
2021		0	0	0	0
2022		0	0	0	0
2023		5	6	0	3
2024		5	6	0	3
2025		5	6	0	3
2026		4	9	0	4
2027		4	9	0	4
2028		4	9	0	4
2029		4	9	0	4
2030		4	9	0	4
2031		4	8	1	4
2032		4	8	1	4
2033		4	8	1	4
2034		4	8	1	4
2035		4	8	1	4
2036		3	8	2	4
2037		3	8	2	4
2038		3	8	2	4
2039		3	8	2	4
2040		3	8	2	4
2041		37	57	22	28
2042		37	57	22	28
2043		37	57	22	28
2044		37	57	22	28
2045		37	57	22	28
2046		0	0	0	0
2047		0	0	0	0
2048		0	0	0	0
2049		0	0	0	0
2050		0	0	0	0

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.002333
2024	0.004652
2025	0.006960
2026	0.009992
2027	0.013017
2028	0.016036
2029	0.019049
2030	0.022056
2031	0.025036
2032	0.028016
2033	0.030994
2034	0.033973
2035	0.036950
2036	0.040055
2037	0.043159
2038	0.046263
2039	0.049367
2040	0.052471
2041	0.078304
2042	0.104137
2043	0.129970
2044	0.155803
2045	0.181636
2046	0.181636
2047	0.181636
2048	0.181636
2049	0.181636
2050	0.181636



Landscape & Irrigation Codes

Overview	
Name	Landscape & Irrigation Codes
Abbr	12
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2020	Permanent	<input checked="" type="checkbox"/>
Last Year	2050		
Measure Length	31		

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
MULTI	\$408.00	\$2,000.00	1
BUSLDS	\$408.00	\$5,000.00	1
RELDS	\$408.00	\$5,000.00	1
INDLDS	\$408.00	\$5,000.00	1
INSTLDS	\$408.00	\$5,000.00	1

Administration Costs	
Method	Percent
Markup Percentage	25%

Description
Existing Model Water Efficient Landscape Ordinance (MWELO), as amended in 2015, which establishes specific outdoor water efficiency requirements for new accounts and existing accounts undergoing eligible site renovations.

Customer Classes									
RES	<input checked="" type="checkbox"/>	MULTI	<input checked="" type="checkbox"/>	BUS	<input type="checkbox"/>	IND	<input type="checkbox"/>	OTHER	<input type="checkbox"/>
BUSLDS	<input checked="" type="checkbox"/>	RELDS	<input checked="" type="checkbox"/>	INDLDS	<input checked="" type="checkbox"/>	INSTLDS	<input checked="" type="checkbox"/>	PRE	<input type="checkbox"/>
HYD	<input type="checkbox"/>								

End Uses									
RES	<input checked="" type="checkbox"/>	MULTI	<input checked="" type="checkbox"/>	BUS	<input type="checkbox"/>	IND	<input type="checkbox"/>	OTHER	<input type="checkbox"/>
BUSLDS	<input checked="" type="checkbox"/>	RELDS	<input checked="" type="checkbox"/>	INDLDS	<input checked="" type="checkbox"/>	INSTLDS	<input checked="" type="checkbox"/>	PRE	<input type="checkbox"/>
HYD	<input type="checkbox"/>								
Toilets	<input type="checkbox"/>								
Urinals	<input type="checkbox"/>								
Lavatory Faucets	<input type="checkbox"/>								
Showers	<input type="checkbox"/>								
Dishwashers	<input type="checkbox"/>								
Clothes Washers	<input type="checkbox"/>								
Process	<input type="checkbox"/>								
Kitchen Spray Rinse	<input type="checkbox"/>								
Internal Leakage	<input type="checkbox"/>								
Baths	<input type="checkbox"/>								
Other	<input type="checkbox"/>								
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>								
Irrigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input type="checkbox"/>								
Wash Down	<input type="checkbox"/>								
Car Washing	<input type="checkbox"/>								
External Leakage	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input type="checkbox"/>								
Cooling	<input type="checkbox"/>								

Comments
> Utility Costs- \$408 per account or JUST UNDER 3 hours of staff time at \$150/hr. and 25% admin to represent random field inspection cost, for a total cost of just over 3 hours.
> Customer Costs- Assume average additional cost to build landscape by MWELO standards (cost to comply versus install typical all-turf) landscape (\$2000-\$5000/acct). Also includes non-residential customer smart irrigation controller cost of \$750 based on \$700 device unit cost (per RainBird ITC-LX) and \$50 unit installation cost per controller with 3 controllers needed for large sites.
> End Use Water Savings - The maximum applied water allowance (MAWA) has been lowered from 70% of the reference evapotranspiration (ET_o) to 55% for residential landscape projects, and to 45% of ET_o for non-residential projects. Savings are simplified to be the difference from the prior standard to the new MWELO standard budget difference of 70-55% for residential or 70-45% for non-residential. This water allowance reduces the landscape area that can be planted with high water use plants such as cool season turf. For typical residential projects, the reduction in the MAWA reduces the percentage of landscape area that can be planted to high water use plants from 33% to 25%. The site-wide irrigation efficiency of the previous ordinance (2010) was 0.71; for the purposes of estimating total water use, the revised MWELO defines the irrigation efficiency (IE) of drip irrigation as 0.81 and overhead irrigation and other technologies must meet a minimum IE of 0.75. Also assumed that the amount of irrigated landscape per new development for each individual parcel is reducing over time (meaning that the lot size for homes/businesses is shrinking when comparing existing homes versus new homes/businesses.) Assume some external leakage reduction (since new development would not have much) in addition to irrigation water use reduction. Assume end use savings as compared to existing account irrigation water end use.
> Targets - Assumes 90% of new accounts will comply. High because assumes total accounts targeted includes a number of existing account remodels that are eligible.
> RES not selected because there is no population growth in the RES customer category.

Results	
Units	MG
Average Water Savings (mgd)	0.235801
Lifetime Savings - Present Value (\$)	
Utility	\$8,473,371
Community	\$8,473,371
Lifetime Costs - Present Value (\$)	
Utility	\$1,253,510
Community	\$8,225,620
Benefit to Cost Ratio	
Utility	6.76
Community	1.03
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$469

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
MULTI Irrigation	25.0%	182.6
BUSLDS Irrigation	25.0%	1,994.2
RELDS Irrigation	25.0%	2,036.9
INDLDS Irrigation	25.0%	2,253.5
INSTLDS Irrigation	25.0%	852.6
MULTI External Leakage	10.0%	15.4
BUSLDS External Leakage	10.0%	105.0
RELDS External Leakage	10.0%	107.2
INDLDS External Leakage	10.0%	118.6
INSTLDS External Leakage	10.0%	44.9

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	90.000%
Only Affects New Accts	<input checked="" type="checkbox"/>

Costs			
View	Summary		
	Utility	Customer	Total
2020	\$24,334	\$135,820	\$160,154
2021	\$24,334	\$135,820	\$160,154
2022	\$24,299	\$135,469	\$159,768
2023	\$24,264	\$135,134	\$159,398
2024	\$24,232	\$134,814	\$159,045
2025	\$24,200	\$134,508	\$158,708
2026	\$36,683	\$197,035	\$233,718
2027	\$36,667	\$196,872	\$233,538
2028	\$36,651	\$196,714	\$233,365
2029	\$36,635	\$196,562	\$233,197
2030	\$36,620	\$196,415	\$233,035
2031	\$34,339	\$186,121	\$220,460
2032	\$34,338	\$186,108	\$220,446
2033	\$34,337	\$186,096	\$220,433
2034	\$34,336	\$186,083	\$220,419
2035	\$34,334	\$186,071	\$220,406
2036	\$34,377	\$187,755	\$222,133
2037	\$34,377	\$187,756	\$222,133
2038	\$34,377	\$187,756	\$222,133
2039	\$34,377	\$187,756	\$222,133
2040	\$34,377	\$187,756	\$222,133
2041	\$250,252	\$1,411,713	\$1,661,965
2042	\$250,252	\$1,411,713	\$1,661,965
2043	\$250,252	\$1,411,713	\$1,661,965
2044	\$250,252	\$1,411,713	\$1,661,965
2045	\$250,252	\$1,411,713	\$1,661,965
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets						
View	Accounts					
	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	34	5	6	0	3	48
2021	34	5	6	0	3	48
2022	34	5	6	0	3	48
2023	34	5	6	0	3	48
2024	34	5	6	0	3	48
2025	34	5	6	0	3	47
2026	54	4	9	0	4	72
2027	54	4	9	0	4	72
2028	54	4	9	0	4	72
2029	54	4	9	0	4	72
2030	54	4	9	0	4	72
2031	50	4	8	1	4	67
2032	50	4	8	1	4	67
2033	50	4	8	1	4	67
2034	50	4	8	1	4	67
2035	50	4	8	1	4	67
2036	50	3	8	2	4	67
2037	50	3	8	2	4	67
2038	50	3	8	2	4	67
2039	50	3	8	2	4	67
2040	50	3	8	2	4	67
2041	347	37	57	22	28	491
2042	347	37	57	22	28	491
2043	347	37	57	22	28	491
2044	347	37	57	22	28	491
2045	347	37	57	22	28	491
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.007612
2021	0.015225
2022	0.022802
2023	0.030346
2024	0.037858
2025	0.045338
2026	0.055592
2027	0.065830
2028	0.076051
2029	0.086258
2030	0.096449
2031	0.106386
2032	0.116320
2033	0.126253
2034	0.136185
2035	0.146114
2036	0.156348
2037	0.166581
2038	0.176814
2039	0.187048
2040	0.197281
2041	0.279339
2042	0.361398
2043	0.443456
2044	0.525514
2045	0.607572
2046	0.607572
2047	0.607572
2048	0.607572
2049	0.607572
2050	0.607572



Residential Indoor Water Surveys

Overview	
Name	Residential Indoor Water Surveys
Abbr	13
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2023	Permanent	<input type="checkbox"/>
Last Year	2050	Years	5
Measure Length	28	Repeat	<input type="checkbox"/>

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$200.00	\$50.00	1
MULTI	\$200.00	\$50.00	1

Administration Costs	
Method:	Percent
Markup Percentage	25%

Description
Indoor water surveys for existing 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. Could be combined with Residential Outdoor Water Surveys measure.

Customer Classes											
RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLL	FIRE	HYD	

End Uses											
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
External Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									

Comments
> Utility Costs - Utility costs for this measure are primarily staff time. Admin costs/time estimates includes field time, drive time, scheduling, and data entry. Portion 25% to admin in measure design. Giveaway device costs and device rebates as a result of this measure are not included since these are covered in separate measures.
> Customer Costs - Customer costs represent average customer cost to implement any survey suggestions.
> End Use Water Savings - Savings represents average account savings. Savings based off of California Urban Water Agencies water savings study (4/13/15). Approximate 5.8% savings for indoor. Slightly lower value of 5% water savings were selected to account for efficient devices installed during the recent CA drought, and more efficient homes built to CALGreen on the market in the past 5 years.
> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 2.71%. ~11 BAWSCA agencies reported. 0.8% SF survey participation and 4.6% MF survey participation. ACWD Target lowered to 0.8% accounts/year.

Results	
Units	MG
Average Water Savings (mgd)	
	0.027654
Lifetime Savings - Present Value (\$)	
Utility	\$1,123,045
Community	\$3,013,575
Lifetime Costs - Present Value (\$)	
Utility	\$3,067,182
Community	\$3,680,618
Benefit to Cost Ratio	
Utility	0.37
Community	0.82
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$9,795


End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
RES Toilets	5.0%	26.3
MULTI Toilets	5.0%	266.6
RES Lavatory Faucets	5.0%	8.1
MULTI Lavatory Faucets	5.0%	90.2
RES Showers	5.0%	35.5
MULTI Showers	5.0%	296.2
RES Dishwashers	5.0%	4.8
MULTI Dishwashers	5.0%	20.2
RES Clothes Washers	5.0%	17.3
MULTI Clothes Washers	5.0%	228.9
RES Internal Leakage	5.0%	22.6
MULTI Internal Leakage	5.0%	161.6
RES Baths	5.0%	6.5
MULTI Baths	5.0%	40.4
RES Other	5.0%	19.4
MULTI Other	5.0%	53.9
RES Non-Lavatory/Kitchen Faucets	5.0%	21.0
MULTI Non-Lavatory/Kitchen Faucets	5.0%	188.5

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.800%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$157,034	\$31,407	\$188,441
2024	\$157,110	\$31,422	\$188,533
2025	\$157,187	\$31,437	\$188,624
2026	\$157,307	\$31,461	\$188,768
2027	\$157,427	\$31,485	\$188,913
2028	\$157,548	\$31,510	\$189,057
2029	\$157,668	\$31,534	\$189,202
2030	\$157,789	\$31,558	\$189,347
2031	\$157,900	\$31,580	\$189,480
2032	\$158,012	\$31,602	\$189,614
2033	\$158,123	\$31,625	\$189,748
2034	\$158,235	\$31,647	\$189,882
2035	\$158,346	\$31,669	\$190,016
2036	\$158,457	\$31,691	\$190,148
2037	\$158,568	\$31,714	\$190,281
2038	\$158,678	\$31,736	\$190,414
2039	\$158,789	\$31,758	\$190,546
2040	\$158,899	\$31,780	\$190,679
2041	\$159,010	\$31,802	\$191,812
2042	\$160,443	\$32,089	\$192,531
2043	\$161,214	\$32,243	\$193,457
2044	\$161,986	\$32,397	\$194,383
2045	\$162,758	\$32,552	\$195,309
2046	\$162,758	\$32,552	\$195,309
2047	\$162,758	\$32,552	\$195,309
2048	\$162,758	\$32,552	\$195,309
2049	\$162,758	\$32,552	\$195,309
2050	\$162,758	\$32,552	\$195,309

Targets			
View	Accounts		
	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	593	35	628
2024	593	35	628
2025	593	36	629
2026	593	36	629
2027	593	37	630
2028	593	37	630
2029	593	38	631
2030	593	38	631
2031	593	39	632
2032	593	39	632
2033	593	39	632
2034	593	40	633
2035	593	40	633
2036	593	41	634
2037	593	41	634
2038	593	42	635
2039	593	42	635
2040	593	43	636
2041	593	46	639
2042	593	49	642
2043	593	52	645
2044	593	55	648
2045	593	58	651
2046	593	58	651
2047	593	58	651
2048	593	58	651
2049	593	58	651
2050	593	58	651

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.006832
2024	0.013567
2025	0.020210
2026	0.026776
2027	0.033264
2028	0.033096
2029	0.032934
2030	0.032779
2031	0.032621
2032	0.032480
2033	0.032355
2034	0.032245
2035	0.032148
2036	0.032065
2037	0.031994
2038	0.031935
2039	0.031886
2040	0.031846
2041	0.031900
2042	0.032111
2043	0.032474
2044	0.032984
2045	0.033638
2046	0.034176
2047	0.034557
2048	0.034783
2049	0.034855
2050	0.034773



Residential Water-Savings Devices Giveaway

Overview	
Name	Residential Water-Savings Devices Giveaway
Abbr	14
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year	2020
Last Year	2050
Measure Length	31

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$15.00	\$15.00	2
MULTI	\$15.00	\$15.00	25

Administration Costs	
Method:	Percent
Markup Percentage	25%

Description
Utility would buy high efficiency showerheads and faucets, aerators in bulk and give them away at Utility office or community events.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSL	RELS	INDL	INSTL	FIRE	HYD
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses											
	RES	MULTI	BUS	IND	OTHER	BUSL	RELS	INDL	INSTL	FIRE	HYD
Toilets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urinals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kitchen Spray Rinse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments
> Utility Costs - Devices are ordered in bulk. Devices are given away individually, and not necessarily as a "kit". Average cost for devices: 1.2 gpm bathroom aerators (\$1/ea.), 1.8 gpm kitchen aerators (\$2.10/ea.), 1.8 gpm showerheads (\$4.60/ea.). Admin costs for tracking of program
> Customer Costs - Assumes minimal cost for installation.
> End Use Water Savings - Assume kits save 27.6% (reduced to be conservative) by assuming only 25% of kits are actually installed in the homes and yield water savings. Assumed Kit savings of 27.6% * 0.25 installed = 6.9% actual savings.
> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 1.24%. ~12 BAWSCA agencies reported.

Results		
Units	MG	
Average Water Savings (mgd)	0.083742	
Lifetime Savings - Present Value (\$)		
Utility	\$3,224,175	
Community	\$7,949,092	
Lifetime Costs - Present Value (\$)		
Utility	\$1,442,841	
Community	\$2,597,113	
Benefit to Cost Ratio		
Utility	2.23	
Community	3.06	
Cost of Savings per Unit Volume (\$/mg)		
Utility	\$1,522	

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
RES Lavatory Faucets	6.9%	8.1
MULTI Lavatory Faucets	6.9%	90.2
RES Showers	6.9%	35.5
MULTI Showers	6.9%	296.2
RES Non-Lavatory/Kitchen Faucets	6.9%	21.0
MULTI Non-Lavatory/Kitchen Faucets	6.9%	188.5

Targets		
Target Method:	Percentage	
% of Accts Targeted/Yr		1.240%
Only Affects New Accts	<input type="checkbox"/>	

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$59,313	\$47,450	\$106,763
2021	\$59,534	\$47,627	\$107,161
2022	\$59,755	\$47,804	\$107,559
2023	\$59,976	\$47,981	\$107,957
2024	\$60,197	\$48,158	\$108,355
2025	\$60,419	\$48,335	\$108,754
2026	\$60,641	\$48,512	\$109,153
2027	\$60,862	\$48,689	\$109,551
2028	\$61,084	\$48,866	\$109,949
2029	\$61,305	\$49,043	\$110,348
2030	\$61,527	\$49,220	\$110,746
2031	\$61,748	\$49,397	\$111,145
2032	\$61,969	\$49,574	\$111,543
2033	\$62,191	\$49,751	\$111,942
2034	\$62,412	\$49,928	\$112,340
2035	\$62,634	\$50,105	\$112,739
2036	\$62,855	\$50,282	\$113,137
2037	\$63,077	\$50,459	\$113,536
2038	\$63,298	\$50,636	\$113,934
2039	\$63,520	\$50,813	\$114,333
2040	\$63,741	\$50,990	\$114,731
2041	\$63,963	\$51,167	\$115,130
2042	\$64,184	\$51,344	\$115,528
2043	\$64,406	\$51,521	\$115,927
2044	\$64,627	\$51,698	\$116,325
2045	\$64,849	\$51,875	\$116,724
2046	\$65,070	\$52,052	\$117,122
2047	\$65,292	\$52,229	\$117,521
2048	\$65,513	\$52,406	\$117,919
2049	\$65,735	\$52,583	\$118,318
2050	\$65,956	\$52,760	\$118,716

Targets			
View	Accounts		
	RES	MULTI	Total
2020	919	53	972
2021	919	53	973
2022	919	54	973
2023	919	54	974
2024	919	55	974
2025	919	55	975
2026	919	56	975
2027	919	57	976
2028	919	58	977
2029	919	58	978
2030	919	59	978
2031	919	60	979
2032	919	60	980
2033	919	61	980
2034	919	62	981
2035	919	63	982
2036	919	63	982
2037	919	64	983
2038	919	65	984
2039	919	65	984
2040	919	66	985
2041	919	71	990
2042	919	76	995
2043	919	80	1,000
2044	919	85	1,004
2045	919	90	1,009
2046	919	90	1,009
2047	919	90	1,009
2048	919	90	1,009
2049	919	90	1,009
2050	919	90	1,009

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.006094
2021	0.012000
2022	0.017740
2023	0.023334
2024	0.028798
2025	0.034148
2026	0.039393
2027	0.044559
2028	0.049657
2029	0.054696
2030	0.059685
2031	0.064633
2032	0.069544
2033	0.074425
2034	0.079281
2035	0.084116
2036	0.088935
2037	0.093741
2038	0.098538
2039	0.103326
2040	0.108111
2041	0.112813
2042	0.117672
2043	0.122681
2044	0.127838
2045	0.133139
2046	0.138580
2047	0.144010
2048	0.149428
2049	0.154837
2050	0.160238



Leak Repair & Plumbing Emergency Assistance

Overview	
Name	Leak Repair & Plumbing Emergency
Abbr	16
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2023	Permanent	<input type="checkbox"/>
Last Year	2050	Years	10
Measure Length	28	Repeat	<input type="checkbox"/>

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$300.00	\$400.00	1
MULTI	\$300.00	\$400.00	2

Administration Costs	
Method:	Percent
Markup Percentage	25%

Description
Program provides leak identification and possible rebates and/or pre-negotiated pricing with approved plumbers to assist customers in locating and repair leaks.

Customer Classes										
RES	MULTI	BUS	IND	OTHER	BUSLC	RELD	INDLD	INSTLL	FIRE	HYD
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses										
RES	MULTI	BUS	IND	OTHER	BUSLC	RELD	INDLD	INSTLL	FIRE	HYD
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toilets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urinals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lavatory Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dishwashers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes Washers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kitchen Spray Rinse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash Down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car Washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments
> Utility Costs - Utility costs might represent staff time for account leak identification, multiple notifications and a possible site survey (incl drive time) and reporting. ~ 2 HRS
> Customer Costs - Cost to fix the leak.
> End Use Water Savings - Savings might be over 200% if based on a targeted account's using 2-4 times the amount of the previous year's water use. Assume 50% of internal leaks are fixed. Assume 1 leak per SF, 2 leaks per MF (typically duplex owners), as these programs typically are for owner-occupied residences.
> Targets - Assume 0.1% of accounts per year need leak repair and plumbing assistance.

Results	
Units	MG
Average Water Savings (mgd)	
0.010690	
Lifetime Savings - Present Value (\$)	
Utility	\$419,791
Community	\$1,975,694
Lifetime Costs - Present Value (\$)	
Utility	\$614,036
Community	\$1,269,008
Benefit to Cost Ratio	
Utility	0.68
Community	1.56
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$5,073

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
RES Internal Leakage	50.0%	22.6
MULTI Internal Leakage	50.0%	161.6
RES External Leakage	50.0%	3.5
MULTI External Leakage	50.0%	15.4

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.100%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$31,090	\$33,162	\$64,252
2024	\$31,118	\$33,193	\$64,311
2025	\$31,147	\$33,223	\$64,370
2026	\$31,192	\$33,271	\$64,463
2027	\$31,237	\$33,319	\$64,556
2028	\$31,282	\$33,368	\$64,650
2029	\$31,327	\$33,416	\$64,743
2030	\$31,372	\$33,464	\$64,836
2031	\$31,414	\$33,509	\$64,923
2032	\$31,456	\$33,553	\$65,009
2033	\$31,498	\$33,598	\$65,096
2034	\$31,540	\$33,642	\$65,182
2035	\$31,582	\$33,687	\$65,268
2036	\$31,623	\$33,731	\$65,354
2037	\$31,664	\$33,775	\$65,440
2038	\$31,706	\$33,820	\$65,526
2039	\$31,747	\$33,864	\$65,611
2040	\$31,789	\$33,908	\$65,697
2041	\$32,078	\$34,217	\$66,295
2042	\$32,368	\$34,525	\$66,893
2043	\$32,657	\$34,834	\$67,491
2044	\$32,946	\$35,143	\$68,089
2045	\$33,236	\$35,451	\$68,687
2046	\$33,236	\$35,451	\$68,687
2047	\$33,236	\$35,451	\$68,687
2048	\$33,236	\$35,451	\$68,687
2049	\$33,236	\$35,451	\$68,687
2050	\$33,236	\$35,451	\$68,687

Targets			
View	Accounts		
	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	74	4	79
2024	74	4	79
2025	74	4	79
2026	74	5	79
2027	74	5	79
2028	74	5	79
2029	74	5	79
2030	74	5	79
2031	74	5	79
2032	74	5	79
2033	74	5	79
2034	74	5	79
2035	74	5	79
2036	74	5	79
2037	74	5	79
2038	74	5	79
2039	74	5	79
2040	74	5	79
2041	74	6	80
2042	74	6	80
2043	74	6	81
2044	74	7	81
2045	74	7	81
2046	74	7	81
2047	74	7	81
2048	74	7	81
2049	74	7	81
2050	74	7	81

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.001334
2024	0.002672
2025	0.004013
2026	0.005359
2027	0.006710
2028	0.008067
2029	0.009429
2030	0.010796
2031	0.012168
2032	0.013545
2033	0.013592
2034	0.013641
2035	0.013692
2036	0.013742
2037	0.013792
2038	0.013841
2039	0.013889
2040	0.013938
2041	0.014015
2042	0.014121
2043	0.014255
2044	0.014418
2045	0.014610
2046	0.014798
2047	0.014980
2048	0.015158
2049	0.015330
2050	0.015498



Multifamily UHET Direct Install

Overview	
Name	Multifamily UHET Direct Install
Abbr	17
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2023	Permanent	<input checked="" type="checkbox"/>
Last Year	2027		
Measure Length	5		

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
MULTI	\$350.00	\$25.00	25

Administration Costs	
Method:	Percent
Markup Percentage	20%

Description

Program provides property owners and managers of multi-family housing direct installation of high-efficiency toilets.

Customer Classes											
	RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTL	FIRE	HYD

End Uses											
	RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTL	FIRE	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation											
Pools											
Wash Down											
Car Washing											
External Leakage											
Outdoor											
Cooling											

Comments

> Utility Cost - Cost reflects cost of 1.1 gpf or lower toilet and installation fees based upon City of Santa Monica, CA program.
https://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Water/DirectInstall_Toilet.pdf

> Administrative Cost - reflects utility staff time to track and run program.

> Customer Cost - Minimal customer cost.

> End Use Water Savings - Savings estimates assume the difference between 0.8 gpf and 1.6 gpf or 50% savings on average.

> Targets - Assumes 0.1% of multifamily accounts targeted per year.

Results	
Units	MG
Average Water Savings (mgd)	
0.001984	
Lifetime Savings - Present Value (\$)	
Utility	\$81,917
Community	\$81,917
Lifetime Costs - Present Value (\$)	
Utility	\$208,815
Community	\$221,245
Benefit to Cost Ratio	
Utility	0.39
Community	0.37
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$9,295

End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	50.0%	266.6

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.100%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$0	\$0	\$0
2021	\$0	\$0	\$0
2022	\$0	\$0	\$0
2023	\$46,076	\$2,743	\$48,818
2024	\$46,475	\$2,766	\$49,242
2025	\$46,875	\$2,790	\$49,665
2026	\$47,507	\$2,828	\$50,335
2027	\$48,140	\$2,865	\$51,005
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
2036	\$0	\$0	\$0
2037	\$0	\$0	\$0
2038	\$0	\$0	\$0
2039	\$0	\$0	\$0
2040	\$0	\$0	\$0
2041	\$0	\$0	\$0
2042	\$0	\$0	\$0
2043	\$0	\$0	\$0
2044	\$0	\$0	\$0
2045	\$0	\$0	\$0
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets		
View	Accounts	Total
	MULTI	
2020	0	0
2021	0	0
2022	0	0
2023	4	4
2024	4	4
2025	4	4
2026	5	5
2027	5	5
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0
2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.000551
2024	0.001092
2025	0.001623
2026	0.002146
2027	0.002661
2028	0.002626
2029	0.002592
2030	0.002560
2031	0.002530
2032	0.002501
2033	0.002473
2034	0.002447
2035	0.002421
2036	0.002397
2037	0.002374
2038	0.002351
2039	0.002330
2040	0.002310
2041	0.002265
2042	0.002227
2043	0.002193
2044	0.002163
2045	0.002136
2046	0.002126
2047	0.002116
2048	0.002107
2049	0.002098
2050	0.002089



Developer Financed Zero Footprint New Development

Overview	
Name	Developer Financed Zero Footprint
Abbr	19
Category	Default
Measure Type	Standard Measure

Time Period	Measure Life
First Year	2035
Last Year	2050
Measure Length	16

Fixture Cost per Device		
Utility	Customer	Fix/Acct
MULTI	\$1,000.00	\$1,500.00 25

Administration Costs	
Method:	Percent
Markup Percentage	10%

Description
Utility would require developers of new homes to contribute money to the Utility's water conservation program to help generate the water needed to supply their project.

Customer Classes											
RES	MULTI	BUS	IND	OTHER	BUSLD	RELS	INDLD	INSTLL	FIRE	HYD	

End Uses											
Toilets	✓										
Urinals	✓										
Lavatory Faucets	✓										
Showers	✓										
Dishwashers	✓										
Clothes Washers	✓										
Process											
Kitchen Spray Rinse											
Internal Leakage	✓										
Baths	✓										
Other	✓										
Non-Lavatory/Kitchen Faucets	✓										
Irrigation	✓										
Pools	✓										
Wash Down	✓										
Car Washing	✓										
External Leakage	✓										
Outdoor											
Cooling											

Comments
> Utility Cost: Cost of staff time to negotiate and collect the fee from developers. Redirects developer fee to conservation programs.
> Customer Cost: Assumes connection Fee \$1,500/MF acct.
> End Use Water Savings: Assumes the home has best available technology (0.8gpf toilet instead of a 1.28 gpf toilet) due to the offset in fees by developer and installation of the higher water efficiency fixtures
> Targets: ACWD edits: New accounts only, assumes only ~25% of MF new accounts a year.
> RES not selected because there is no population growth in the RES customer category.

Results	
Units	MG
Average Water Savings (mgd)	
0.020122	
Lifetime Savings - Present Value (\$)	
Utility	\$664,187
Community	\$1,596,988
Lifetime Costs - Present Value (\$)	
Utility	\$9,204,218
Community	\$21,755,423
Benefit to Cost Ratio	
Utility	0.07
Community	0.07
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$40,398


End Use Savings Per Replacement		
Method:	Percent	
	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	10.0%	266.6
MULTI Lavatory Faucets	10.0%	90.2
MULTI Showers	10.0%	296.2
MULTI Dishwashers	10.0%	20.2
MULTI Clothes Washers	10.0%	228.9
MULTI Internal Leakage	10.0%	161.6
MULTI Baths	10.0%	40.4
MULTI Other	10.0%	53.9
MULTI Non-Lavatory/Kitchen Faucets	10.0%	188.5
MULTI Irrigation	10.0%	182.6
MULTI Pools	10.0%	4.4
MULTI Wash Down	10.0%	8.8
MULTI Car Washing	10.0%	8.8
MULTI External Leakage	10.0%	15.4

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	25.000%
Only Affects New Accts	✓

Costs			
View:	Summary		
	Utility	Customer	Total
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	\$383,320	\$522,709	\$906,028
2036	\$380,098	\$518,316	\$898,415
2037	\$380,098	\$518,316	\$898,415
2038	\$380,098	\$518,316	\$898,415
2039	\$380,098	\$518,316	\$898,415
2040	\$380,098	\$518,316	\$898,415
2041	\$2,652,564	\$3,617,133	\$6,269,698
2042	\$2,652,564	\$3,617,133	\$6,269,698
2043	\$2,652,564	\$3,617,133	\$6,269,698
2044	\$2,652,564	\$3,617,133	\$6,269,698
2045	\$2,652,564	\$3,617,133	\$6,269,698
2046	\$0	\$0	\$0
2047	\$0	\$0	\$0
2048	\$0	\$0	\$0
2049	\$0	\$0	\$0
2050	\$0	\$0	\$0

Targets		
View	Accounts	Total
	MULTI	
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	14	14
2036	14	14
2037	14	14
2038	14	14
2039	14	14
2040	14	14
2041	96	96
2042	96	96
2043	96	96
2044	96	96
2045	96	96
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings	
Units	mgd
	Total Savings (mgd)
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	0.001855
2036	0.003670
2037	0.005463
2038	0.007237
2039	0.008994
2040	0.010735
2041	0.022999
2042	0.035089
2043	0.047044
2044	0.058891
2045	0.070653
2046	0.070502
2047	0.070359
2048	0.070224
2049	0.070097
2050	0.069977



Fixture Retrofit on Resale or Water Account Change

Overview

Name: Fixture Retrofit on Resale or Water Account Change

Abbr: 21

Category: Default

Measure Type: Standard Measure

Time Period

First Year: 2020

Last Year: 2050

Measure Length: 31

Measure Life

Permanent: ☒

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	\$300.00	\$100.00	1
MULTI	\$450.00	\$200.00	3
BUS	\$450.00	\$200.00	3
IND	\$450.00	\$200.00	3
OTHER	\$450.00	\$200.00	3

Administration Costs

Method: Percent

Markup Percentage: 12%

Description

This is an existing code requiring fixture retrofit upon resale or permitted alteration. Model assumes agencies will take active role in ensuring compliance, in participation by sending retrofit letters to new accounts holders who do not have a certificate on file. Random inspections would be conducted by utility staff to ensure process is valid and yields fixture replacements.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSL	REDL	INDL	INSTL	FFR	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leaks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
External Leaks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSL	REDL	INDL	INSTL	FFR	HYD
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leaks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Baths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
External Leaks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

> Utility Costs - Random inspections would be conducted by utility staff to ensure process is valid and yields fixture replacements. Assume staff avg fully burdened Rate with fringe and overhead is \$150/hr., (ACWD Water Conservation Rate is \$55/hr. for base rate with fringe and overhead add 1.68%) UPDATED BY ACWD Assuming 2 hours for single family and 3 for MF/CII on average per site, assuming inspections are random. Assume a typical unit has 2 toilets, 1 showerhead, 2 bath aerators, and 1 kitchen aerator replaced as needed. Non-residential units are assume to have 1 urinal too. Assume multiple units per non-SF account.

> Customer Costs - Represent any fixture cost to comply with California standards. CII cost accounts for urinals too.

> Administration Costs - 12% costs represent staff time to administer the measure.

> End Use Water Savings - Savings from this code measure assume 2.2 gpm faucets, 2.5 showerheads, 1.6 gpf toilets and 1.0 gpf urinals are replaced with 1.2 gpm bathroom aerators (\$1/ea.), 1.8 gpm kitchen aerators (\$2.10/ea.), 1.8 gpm showerheads (\$4.60/ea.), 1.28 gpf (\$100/ea.), and 0.125 gpf urinals (\$150/ea.).

> Targets - Target % percent of accounts is a conservative assumption for recent resale and water account change rates.

> This measure is modeled through the full analysis period in order to reach ALL pre-1992 housing stock.

Results

Units: MG

Average Water Savings (mgd): 0.087228

Lifetime Savings - Present Value (\$)

	Utility	Customer
Utility	\$3,367,340	
Community	\$7,027,447	

Lifetime Costs - Present Value (\$)

	Utility	Customer
Utility	\$1,916,083	
Community	\$2,496,752	

Benefit to Cost Ratio

	Utility	Community
Utility	1.76	
Community	2.81	

Cost of Savings per Unit Volume (\$/mg)

	Utility	Community
Utility	\$1,940	
Community		\$1,940

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	20.0%	26.3
MULTI Toilets	20.0%	266.6
BUS Toilets	20.0%	142.3
IND Toilets	20.0%	159.6
OTHER Toilets	20.0%	154.0
BUS Urinals	87.5%	48.4
IND Urinals	87.5%	44.6
OTHER Urinals	87.5%	46.2
RES Lavatory Faucets	45.5%	8.1
MULTI Lavatory Faucets	45.5%	90.2
BUS Lavatory Faucets	45.5%	36.1
IND Lavatory Faucets	45.5%	32.4
OTHER Lavatory Faucets	45.5%	66.5
RES Showers	28.0%	35.5
MULTI Showers	28.0%	296.2
BUS Showers	28.0%	94.9
IND Showers	28.0%	44.6
OTHER Showers	28.0%	77.0
RES Non-Lavatory/Kitchen Faucets	18.2%	21.0
MULTI Non-Lavatory/Kitchen Faucets	18.2%	188.5
BUS Non-Lavatory/Kitchen Faucets	18.2%	60.7
IND Non-Lavatory/Kitchen Faucets	18.2%	80.3
OTHER Non-Lavatory/Kitchen Faucets	18.2%	56.7

Targets

Target Method: Percentage

	% of Accts Targeted/Yr	Only Affects New Accts
Percentage	0.200%	<input type="checkbox"/>

Costs

View: Summary

	Utility	Customer	Total
2020	\$80,699	\$24,517	\$105,216
2021	\$80,916	\$24,580	\$105,497
2022	\$81,133	\$24,644	\$105,777
2023	\$81,349	\$24,707	\$106,056
2024	\$81,565	\$24,769	\$106,334
2025	\$81,780	\$24,832	\$106,612
2026	\$82,068	\$24,910	\$106,978
2027	\$82,355	\$24,988	\$107,343
2028	\$82,643	\$25,066	\$107,708
2029	\$82,930	\$25,144	\$108,073
2030	\$83,216	\$25,221	\$108,438
2031	\$83,512	\$25,305	\$108,818
2032	\$83,808	\$25,389	\$109,198
2033	\$84,105	\$25,473	\$109,578
2034	\$84,401	\$25,557	\$109,958
2035	\$84,697	\$25,641	\$110,338
2036	\$84,993	\$25,726	\$110,719
2037	\$85,289	\$25,810	\$111,099
2038	\$85,585	\$25,894	\$111,479
2039	\$85,881	\$25,979	\$111,860
2040	\$86,177	\$26,063	\$112,240
2041	\$86,685	\$26,827	\$113,512
2042	\$91,193	\$27,590	\$118,784
2043	\$93,701	\$28,354	\$122,056
2044	\$96,209	\$29,118	\$125,327
2045	\$98,717	\$29,882	\$128,599
2046	\$98,717	\$29,882	\$128,599
2047	\$98,717	\$29,882	\$128,599
2048	\$98,717	\$29,882	\$128,599
2049	\$98,717	\$29,882	\$128,599
2050	\$98,717	\$29,882	\$128,599

Targets


View: Accounts

	RES	MULTI	BUS	IND	OTHER	Total
2020	148	9	8	2	1	169
2021	148	9	8	2	1	169
2022	148	9	8	2	1	169
2023	148	9	8	2	1	169
2024	148	9	8	2	1	169
2025	148	9	8	2	1	169
2026	148	9	9	2	2	170
2027	148	9	9	2	2	170
2028	148	9	9	2	2	170
2029	148	9	9	2	2	170
2030	148	10	9	2	2	170
2031	148	10	9	2	2	171
2032	148	10	9	2	2	171
2033	148	10	9	2	2	171
2034	148	10	9	2	2	171
2035	148	10	9	2	2	171
2036	148	10	9	2	2	172
2037	148	10	9	2	2	172
2038	148	10	9	2	2	172
2039	148	11	9	2	2	172
2040	148	11	10	2	2	172
2041	148	11	10	2	2	174
2042	148	12	11	3	2	176
2043	148	13	12	3	2	177
2044	148	14	12	3	2	179
2045	148	14	13	3	2	181
2046	148	14	13	3	2	181
2047	148	14	13	3	2	181
2048	148	14	13	3	2	181
2049	148	14	13	3	2	181
2050	148	14	13	3	2	181

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.006528
2021	0.012852
2022	0.018994
2023	0.024970
2024	0.030798
2025	0.036491
2026	0.042058
2027	0.047522
2028	0.052895
2029	0.058187
2030	0.063406
2031	0.068551



ACWD Public & School Education

Overview

Name ACWD Public & School Education
Abbr 22
Category Default
Measure Type Standard Measure

Time Period

First Year 2020
Last Year 2050
Measure Length 31

Measure Life

Permanent ☐
Years 2
Repeat ☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	\$3.50	\$0.00	1

Administration Costs

Method: Percent
Markup Percentage 15%

Description

ACWD public and school education program measure that includes the following aspects: Recognition Programs for Water Savings by Residences & Apartments Program, Recognition Programs for Water Savings by Businesses, Recognition Programs for Water Savings by Residences & Apartments Program, Recognition Programs for Water Savings by Businesses, Outdoor Residential focused Public Awareness Information Program, Efficient Outdoor Use Education and Training Programs, Train Landscape Maintenance Workers (Green Gardener Program), Networking with Landscaping Industry, Landscape Water Calculator, Xeriscape Demonstration Gardens, Conservation Print Media, Electronic Conservation Options/Web Site/Social Media, Speakers Bureau/Event Participation, Media Campaign: such as the "Use Only What You Need" or "Beat the Peak", Billing Report Educational Tool, Conservation Print Media, Electronic Conservation Options/Web Site/Social Media, Speakers Bureau/Event Participation, Media Campaign: such as the "Use Only What You Need" or "Beat the Peak", Billing Report Educational Tool, Car Wash Coupon, Shade Tree Program

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLC	RELS	INDLD	INSTLL	FRE	HYD
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLC	RELS	INDLD	INSTLL	FRE	HYD
Toilets	<input checked="" type="checkbox"/>										
Urinals	<input checked="" type="checkbox"/>										
Lavatory Faucets	<input checked="" type="checkbox"/>										
Showers	<input checked="" type="checkbox"/>										
Dishwashers	<input checked="" type="checkbox"/>										
Clothes Washers	<input checked="" type="checkbox"/>										
Process	<input checked="" type="checkbox"/>										
Kitchen Spray Rinse	<input checked="" type="checkbox"/>										
Internal Leakage	<input checked="" type="checkbox"/>										
Baths	<input checked="" type="checkbox"/>										
Other	<input checked="" type="checkbox"/>										
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>										
Irrigation	<input checked="" type="checkbox"/>										
Pools	<input checked="" type="checkbox"/>										
Wash Down	<input checked="" type="checkbox"/>										
Car Washing	<input checked="" type="checkbox"/>										
External Leakage	<input checked="" type="checkbox"/>										
Outdoor	<input checked="" type="checkbox"/>										
Cooling	<input checked="" type="checkbox"/>										

Comments

> Utility Cost - Utility costs include the following: dye tabs, shower timers, dish scrapers, plumbers tape, drip gauge, tank bags, adult stickers, website hosting and support, print ads, radio ads, signs, internet ads, events, realtor lunch, hospitality lunch, bill stuffer, printed collateral, customer appreciation, and tourism collateral. Might include school education outreach materials such as stickers, coloring books and activity books. ACWD public and school education costs broken out into: \$35K estimated WC staff time devoted to general WC outreach ~5 hours per week at \$150/hr., \$35K estimated PA staff time devoted to general WC outreach ~5 hours per week at \$150/hr., \$20K for materials, \$60K for school education. Approx. a total of \$150,000 per year.

> Customer Cost - No Customer Cost

> End Use Water Savings - Public info water savings range is 0.1%-0.5% on each end use. Assumed the average of 0.25%

> Targets - Target all end uses 50% of residential accounts per yr.

Results

Units MG
Average Water Savings (mgd) 0.035328
Lifetime Savings - Present Value (\$) Utility \$1,534,641
Community \$3,453,896
Lifetime Costs - Present Value (\$) Utility \$3,314,530
Community \$3,314,530
Benefit to Cost Ratio Utility 0.46
Community 1.04
Cost of Savings per Unit Volume (\$/mg) Utility \$8,286

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	0.3%	26.3
RES Lavatory Faucets	0.3%	8.1
RES Showers	0.3%	35.5
RES Dishwashers	0.3%	4.8
RES Clothes Washers	0.3%	17.3
RES Internal Leakage	0.3%	22.6
RES Baths	0.3%	6.5
RES Other	0.3%	19.4
RES Non-Lavatory/Kitchen Faucets	0.3%	21.0
RES Irrigation	0.3%	42.0
RES Pools	0.3%	1.0
RES Wash Down	0.3%	2.0
RES Car Washing	0.3%	2.0
RES External Leakage	0.3%	3.5

Targets

Target Method: Percentage

	% of Accts Targeted/Yr	50.000%
Only Affects New Accts	<input type="checkbox"/>	

Costs

View: Summary

	Utility	Customer	Total
2020	\$149,185	\$0	\$149,185
2021	\$149,185	\$0	\$149,185
2022	\$149,185	\$0	\$149,185
2023	\$149,185	\$0	\$149,185
2024	\$149,185	\$0	\$149,185
2025	\$149,185	\$0	\$149,185
2026	\$149,185	\$0	\$149,185
2027	\$149,185	\$0	\$149,185
2028	\$149,185	\$0	\$149,185
2029	\$149,185	\$0	\$149,185
2030	\$149,185	\$0	\$149,185
2031	\$149,185	\$0	\$149,185
2032	\$149,185	\$0	\$149,185
2033	\$149,185	\$0	\$149,185
2034	\$149,185	\$0	\$149,185
2035	\$149,185	\$0	\$149,185
2036	\$149,185	\$0	\$149,185
2037	\$149,185	\$0	\$149,185
2038	\$149,185	\$0	\$149,185
2039	\$149,185	\$0	\$149,185
2040	\$149,185	\$0	\$149,185
2041	\$149,185	\$0	\$149,185
2042	\$149,185	\$0	\$149,185
2043	\$149,185	\$0	\$149,185
2044	\$149,185	\$0	\$149,185
2045	\$149,185	\$0	\$149,185
2046	\$149,185	\$0	\$149,185
2047	\$149,185	\$0	\$149,185
2048	\$149,185	\$0	\$149,185
2049	\$149,185	\$0	\$149,185
2050	\$149,185	\$0	\$149,185

Targets

View: Accounts

	RES	Total
2020	37,065	37,065
2021	37,065	37,065
2022	37,065	37,065
2023	37,065	37,065
2024	37,065	37,065
2025	37,065	37,065
2026	37,065	37,065
2027	37,065	37,065
2028	37,065	37,065
2029	37,065	37,065
2030	37,065	37,065
2031	37,065	37,065
2032	37,065	37,065
2033	37,065	37,065
2034	37,065	37,065
2035	37,065	37,065
2036	37,065	37,065
2037	37,065	37,065
2038	37,065	37,065
2039	37,065	37,065
2040	37,065	37,065
2041	37,065	37,065
2042	37,065	37,065
2043	37,065	37,065
2044	37,065	37,065
2045	37,065	37,065
2046	37,065	37,065
2047	37,065	37,065
2048	37,065	37,065
2049	37,065	37,065
2050	37,065	37,065

Water Savings

Units mgd
Total Savings (mgd)

2020	0.019310
2021	0.038376
2022	0.038147
2023	0.037932
2024	0.037730
2025	0.037540
2026	0.037360
2027	0.037184
2028	0.036981
2029	0.036775
2030	0.036568
2031	0.036358
2032	0.036163
2033	0.035981
2034	0.035812
2035	0.035655
2036	0.035507
2037	0.035369
2038	0.035240
2039	0.035118
2040	0.035004
2041	0.034896
2042	0.034795
2043	0.034700
2044	0.034611
2045	0.034527
2046	0.034447
2047	0.034372
2048	0.034300
2049	0.034233
2050	0.034168




Water Budget-Based Billing

Description
Develop individualized monthly water budgets for all 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 are based on size of the irrigated area and average indoor use estimates. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Would require rate study and capable billing software.

Comments
> Utility Cost: 1 hr staff (\$150/hr) time per SF/M/CI meter on average to establish or revise outdoor budget.
> Customer Cost: Customer cost represents average cost to implement any water savings actions done by customers as a result of their budget.
> End Use Water Savings: Using variance program and Aurora program estimates on average customers are 15% over budget or "expected" water use.
Customers on average will become slightly more efficient because of cost of being inefficient so assume 0.5%-3% savings
> Targets: 1% of accounts targeted annually

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	1.000%
Only Affects New Accts	<input type="checkbox"/>

Water Savings	
Units	mgd
	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.001606
2024	0.003206
2025	0.004801
2026	0.006391
2027	0.007976
2028	0.009553
2029	0.011123
2030	0.012685
2031	0.012670
2032	0.012660
2033	0.012655
2034	0.012653
2035	0.012654
2036	0.012658
2037	0.012664
2038	0.012673
2039	0.012683
2040	0.012695
2041	0.012731
2042	0.012798
2043	0.012896
2044	0.013024
2045	0.013182
2046	0.013340
2047	0.013495
2048	0.013647
2049	0.013766
2050	0.013854



AMI Portal Data Analysis

Time Period

First Year 2023

Last Year 2050

Measure Length 28

Measure Life

Permanent

Overview

Name

AMI Portal Data Analysis

Abbrev

25

Category

Default

Measure Type

Standard Measure

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLDS	RELD	INDLDS	INSTLDS	FIRE	HYD
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End Uses

Toilets	Urinals	Lavatory Faucets	Showers	Dishwashers	Clothes Washers	Process	Kitchen Spray/Rinse	Internal Leakage	Baths	Other	Non-Lavatory/Kitchen Faucets	Irrigation	Pools	Wash Down	Car Washing	External Leakage	Outdoor	Cooling
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

> Utility & Admin Cost: Per ACWD's direction, a set cost of \$140,000/year (1 staff person dedicated to this project, with F&O) to cover AMI utility staff time to track and monitor program through a typical customer portal. This was done by selecting \$0 for utility cost and setting a fixed admin cost of \$140,000.

> Customer Costs - Customer cost includes leak repair.

> End Use Water Savings - AMI savings based on significant reductions to leakage and irrigation end uses. Savings based on SFPUC case study per Julie Ortiz ppt at 2019 Peer-to-Peer "AMI: Everything you need to know to run a successful program." Savings are estimated to be 20%-50% on leakage (internal and external) with a potential additional 5% savings on all other end uses due to behavioral changes, 5% savings to irrigation. ACWD Edits: based on AMI Grant and research, changed to 30% leak savings and kept 5% on end uses.

> Targets - Assumes 60,739 Electronic Bill Payment and Presentment (EBPP) customers as of Sept 2020. 50% is 30,370, divided by 3 years 10,123 accounts/year in 2023, 2024, and 2025 for RES only. 12-22-20: changed classes to include all customers, same end uses as for Residential, target to 1.5% of account per year, over 31 years, which in the end impacts just under 50% of all accounts.

Results

Units

mgd

Average Water Savings (mgd)

0.454117

Lifetime Savings - Present Value (\$)

\$16,883,027

Utility

\$51,169,751

Lifetime Costs - Present Value (\$)

\$2,700,228

Community

\$12,451,287

Benefit to Cost Ratio

6.25

Utility

4.11

Community

\$525

Cost of Savings per Unit Volume (\$/mg)

\$525

End Use Savings Per Replacement

Method	Percent	% Savings/Account	Avg GPD/Account	% Savings/Account	Avg GPD/Account
RES Lavatory Faucets	5.0%	8.1	IND Internal Leak	30.0%	127.2
RES Showers	5.0%	35.5	OTHER Internal	30.0%	77.0
RES Dishwashers	5.0%	4.8	MULTI Other	5.0%	53.9
RES Clothes Washers	5.0%	17.3	BUS Other	5.0%	63.6
RES Internal Leakage	30.0%	22.6	IND Other	5.0%	125.0
RES Other	5.0%	19.4	OTHER Other	5.0%	100.1
RES Non-Lavatory/Kitchen Faucets	5.0%	21.0	MULTI Non-Lavato	5.0%	188.5
RES Irrigation	5.0%	42.0	BUS Non-Lavato	5.0%	60.7
RES Wash Down	5.0%	2.0	IND Non-Lavato	5.0%	80.3
RES Car Washing	5.0%	2.0	OTHER Non-Lav	5.0%	56.7
RES External Leakage	30.0%	3.5	MULTI Irrigation	5.0%	182.6
MULTI Lavatory Faucets	5.0%	90.2	BUS Irrigation	5.0%	136.3
BUS Lavatory Faucets	5.0%	36.1	IND Irrigation	5.0%	421.7
IND Lavatory Faucets	5.0%	32.4	OTHER Irrigation	5.0%	683.2
OTHER Lavatory Faucets	5.0%	66.5	BUSLDS Irrigati	5.0%	1,994.2
MULTI Showers	5.0%	296.2	RELD Irrigation	5.0%	2,036.9
BUS Showers	5.0%	94.9	INDLDS Irrigati	5.0%	2,253.5
IND Showers	5.0%	44.6	INSTLDS Irrigati	5.0%	852.6
OTHER Showers	5.0%	77.0	MULTI Wash Do	5.0%	8.8
MULTI Dishwashers	5.0%	20.2	MULTI Car Was	5.0%	8.8
BUS Dishwashers	5.0%	66.4	MULTI External	30.0%	15.4
IND Dishwashers	5.0%	55.8	BUS External Leak	30.0%	12.2
MULTI Clothes Washers	5.0%	228.9	IND External Leak	30.0%	40.4
BUS Clothes Washers	5.0%	151.8	OTHER External	30.0%	65.5
IND Clothes Washers	5.0%	89.3	BUSLDS External	30.0%	105.0
OTHER Clothes Washers	5.0%	107.8	RELD External	30.0%	107.2
MULTI Internal Leakage	30.0%	161.6	INDLDS External	30.0%	118.6
BUS Internal Leakage	30.0%	104.4	INSTLDS External	30.0%	44.9

Administration Costs

Method

Fixed

Annual Admin Costs

\$140,000

Description

Program provides customer portal for accounts with AMI meters capable of providing continuous consumption data to customers and utility. System provides identification and notification of suspected customer leaks as well as improved customer service and enhanced ability to identify water theft. This measure is only applicable to agencies that already have AMI.

Targets

Target Method	Percentage
% of Accts Targeted/Yr	1.500%
Only Affects New Accts	

Costs

View	Summary	Utility	Customer	Total
2020		\$0	\$0	\$0
2021		\$0	\$0	\$0
2022		\$0	\$0	\$0
2023	\$140,000	\$482,438	\$622,438	
2024	\$140,000	\$483,267	\$623,267	
2025	\$140,000	\$484,094	\$624,094	
2026	\$140,000	\$485,141	\$625,141	
2027	\$140,000	\$486,187	\$626,187	
2028	\$140,000	\$487,233	\$627,233	
2029	\$140,000	\$488,277	\$628,277	
2030	\$140,000	\$489,320	\$629,320	
2031	\$140,000	\$490,489	\$630,489	
2032	\$140,000	\$491,658	\$631,658	
2033	\$140,000	\$492,827	\$632,827	
2034	\$140,000	\$493,996	\$633,996	
2035	\$140,000	\$495,165	\$635,165	
2036	\$140,000	\$496,347	\$636,347	
2037	\$140,000	\$497,529	\$637,529	
2038	\$140,000	\$498,712	\$638,712	
2039	\$140,000	\$499,894	\$639,894	
2040	\$140,000	\$501,076	\$641,076	
2041	\$140,000	\$511,856	\$651,856	
2042	\$140,000	\$522,637	\$662,637	
2043	\$140,000	\$533,417	\$673,417	
2044	\$140,000	\$544,197	\$684,197	
2045	\$140,000	\$554,978	\$694,978	
2046	\$140,000	\$554,978	\$694,978	
2047	\$140,000	\$554,978	\$694,978	
2048	\$140,000	\$554,978	\$694,978	
2049	\$140,000	\$554,978	\$694,978	
2050	\$140,000	\$554,978	\$694,978	

Targets

View	Accounts	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELD	INDLDS	INSTLDS	Total
2020		0	0	0	0	0	0	0	0	0	0
2021		0	0	0	0	0	0	0	0	0	0
2022		0	0	0	0	0	0	0	0	0	0
2023	1,112	66	62	17	11	8	11	5	15	1,307	
2024	1,112	66	63	17	11	8	11	5	15	1,308	
2025	1,112	67	64	17	11	8	11	5	15	1,309	
2026	1,112	68	64	17	11	8	11	5	15	1,311	
2027	1,112	69	65	16	11	8	11	5	15	1,313	
2028	1,112	70	65	16	11	8	12	5	15	1,314	
2029	1,112	71	66	16	11	8	12	5	15	1,316	
2030	1,112	71	67	16	11	8	12	5	15	1,318	
2031	1,112	72	67	16	12	8	12	5	16	1,319	
2032	1,112	73	68	16	12	8	12	5	16	1,321	
2033	1,112	74	68	16	12	8	12	5	16	1,323	
2034	1,112	75	69	16	12	8	12	5	16	1,325	
2035	1,112	76	69	16	12	8	12	5	16	1,326	
2036	1,112	76	70	16	12	8	13	5	16	1,328	
2037	1,112	77	70	17	12	8	13	5	16	1,330	
2038	1,112	78	71	17	12	9	13	5	16	1,332	
2039	1,112	79	71	17	12	9	13	5	16	1,334	
2040	1,112	80	72	17	12	9	13	5	16	1,335	
2041	1,112	86	77	18	12	9	14	5	17	1,350	
2042	1,112	91	82	19	13	10	15	6	17	1,365	
2043	1,112	97	87	21	13	10	16	6	18	1,380	
2044	1,112	103	92	22	13	11	17	6	18	1,395	
2045	1,112	109	97	23	14	12	18	7	18	1,409	
2046	1,112	109	97	23	14	12	18	7	18	1,409	
2047	1,112	109	97	23	14	12	18	7	18	1,409	
2048	1,112	109	97	23	14	12	18	7	18	1,409	
2049	1,112	109	97	23	14	12	18	7	18	1,409	
2050	1,112	109	97	23	14	12	18	7	18	1,409	

Water Savings

Units	mgd	Total Savings (mgd)
2020		0.000000
2021		0.000000
2022		0.000000
2023		0.034128
2024		0.068179
2025		0.102167
2026		0.136144
2027		0.170110
2028		0.204011
2029		0.237872
2030		0.271692
2031		0.305481
2032		0.339319
2033		0.373221
2034		0.407200
2035		0.441267
2036		0.475434
2037		0.509708
2038		0.544097
2039		0.578607
2040		0.613242
2041		0.648902
2042		0.685875
2043		0.724153
2044		0.763734
2045		0.804612
2046		0.845654
2047		0.886684
2048		0.927704
2049		0.968716
2050		1.009721



Prohibition of Water Waste & Practices

Overview	
Name	Prohibition of Water Waste & Practices
Abbr	26
Category	Default
Measure Type	Standard Measure

Time Period		Measure Life	
First Year	2020	Permanent	<input type="checkbox"/>
Last Year	2050	Years	5
Measure Length	31	Repeat	<input type="checkbox"/>

Fixture Cost per Device			
	Utility	Customer	Fix/Acct
RES	\$200.00	\$50.00	1
MULTI	\$200.00	\$100.00	1
BUS	\$200.00	\$100.00	1
IND	\$200.00	\$100.00	1
OTHER	\$200.00	\$100.00	1

Administration Costs	
Method: Percent	
Markup Percentage	15%

Description

This ordinance prohibits water waste as defined as gutter flooding and failure to repair leaks in a timely manner. Residential customers shall not water lawns or gardens resulting in flooding or excessive run off; use water for washing sidewalks, walkways, driveways, or other hard surfaces which result in excessive run off; and use of water for washing cars, trailers, boats, or other vehicles that result in excessive run off of water. Hoses should be equipped with shut off nozzles. Nonresidential customers shall not use single pass cooling systems in new connections; use non-recirculating systems in new conveyor car wash and commercial laundry systems; use non-recycling decorative fountains; use water for watering lawns or gardens that result in flooding or excessive runoff; and use water for washing sidewalks, walkways, driveways, and other hard surfaces in a manner that results in excessive runoff.

Customer Classes											
RES	MULTI	BUS	IND	OTHER	BUSL	RELD	INDL	INSTL	FIRE	HYD	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

End Uses											
RES	MULTI	BUS	IND	OTHER	BUSL	RELD	INDL	INSTL	FIRE	HYD	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Toilets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Urinals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lavatory Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Showers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dishwashers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clothes Washers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Kitchen Spray Rinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bathtubs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Non-Lavatory/Kitchen Faucets	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irrigation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wash Down	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Car Washing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
External Leakage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Outdoor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cooling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

> Utility Costs - Utility costs and target to be based on historical non-drought Water Waste Reports database annual average. Assume less staff time for SF contact and enforcement.

> Customer Costs - Assume \$50/SF customer cost and \$100 MF/CII cost to fix irrigation water waste/leak - most visible water waste is irrigation.

> Administration Costs - represents staff time to identify waste and investigate the water waste calls. Admin time can vary from 1-2 hours per week of office time depending on call volume to manage the letters and manage the program. Assume average of 1.5 hours per week to manage the program and database tracking.

> End Use Water Savings - Savings of 6% approximately equates to an account having a leak of 33 gallons per day. Assumed 3% water savings per account to be conservative since not all site visits reveal water waste which yield water savings.

> Targets - Assume 0.062% of accounts targeted per year based off of 2016-2019 water waste reports. An average of 52 water waste reports a year over all customer accounts.

FYI - ACWD Water Waste ordinance link:
<https://www.acwd.org/DocumentCenter/View/1464/Ord-2008-01-Water-Waste?bidid=>

> Watering days per week element is not enforced.

Results	
Units	MG
Average Water Savings (mgd)	
0.000884	
Lifetime Savings - Present Value (\$)	
Utility	\$36,943
Community	\$83,564
Lifetime Costs - Present Value (\$)	
Utility	\$273,022
Community	\$340,672
Benefit to Cost Ratio	
Utility	0.14
Community	0.25
Cost of Savings per Unit Volume (\$/mg)	
Utility	\$27,276

End Use Savings Per Replacement		
Method:	Percent	
RES Internal Leakage	3.0%	22.6
MULTI Internal Leakage	3.0%	161.6
BUS Internal Leakage	3.0%	104.4
IND Internal Leakage	3.0%	127.2
OTHER Internal Leakage	3.0%	77.0
RES Irrigation	3.0%	42.0
MULTI Irrigation	3.0%	182.6
BUS Irrigation	3.0%	136.3
IND Irrigation	3.0%	421.7
OTHER Irrigation	3.0%	683.2
RES Wash Down	3.0%	2.0
MULTI Wash Down	3.0%	8.8
RES Car Washing	3.0%	2.0
MULTI Car Washing	3.0%	8.8
RES External Leakage	3.0%	3.5
MULTI External Leakage	3.0%	15.4
BUS External Leakage	3.0%	12.2
IND External Leakage	3.0%	40.4
OTHER External Leakage	3.0%	65.5
BUS Cooling	3.0%	26.2
IND Cooling	3.0%	115.5
OTHER Cooling	3.0%	140.4

Targets	
Target Method:	Percentage
% of Accts Targeted/Yr	0.062%
Only Affects New Accts	<input type="checkbox"/>

Costs			
View:	Summary		
	Utility	Customer	Total
2020	\$12,027	\$2,931	\$14,958
2021	\$12,037	\$2,936	\$14,973
2022	\$12,048	\$2,940	\$14,988
2023	\$12,058	\$2,945	\$15,002
2024	\$12,068	\$2,949	\$15,017
2025	\$12,078	\$2,953	\$15,032
2026	\$12,092	\$2,959	\$15,051
2027	\$12,105	\$2,965	\$15,070
2028	\$12,119	\$2,971	\$15,090
2029	\$12,132	\$2,977	\$15,109
2030	\$12,146	\$2,983	\$15,129
2031	\$12,160	\$2,989	\$15,149
2032	\$12,174	\$2,995	\$15,169
2033	\$12,188	\$3,001	\$15,189
2034	\$12,202	\$3,007	\$15,209
2035	\$12,216	\$3,013	\$15,229
2036	\$12,230	\$3,019	\$15,249
2037	\$12,244	\$3,025	\$15,269
2038	\$12,258	\$3,031	\$15,289
2039	\$12,272	\$3,037	\$15,309
2040	\$12,286	\$3,044	\$15,329
2041	\$12,404	\$3,095	\$15,499
2042	\$12,522	\$3,146	\$15,668
2043	\$12,640	\$3,198	\$15,838
2044	\$12,759	\$3,249	\$16,008
2045	\$12,877	\$3,301	\$16,177
2046	\$12,877	\$3,301	\$16,177
2047	\$12,877	\$3,301	\$16,177
2048	\$12,877	\$3,301	\$16,177
2049	\$12,877	\$3,301	\$16,177
2050	\$12,877	\$3,301	\$16,177

Targets							
View	Accounts	RES	MULTI	BUS	IND	OTHER	Total
2020	46	3	2	1	0	0	52
2021	46	3	3	1	0	0	52
2022	46	3	3	1	0	0	52
2023	46	3	3	1	0	0	52
2024	46	3	3	1	0	0	52
2025	46	3	3	1	0	0	53
2026	46	3	3	1	0	0	53
2027	46	3	3	1	0	0	53
2028	46	3	3	1	0	0	53
2029	46	3	3	1	0	0	53
2030	46	3	3	1	0	0	53
2031	46	3	3	1	0	0	53
2032	46	3	3	1	0	0	53
2033	46	3	3	1	0	0	53
2034	46	3	3	1	0	0	53
2035	46	3	3	1	0	0	53
2036	46	3	3	1	0	0	53
2037	46	3	3	1	0	0	53
2038	46	3	3	1	0	0	53
2039	46	3	3	1	0	0	53
2040	46	3	3	1	0	0	53
2041	46	4	3	1	1	1	54
2042	46	4	3	1	1	1	55
2043	46	4	4	1	1	1	55
2044	46	4	4	1	1	1	55
2045	46	4	4	1	1	1	56
2046	46	4	4	1	1	1	56
2047	46	4	4	1	1	1	56
2048	46	4	4	1	1	1	56
2049	46	4	4	1	1	1	56
2050	46	4	4	1	1	1	56

Water Savings	
Units	mgd
Total Savings (mgd)	
2020	0.000176
2021	0.000353
2022	0.000530
2023	0.000707
2024	0.000884
2025	0.000886
2026	0.000888
2027	0.000890
2028	0.000893
2029	0.000895
2030	0.000898
2031	0.000901
2032	0.000904
2033	0.000907
2034	0.000910
2035	0.000914
2036	0.000917
2037	0.000921
2038	0.000924
2039	0.000927
2040	0.000931
2041	0.000940
2042	0.000953
2043	0.000972
2044	0.000996
2045	0.001026
2046	0.001049
2047	0.001066
2048	0.001078
2049	0.001084
2050	0.001084

APPENDIX F – WATER USE EFFICIENCY ANALYSIS RESULTS

This appendix presents benefit-cost analysis results for individual water use efficiency measures incorporated into strategies. Table F-1 presents how much water the measures will save through 2030, how much they will cost, and the cost of saved water per unit volume *if the measures were to be implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses)*. Savings from measures which address the same end use(s) are not additive; the model uses impact factors to avoid double counting in estimating the water savings from programs of measures.³² This is why a measure like “ACWD Public & School Education” may show a distorted cost in comparison to water saved. Most, if not all measures rely on public awareness. However, it is important to note that water savings are more directly attributable to an “active” measure, like a toilet rebate, than the less “active” public education/awareness measure that informs the community of the active measure.

Since interaction between measures has not been accounted for in Table F-1, it is not appropriate to include totals at the bottom of the table. However, the table is useful to give a close approximation of the cost effectiveness of each measure.

Cost categories are defined as follows:

- ◆ Utility Costs – those costs that ACWD as a water utility will incur to operate the measure, including administrative costs.
- ◆ Utility Benefits – the avoided cost of producing water at the identified rate \$1,742/AF. More information about the source of this value can be found in Section 6.2.
- ◆ Customer (Community) Costs – those costs customers will incur to implement a measure in ACWD’s water use efficiency strategy and maintain its effectiveness over the life of the measure.
- ◆ Customer (Community) Benefits – the additional savings, such as energy savings resulting from reduced use of hot water. These savings are additional as customers would also have reduced water bills (since the utility costs and benefits transfer to the customers).
- ◆ Community Costs – includes Utility Costs plus Customer Costs.
- ◆ Community Benefits – includes Utility Benefits plus Customer Benefits.

The column headings in Table F-1 are defined as follows:

- ◆ Present Value (PV) of Utility and Community Costs and Benefits (\$) = the present value of the 31-year time stream of annual costs or benefits, discounted to the base year.
- ◆ Utility Benefit to Cost Ratio = PV of Utility Benefits divided by PV of Utility Costs over 31 years.
- ◆ Community Benefit to Cost Ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (PV of Utility Costs plus PV of Customer Costs), over 31 years.

³² 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 of 20%. Rather, it is the cumulative impact of the first measure reducing the use to 90% of what it was originally, without the first measure in place. Then, the revised use of 90% is reduced by another 10% ($10\% \times 90\% = 9\%$) to result in the use being 81% ($90\% - 9\% = 81\%$). In this example, the net savings is 19%, not 20%. Using impact factors, the model computes the reduction as follows, $0.9 \times 0.9 = 0.81$ or 19% water savings.

- ◆ Five Years of Water Utility Costs (\$) = the sum of the annual Utility Costs for the years 2020-2024. The measures start in the years as specified for each measure shown in Appendix E. Utility costs include administrative costs and staff labor.
- ◆ Water Savings in 2030 (AFY) = water saved in acre-feet per year. The year 2030 is provided as requested by ACWD staff to correspond with the 2020 UWMP.
- ◆ Cost of Savings per Unit Volume (\$/AF) = PV of Utility Costs over 31 years divided by the 31-year water savings. The analysis period is 2020-2050. This value is compared to the utility's avoided cost of water as ACWD's primary indicator of the cost effectiveness of water use efficiency efforts. Note that this value somewhat minimizes the cost of savings because program costs are discounted to present value, but water benefits are not.

Table F-1. Estimated Water Use Efficiency Measure Costs and Savings

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume (\$/AF)	Strategy
Commercial, Industrial, and Institutional										
CII Water Survey	\$718,528	\$1,542,562	\$382,432	\$548,707	1.88	2.81	\$75,980	21.82	\$622	A, B, C
CII Water Efficient Technology (WET) Rebate	\$3,261,467	\$6,950,306	\$4,355,840	\$7,840,512	0.75	0.89	\$566,238	61.09	\$1,440	B, C
School Building Retrofit	\$1,822,323	\$2,806,516	\$1,146,287	\$2,063,317	1.59	1.36	\$694,207	56.82	\$748	B, C
Ultra-High Efficiency Toilet Incentive	\$680,610	\$680,610	\$269,606	\$865,960	2.52	0.79	\$279,328	19.64	\$496	A, B, C
Large Landscape										
Large Landscape Outdoor Water Surveys	\$3,178,530	\$3,178,530	\$1,196,179	\$1,737,943	2.66	1.83	\$239,715	94.05	\$437	A, B, C
Large Landscape (Waterfluence)	\$5,484,743	\$5,484,743	\$1,002,658	\$1,002,658	5.47	5.47	\$298,845	202.67	\$244	A, B, C
Water Efficient Landscape Rebate	\$3,502,367	\$3,502,367	\$3,247,800	\$12,216,924	1.08	0.29	\$704,434	76.41	\$1,039	B, C
Financial Incentives for Irrigation & Landscape Upgrades	\$2,816,980	\$2,816,980	\$2,508,113	\$3,503,784	1.12	0.80	\$457,287	89.65	\$1,027	B, C

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume (\$/AF)	Strategy
Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Development	\$2,311,992	\$2,311,992	\$342,678	\$6,157,354	6.75	0.38	\$14,103	24.72	\$150	C
Landscape & Irrigation Codes	\$8,473,371	\$8,473,371	\$1,253,510	\$8,225,620	6.76	1.03	\$121,463	108.11	\$153	C
Residential (SFR and MFR)										
Residential Outdoor Water Surveys	\$3,732,798	\$3,732,798	\$5,490,246	\$6,062,147	0.68	0.62	\$569,311	111.68	\$1,674	B, C
Residential Indoor Water Surveys	\$1,123,045	\$3,013,575	\$3,067,182	\$3,680,618	0.37	0.82	\$314,145	36.74	\$3,192	C
Residential Water-Savings Devices Giveaway	\$3,224,175	\$7,949,092	\$1,442,841	\$2,597,113	2.23	3.06	\$298,775	66.90	\$496	A, B, C
Leak Repair & Plumbing Emergency Assistance	\$419,791	\$1,975,694	\$614,036	\$1,269,008	0.68	1.56	\$62,208	12.10	\$1,653	B, C
Multifamily UHET Direct Install	\$81,917	\$81,917	\$208,815	\$221,245	0.39	0.37	\$92,551	2.87	\$3,029	C
Developer Financed Zero Footprint New Development	\$664,187	\$1,596,988	\$9,204,218	\$21,755,423	0.07	0.07	\$0	0.00	\$13,164	C

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume (\$/AF)	Strategy
Fixture Retrofit on Resale or Water Account Change	\$3,367,340	\$7,027,447	\$1,916,083	\$2,496,752	1.76	2.81	\$405,662	71.07	\$632	B, C
Plumber Initiated Ultra High Efficiency Toilet Retrofit	\$735,289	\$735,289	\$1,146,038	\$1,217,220	0.64	0.60	\$370,922	27.02	\$1,825	B, C
Community and Education										
ACWD Public & School Education	\$1,534,641	\$3,453,896	\$3,314,530	\$3,314,530	0.46	1.04	\$745,923	40.99	\$2,700	A, B, C
Water Budget-Based Billing	\$406,931	\$578,595	\$2,876,005	\$2,966,050	0.14	0.20	\$291,845	14.22	\$8,101	C
AMI Portal Data Analysis	\$16,883,027	\$51,169,751	\$2,700,228	\$12,451,287	6.25	4.11	\$280,000	304.54	\$171	A, B, C
Prohibition of Water Waste & Practices	\$36,943	\$83,564	\$273,022	\$340,672	0.14	0.25	\$60,238	1.01	\$8,888	A, B, C

* The year 2030 was selected for the Water Savings (AFY) column because it demonstrates estimated projected annual water savings achievements from established measures but is not too far out to lose the savings impact from measures that do not have permanent savings. One measure has zero savings in 2030 because the measure is proposed to start in 2035.

See Table 5-1 in Section 5 for measure descriptions. Overall strategy estimated costs, water savings, and benefit-cost ratios can be found in Table 6-2 in Section 6. Additional information about the water reduction methodology, perspectives on benefits and costs, and assumptions about present value parameters and measure costs/savings can be found earlier in this Plan in Appendix D.

Note: The following measures will be further studied: (1) Multifamily Submetering for Existing Accounts (not listed in the table above because it was not included in a strategy), and (2) Developer Financed Zero Footprint New Development.

APPENDIX G – UTILIZATION OF COMMUNITY SURVEY RESULTS IN WATER EFFICIENCY MASTER PLAN

G.1 Purpose and Background

The purpose of this appendix is to summarize the utilization of the 2019 Alameda County Water District Community Survey conducted to obtain fixture saturation and customer interest information for the ACWD Water Efficiency Master Plan.

G.1.1 Demand and Water Use Efficiency Projections Analysis Process

As explained in detail in previous appendices (Appendices B-D), the Least Cost Planning Decision Support System (DSS Model), developed by Maddaus Water Management, was used in this Plan's analysis to prepare long-range water demand and water use efficiency savings projections.

First developed in 1999 and continuously updated, the DSS Model is an end-use model that breaks down total water production (i.e., water demand in the service area) into specific water end uses (toilets, faucets, irrigation etc.). This "bottom-up" approach allows for detailed criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and water use efficiency efforts. The purpose of using end-use data is to enable a more accurate assessment of the impact of water use efficiency measures on demand and to provide a rigorous and defensible modeling approach necessary for projects subject to regulatory or environmental review. The DSS Model also evaluates water use efficiency measures using benefit-cost analysis with the cost of water saved and benefit-to-cost ratio as economic indicators.

G.2 2019 ACWD Community Survey

This section will present the Community Survey methodology and specific points of application of qualitative and quantitative data in the DSS Model calculations.³³

G.2.1 Methodology

From Saturday, October 26, 2019 to Thursday, October 31, 2019, Probolsky Research conducted live-interviewer telephone and online surveys among ACWD customers. A total of 400 customers were surveyed (100 by telephone, 300 online). A survey of this size yields a margin of error of +/-5%, with a confidence level of 95%. Interviews were conducted with respondents on both landline and mobile phones (50%) and were offered in English, Mandarin (5%), and Spanish (3%). For the online survey, participants were invited to participate through email and text messages. Probolsky Research applied a stratified random sampling methodology to the sample design, ensuring that the demographic proportions of survey respondents matched the demographic composition of ACWD customers.

ACWD staff conducted outreach to the entire service area prior to initiation of the survey to educate potential participants about the survey and the reasons for conducting it. To streamline the survey question development task, MWM provided ACWD with an existing set of survey questions that directly related to water use efficiency saturation and the adoption of water use efficiency measures. ACWD modified the questions to fit its service area and to gather specific data to inform the Plan process.

³³ A detailed presentation of the survey questions and results can be found on the ACWD website at: <https://www.acwd.org/2019ACWDCommunitySurvey>.

G.2.2 Application

The 2019 ACWD Community Survey results contributed both qualitative and quantitative inputs to the DSS Model to further increase the accuracy of the assessment of water efficiency measures for ACWD by determining the following:

- ◆ **The saturation of ACWD low-flow fixtures/devices:** Community Survey results were combined with U.S. Census data, ACWD historical water use efficiency data,³⁴ and an assumed natural replacement rate per fixture to determine the current level of water-efficient fixtures and devices installed within ACWD's service area. In addition to this fixture saturation data being applied to demand projection calculations, it also identified the number of inefficient fixtures outstanding in the ACWD service area, including toilets, urinals, showers, faucets, and clothes washers.
- ◆ **The level of adoption of other water use efficiency measures:** Community Survey results provided qualitative data as to the knowledge, perceptions, and interest of ACWD customers regarding different water use efficiency topic areas. Insights from this data included community water use efficiency perceptions, communication preferences, areas of opportunity, water use behaviors, participation levels, and more. Incorporation of the data into the DSS Model enabled MWM and ACWD staff to build water use efficiency measures and programs tailored to ACWD customers with the intent that this will create maximum interest and participation.
- ◆ **The water use efficiency potential in the service area:** With the combination of the quantitative fixture saturation assessment and the qualitative community water use efficiency assessment, MWM and ACWD staff were able to evaluate, select, and build water use efficiency measures and strategies that could result in maximum participation, the highest benefit-cost ratio, and the greatest benefit to ACWD and its customers.
- ◆ **Fixture assessment:** The survey was successful in providing ACWD with a more relevant assessment of water fixture demographics and program participation in the service area and provided a good foundation for the DSS Model analysis.

Fixture Estimate Methodology – Toilets

As discussed in Appendix C, MWM reconciled water-efficient fixtures and devices installed within ACWD's service area and identified the number of inefficient fixtures outstanding. Determining the current level of efficient fixtures in a service area is part of the standard process while evaluating the passive savings in the DSS Model (called "initial fixture proportions"). MWM used the DSS Model to perform a saturation analysis for each of the following plumbing fixtures: toilets, urinals, showers, faucets, and clothes washers. These initial proportions of toilets were determined by categorizing homes by age (corresponding to efficiency levels), adding the net change due to natural replacement and rebate measures less any "free rider effect." The Community Survey (Probolsky October 2019 baseline survey) of 400 ACWD residential customers was used to refine this analysis by identifying actual saturation of low-flow fixtures/devices and level of adoption of other water use efficiency measures.

As mentioned previously in this Plan, "free-ridership" occurs when a customer applies for and receives a rebate on a targeted high efficiency fixture that they would have purchased even without a rebate. In this case, the rebate was not the incentive in their purchase but a "bonus." Rebate measures are designed to target those customers needing financial incentive to install the more efficient fixture beyond current codes or standards. In the analysis, a 25% free-ridership factor was applied to all rebates awarded. This assumption is based on industry standards and MWM team field observations and can be adjusted at ACWD's direction.

³⁴ Analysis uses past ACWD water use efficiency measure activities data (rebates for toilets, rebates for clothes washers, and device giveaways) going back approximately 10 years.

Fixture Initial Proportions – Toilets

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD's service area. These proportions were calculated by:

- ◆ Using standards in place at the time of building construction (1.6 gpf required in 1992 and 1.28 gpf required in 2014),
- ◆ Taking the initial proportions of homes by age or year built as shown in the Table G-1,
- ◆ Adding the net change due to natural replacement (2%-4% per year for toilets depending on type as presented earlier in this document),
- ◆ Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- ◆ Considering the results of the Probolsky October 2019 baseline survey.

Table G-1. Alameda County Water District Service Area Age of Housing

Year Structure Built	# of Structures	Percentage of Structures	Cumulative Percentage of Structures Built
2014 or later	1,152	1.01%	100.00%
2010 to 2013	1,406	1.23%	98.99%
2000 to 2009	5,316	4.67%	97.75%
1990 to 1999	13,493	11.84%	93.09%
1980 to 1989	32,110	28.18%	81.24%
1970 to 1979	28,046	24.62%	53.06%
1960 to 1969	19,204	16.86%	28.44%
1950 to 1959	10,288	9.03%	11.59%
1940 to 1949	1,385	1.22%	2.56%
1939 or earlier	1,526	1.34%	1.34%
Total Housing Units	113,926	100.00%	

Sources: DP04: SELECTED HOUSING CHARACTERISTICS 2017 American Community Survey 1-Year Estimates for Fremont City, California and Union City, California, and DP04: SELECTED HOUSING CHARACTERISTICS 2013-2017 American Community Survey 5-Year Estimates for Newark City, California.

A detailed analysis of how ACWD's service area's age of housing, toilet fixture replacement rates, and historical residential rebates were used to determine a preliminary estimate of residential toilet initial proportions can be found in a separate water use data sheet (WUDS) Excel file in the "Toilet Fixture Assumptions_2020" worksheet. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential toilet initial proportions presented in the following Table G-2. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion toilet estimates.

Table G-2. Preliminary Residential Toilet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate*	Notes
<1.0 gpf Toilet Residential	0%	No rebates were awarded for this fixture type. It is not code, so none were calculated or assumed.
1.28 gpf HET Residential	18.4%	Based on age of housing, AB 715 effective in 2014, 25% free-ridership, 2% replacement rate (or 50-year fixture life), and 3,621 SF toilet rebates awarded. ACWD did not offer SF rebates till 2014.
1.6 gpf ULFT Residential	48.5%	Based on age of housing, the Federal Energy Policy Act of 1992, and a 3% replacement rate (or 33-year fixture life).
High Use Toilet Residential (3.5 gpf or greater)	33.1%	Based on age of housing and 4% replacement rate (or 25-year fixture life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary toilet initial proportion estimates in the revised analysis is presented in the following Table G-3.

Table G-3. Final Residential Toilet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate ¹	Edits/Notes	Secondary/Revised/ Final Estimate ²	
<1.0 gpf Toilet Residential	0%	The Probolsky survey reported 46.3% of residential toilets were 1.28 gpf or less. Assume approximately 3% of these 46.3% toilets are <1.0 gpf or 0.8 gpf; yields 1.3%. $0\% + (3\%) \times (46.3\%) \sim 1.3\%$	1.3%	46.3%
1.28 gpf HET Residential	18.4%	The initial estimate of toilets flushing less than 1.3 gpf was 27.9% lower than the survey reported. Almost 97% of this difference was added to preliminary estimate (with the remaining 3% going to <1.0 gpf). $18.4\% + (97\%) \times (46.3\%) - 18.4\% \sim 45\%$	45.0%	
1.6 gpf ULFT Residential	48.5%	The Probolsky survey reported 46.3% of residential toilets were 1.28 gpf or less, meaning 53.7% were greater than 1.28 gpf. So, the initial estimate for all toilets greater than or equal to 1.6 gpf was too high at 81%. Assume half of the 53.7% difference are 1.6 gpf and half are > 3.5 gpf. This yields a value of approximately 14% that was subtracted from the initial estimates. $48.5\% + 33.1\% \sim 81\%$ $81\% - 53.7\% \sim 28\%$ $28\% / 2 \sim 14\%$ $48.5\% - 14\% \sim 35\%$ $33.1\% - 14\% \sim 19\%$	34.7%	53.7%
High Use Toilet Residential	33.1%		19.0%	
Total	100%		100%	100%

¹ Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

² Also considers the Probolsky October 2019 Baseline Study results.

G.2.3 Fixture Initial Proportions – Showerheads

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD's service area. These proportions were calculated by:

- ◆ Using standards in place at the time of building construction (2.5 gpm required in 1992 and 2.0 gpm required in 2016 and 1.8 gpm required in 2018),
- ◆ Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- ◆ Adding the net change due to natural replacement (4% per year),
- ◆ Adding the change due to giveaway measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- ◆ Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, showerhead replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential showerhead initial proportions, which can be found in a separate water use data sheet (WUDS) Excel document. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential showerhead initial proportions presented in the following table. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey which targeted any residential customer, was applied to the SF preliminary initial proportion showerhead estimates.

Table G-4. Preliminary Residential Showerhead Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate *	Edits/Notes
Ultra-High Efficiency 1.0 gpm	0.00%	No rebates or giveaways were awarded for this fixture type. It is not required by code.
High Efficiency 1.5 gpm	0.50%	Based on 1,096 1.5 gpm showerhead giveaways.
High Efficiency 1.8 gpm	5.00%	Based on 4% annual replacement rate and updated code requirement in 2018.
High Efficiency 2 gpm	9.70%	Based on natural replacement of 4% annual replacement and 5,497 showerhead giveaways.
Low Flow 2.5 gpm	58.80%	Based on 18.1% new building construction since 1990 and 50.8% natural replacement at a 4% annual replacement rate.
High Flow > 3 gpm	26.00%	Based on age of housing and 4% replacement rate (or 25-year fixtures life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary showerhead initial proportion estimates in the revised analysis are presented in Table G-5.

Table G-5. Final Residential Showerhead Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate ¹	Edits/Notes	Secondary/Revised/ Final Estimate ²
Ultra-High Efficiency 1.0 gpm	0.00%	No change	0.00%
High Efficiency 1.5 gpm	0.50%	No change: 0.5% due to free giveaways	0.50%
High Efficiency 1.8 gpm	5.00%	Probolsky Survey reported 49% of SF showerheads were replaced in the last 5 years or WaterSense indicating a higher percentage of HE fixtures installed than estimated in the preliminary analysis. The preliminary analysis accounted for 15.2% of the 49% of HE fixtures leaving 38% of HE fixtures installations unaccounted for. To better reflect Community Survey results, 16.9% (half of the 38%) was removed from the >3 gpm category and distributed proportionally into 1.8 gpm and 2 gpm to reflect purchases made after July 2016. Only a quarter of the remaining 38% (8.45%) was removed from the 2.5gpm to account for purchase made prior to July 2016. The remaining 8.45% was allocated to the 2.0 gpm category since 1.8 gpm showerheads have been the shortest on the market. 49% - (9.70%+5.0%+0.5%) = 33.8%. 5.0% + (16.9%/2) = 5%+8.45% = 13.5% 9.7%+16.9 = 27% 58.8%-(16.9%/2) = 58.8%-8.45%=50% 26.0%- 16.9%=9%	13.50%
High Efficiency 2 gpm	9.70%		27%
Low Flow 2.5 gpm	58.80%		50%
High Flow > 3 gpm	26.00%		9%
Total	100%		100%

¹ Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

² Also considers the Probolsky October 2019 Baseline Study results.

G.2.4 Fixture Initial Proportions – Clothes Washers

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD's service area. These proportions were calculated by:

- Using standards in place at the time of building construction (8.0/4.5 Water Factor [WF] for top load and front load machines (respectively) in 2015 and 6.0 WF for top load machines in 2018),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (10% per year for clothes washers),

- ◆ Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- ◆ Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, clothes washer fixture replacement rates, and historical residential rebates were used to determine a preliminary estimate of residential clothes washer initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential clothes washer initial proportions presented in Table G-6. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion clothes washer estimates.

Table G-6. Final Single Family Residential Clothes Washers Initial Proportions – 2019

Fixture Analysis	Final Estimate ¹	Edits/Notes
Efficient Front Loader	43.40%	Based on age of home, 10% natural replacement rate, and 11,534 High Efficiency Clothes Washer rebated between 2009-2014.
Medium Efficient Front Loader	44.60%	Based on percent of new washers that are medium efficiency, 10% natural replacement rate, and 3,055 Medium Efficiency Clothes Washer rebates prior to 2009.
Top Loader	12.00%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).
Total	100%	--

¹ Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

² Also considers the Probolsky October 2019 Baseline Study results.

G.2.5 Fixture Initial Proportions – Lavatory Faucets

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD's service area. These proportions were calculated by:

- ◆ Using standards in place at the time of building construction (2.5 gpm required in 1990 and 2.2 gpm required in 1992 and 1.2 gpm required in 2016),
- ◆ Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- ◆ Adding the net change due to natural replacement (10% per year for lavatory faucets),
- ◆ Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- ◆ Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, lavatory faucet fixture replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential lavatory faucet initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential lavatory faucet initial proportions presented in Table G-7.

Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion lavatory faucet estimates.

Table G-7. Preliminary Residential Lavatory Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate *	Edits/Notes
0.5 gpm Residential Lavatory Faucets	0.40%	Based on 1,088 giveaways.
1.0 gpm Residential Lavatory Faucets	0.00%	
1.2 gpm Residential Lavatory Faucet	28.50%	Based on age of home relative to 2016 code requirement, 10% natural replacement rate, and 1,539 giveaways.
1.5 gpm Residential Lavatory Faucet	0.00%	
2.2 gpm Residential Lavatory Faucet	68.10%	Based on age of home, 10% natural replacement rate, and 5,049 giveaways.
2.5 gpm Residential Lavatory Faucet	0.70%	Based on age of home relative to 1992 code requirement and 10% natural replacement rate.
>2.5 gpm Residential Lavatory Faucet	2.40%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary lavatory faucet initial proportion estimates in the revised analysis is presented in Table G-8.

Table G-8. Final Residential Lavatory Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate ¹	Edits/Notes	Secondary/Revised/ Final Estimate ²
0.5 gpm Residential Lavatory Faucets	0.40%	No change	0.40%
1.0 gpm Residential Lavatory Faucets	0.00%	0.5% increase a portion of survey results of 35.5% of lavatory aerators replaced in the last 5 years.	0.50%
1.2 gpm Residential Lavatory Faucet	28.50%	No change based on survey results since 1.2 gpm was still code for part of the 5-year review span of the survey period (post-2016).	28.50%
1.5 gpm Residential Lavatory Faucet	0.00%	0.5% increase a portion of survey results of 35.5% of lavatory aerators replaced in the last 5 years.	0.50%
2.2 gpm Residential Lavatory Faucet	68.10%	1% of 2.2 gpm faucets replaced with 1.0 and 1.5 gpm. Small decrease due to 2.2 was still code requirement for part of the 5-year review span of the survey period (pre-2016).	67%
2.5 gpm Residential Lavatory Faucet	0.70%	No change	0.70%
>2.5 gpm Residential Lavatory Faucet	2.40%	No change	2.40%
Total	100%		100%

¹ Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

² Also considers the Probolsky October 2019 Baseline Study results.

G.2.6 Fixture Initial Proportions – Non-Lavatory Faucets

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within ACWD's service area. These proportions were calculated by:

- Using standards in place at the time of building construction (2.5 gpm required in 1990 and 2.2 gpm required in 1992 and 1.8 gpm required in 2016),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (10%),
- Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, non-lavatory faucet fixture replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential non-lavatory faucet initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential non-lavatory faucet initial proportions presented in Table G-9, along with a secondary and final analysis of ACWD's residential initial proportions which includes the results of the October 2019 Probolsky Baseline Study. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion non-lavatory faucet estimates.

Table G-9. Final Residential Non-Lavatory/Kitchen Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate ¹	Edits/Notes	Secondary/Revised/ Final Estimate ²
1.5 gpm Residential Non-Lavatory/Kitchen Faucet	0.80%	Based on age of home, natural replacement rate, and 1,088 giveaways.	0.80%
1.8 gpm Residential Non-Lavatory/Kitchen Faucet	28.50%	Based on age of home relative to 2016 code requirement and 10% natural replacement rate.	28.50%
2.2 gpm Residential Non-Lavatory/Kitchen Faucet	68.00%	Based on age of home relative to 1992 code requirement and 10% natural replacement rate.	68.00%
2.5 gpm Residential Non-Lavatory/Kitchen Faucet	0.50%	Based on age of home relative to pre-1995 code requirement, and 10% natural replacement rate.	0.50%
>2.5 gpm Residential Non-Lavatory/Kitchen Faucet	2.30%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).	2.30%
Total	100%		100%

¹ Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

² Also considers the Probolsky October 2019 Baseline Study results.

APPENDIX H – ACWD’S PAST WATER USE EFFICIENCY MEASURES AND ACTIVITY (UP TO FY 2019/20)

Table H-1 provides activity data for ACWD’s Water Use Efficiency measures since program inception (25 years). Some elements of this activity were discussed in greater detail in Section 1.

Table H-1. ACWD’s Detailed Water Use Efficiency Measure Activity To-Date³⁵

Measure/Activity	Activity Numbers/Description
Residential Measures	
Residential High Efficiency Clothes Washer Rebate	Washer Rebates Issued: 35,861
Residential Low-Flow Device Distribution	Water Conservation Kits Distributed: 25,071 Leak Detection Kits Distributed: 322
Single Family and Multifamily Residential High Efficiency Toilet Rebate	Rebates Issued: 4,822
Multifamily Residential Water Use Efficiency Surveys	Multifamily Units Surveyed: 10,218
Partnership with California Youth Energy Services (CYES)	Single Family and Multifamily Units Surveyed: 4,453
Water Savings Assistance for Income-Qualified Customers	Homes Surveyed: 240 Ultra-High Efficiency Toilets (UHET) Installed: 280 Shower Heads Installed: 329 Faucet Aerators Installed: 523 Toilet Repairs: 177
Residential High Water Use Notification	WaterSmart Home Water Use Reports: measure targeted the top 20% of water users or about 19,000 customers annually. This measure was in effect from 2014-2017. Single Family High Water Use Notices: measure targeted the top 2% of water users or about 1,000 customers. This measure was in effect from 2004-2010.
Residential Leak Detection and Notification	Leak Notices (door hangers left by meter readers): ~880 per year
Residential Seasonal Irrigation Reminder	Irrigation reminders are sent on a seasonal basis to single family residential customers to update them on current landscape irrigation requirements. Reminders are sent via postcards, social media, and/or bill messages each year since 1998.

³⁵ Participation numbers from FY15/16 start to FY 19/20 end (7/1/2015–6/30/2020) were added to the UWMP 2015 “Detailed Program Activity Table.”

Measure/Activity	Activity Numbers/Description
Residential Landscape Workshops, landscape events, and Garden Tours	Partner with BAWSCA and Bay-Friendly Gardening to provide workshops to residential customers on efficient water use in the landscape throughout the spring and fall. Topics include efficient irrigation, water-efficient design elements, low water use plants, rainwater harvesting, and lawn alternatives. In the past ten years, 40 workshops were held and were attended by 1,405 people. In 2020, some landscape events and workshops were offered virtually. In addition, ACWD sponsors and promotes local garden tours including the Bringing Back the Natives Garden Tour. ACWD participates in local landscaping events including StopWaste sheet mulching parties and garden supply store vendor events. ACWD updated its Water-Efficient Landscape Demonstration Garden between 2013-2016, which is located at District Headquarters. The garden serves as an educational tool to showcase what residential and commercial customers can do with their landscape to be more efficient.
“Water-Wise Gardening in the Bay Area” Online Tool	ACWD refers customers to this web tool as a resource for water-efficient landscaping projects.
Residential Rain Barrel Rebate	Rebates Issued: 285
Single-Family Residential Water Efficient Landscape Rebate (Turf Removal)	Square Feet of Turf Removed: 364,663 Sites: 327
Single-Family Residential Smart Sprinkler Controller Instant Rebate	Incentives Redeemed: 93
Commercial, Industrial, and Institutional Measures	
Commercial Water Use Efficiency Survey and Green Business Certification	Surveys Conducted: 731
Commercial High Efficiency Toilet (HET) and Urinal (HEU) Rebate and Waterless Urinal Installation at Local Schools	HET/HEU Rebates Issued: 791
Commercial High Efficiency Clothes Washer Rebate	Rebates Issued: over 300
Spray and Rinse Valve Installation	Spray Valves Installed: over 570
Commercial Custom Water and Energy Efficient Equipment Incentives	Incentives Offered: 1

Measure/Activity	Activity Numbers/Description
Large Landscape Measures	
Landscape Water Use Reports	There are currently over 800 sites (representing approximately 1,600 accounts) receiving reports which represents the majority of dedicated landscape water consumption. 500+ sites receive full access to an online water budget report tool, Waterfluence, that compares the site's water use to a customized water budget each billing cycle. 300 additional sites are monitored by ACWD. ACWD has been providing these reports to customers for over 20 years.
City Parks Landscape Water Use Reports	City parks in Fremont (44), Newark (12), and Union City (35) are included in the measure for a total of 91 parks. Reports are provided annually.
Landscape Conservation Business of the Year Awards	Awards provided to customers who met their landscape water use budgets. In 2020, 323 sites were eligible to receive the award.
Landscape Audits	Audits Completed: 198
Workshops, Trainings, and Certifications for Landscape Contractors	Partner with Bay-Friendly, BAWSCA, irrigation supply manufacturers/distributors, Bay Area Qualified Water Efficient Landscaper (QWEL) via CalWEP, and other interested organizations to provide landscape water use efficiency training and certification programs in the service area and region.
Water Efficient Landscape Rebate (Commercial, Industrial, and Institutional and Multifamily Customers)	Square Feet of Turf Removed: 440,524 Sites: 41
Weather-based Irrigation Controller Rebate	Controllers Installed: 229
California Irrigation Management Information System (CIMIS)	Partner with DWR and Union City to host a CIMIS station at a park in Union City. The station provides climate data that is used for measures such as the landscape water budget measure. ACWD maintains the station on a monthly basis.
Public Information and School Measures	
School Education	Measure that educates students in the service area to better equip them for understanding and practicing water use efficiency techniques. Measure includes assembly programs, student video contests, free online educational resources, classroom giveaways, facility tours, and special activities. ACWD-sponsored assembly programs reach approximately 16,000 students annually.
Avenues for Public Outreach	ACWD website, Aqueduct newsletter, social media, bill messages, postcards, brochures, mailings, email blasts, community newsletters, newspaper advertisements, press releases, community meetings, and participation at community events.

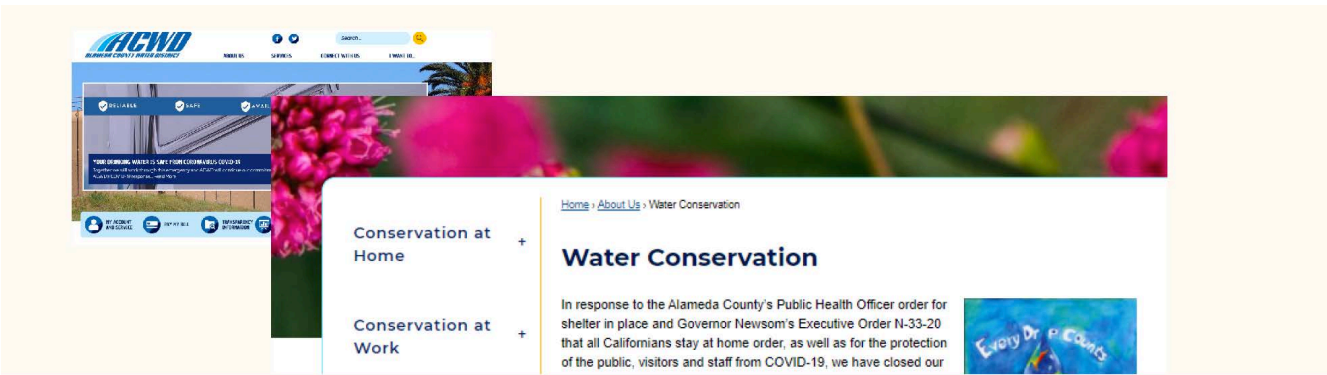
Measure/Activity	Activity Numbers/Description
Customer Service and Conservation Material Distribution	Address customer questions about water conservation in-person, via phone or email. Email and/or mail materials and resources to assist customers in achieving water use efficiency goals.
ACWD's Water Efficient Landscape Demonstration Garden	ACWD's ReScape (previously Bay-Friendly) rated Water Efficient Landscape Demonstration Garden is a great resource for customers interested in water-efficient gardening techniques. The garden demonstrates both commercial and residential water-efficient garden ideas and includes plant labels and educational signage. The garden is also used as a venue for water-efficient landscaping classes.
Other Water Use Efficiency Activities at ACWD	
System Leak Detection, Repair, and Water Loss Auditing	Evaluate the distribution system for leaks and make necessary repairs to the system. On average, ACWD surveys over 39 miles of pipeline for leaks bi-annually. ACWD submits a validated water loss audit to the state annually, per the requirements of SB 555, to monitor ACWD's distribution system water loss and identify system improvements.
Metering and Advanced Metering Infrastructure	All ACWD accounts are metered. ACWD approved the AMI project in 2020. With the capability of offering near real-time data, AMI will enable customers to view water usage at any time during the billing cycle and monitor use to identify the possibility of leaks more quickly.
Billing	All ACWD accounts are billed based on the amount of water used.
Water Waste Reporting	Water Waste Reports: 2,455 Courtesy Notices: 2,298
State Reporting and Compliance	ACWD adheres to all state program/activity reporting requirements, such as monthly reporting to the State Water Resource Control Board.
Partnerships	ACWD maintains strong partnerships with organizations like the Green Business Network, California Urban Water Agencies (CUWA), Local Ecology Agriculture Fremont (LEAF), CalWEP, BAWSCA, StopWaste, and neighboring water agencies through coordination and information sharing.

APPENDIX I – EXAMPLES OF LOCAL AND REGIONAL OUTREACH INITIATIVES

Social Media Examples



Online Examples





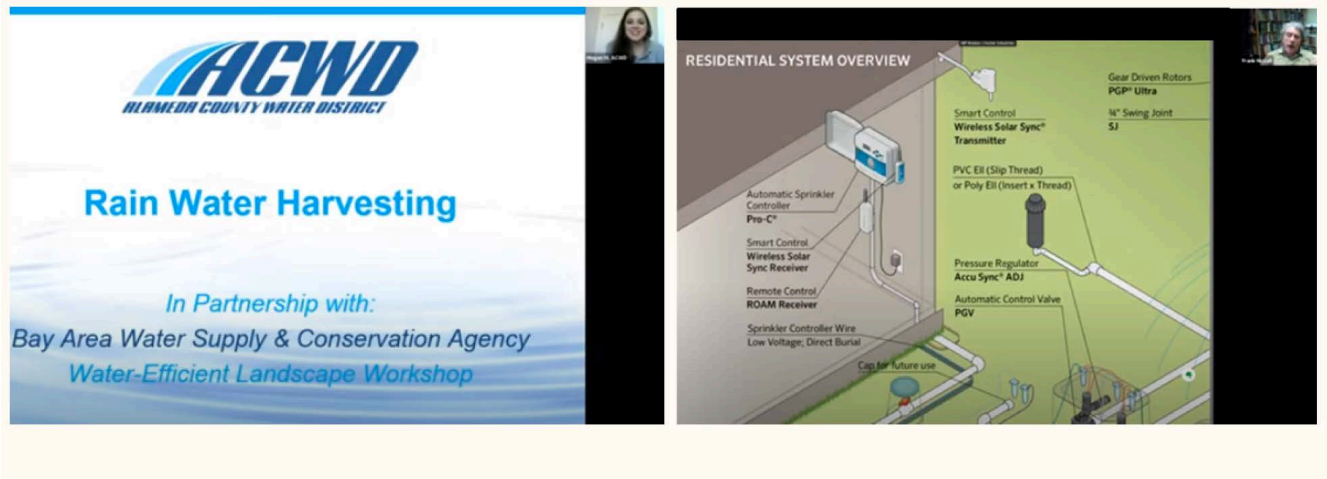
Online Connection

ACWD Website, YouTube, AMI Portal, Email Listservs

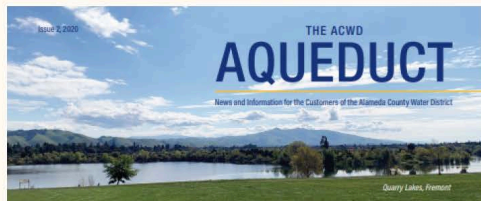
Website: www.acwd.org

YouTube: [AlamedaCountyWater](https://www.youtube.com/AlamedaCountyWater)





Print Ad Examples



Quick Tip: Irrigating Effectively



Fall means shorter days and less irrigation needed. Cut back watering by as much as 50 percent until you completely shut off your irrigation system in the winter. Summer months require the most irrigating, but your watering schedule should never be more than 3-4 days per week.

Learn more at www.acwd.org/conserv.

formed about the many
s going on at ACWD.

pleted our five-year
is on potential programs
d by five strategic goals
nd value, water supply,
nd communication. So,
newsletter article includes
each of these five main

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Get Paid to Remove Your Water Thirsty Lawn

ACWD offers rebates of up to **\$1,500** to single-family residential customers and up to **\$20,000** to commercial, industrial, multifamily, and homeowners association customers who convert lawns to water-efficient landscapes. Rebates are based on the square footage (\$1 per square foot) of lawn replaced. Water efficient landscapes are beautiful and provide long-term benefits. You can save money on water bills, fertilizer and maintenance, and reduce yard waste, greenhouse gas emissions and energy consumption, while increasing wildlife habitat. Learn more about this rebate program by calling 510.668.4218 or going to www.acwd.org/rebates.

GARDEN DESIGN IDEAS AND INSPIRATION

Visit one of the demonstration gardens in your area to get ideas and inspiration! Demonstration gardens show the beauty and environmental benefits of plants adapted to our dry summer and wet winter climate.

• ACWD's Water-efficient Landscape

Demonstration Garden is located at 43885 South Grimmer Blvd. in Fremont and is accessible to the public at all times.

• **The Quarry Lakes Demonstration Garden** by the UC Master Gardener Program of Alameda County is located at 2100 Isherwood Way in Fremont. For garden hours visit www.webparks.org. There is a \$5 entry fee.



Lantana
'Goldstein Gold'

Print Media

Aqueduct Newsletter, Bill Messages, Bill Inserts &
Weekly Newspaper Ad: "The ACWD Connection"

THE ACWD CONNECTION

Free Water Education Workshop for Tri-City Teachers

This month ACWD is partnering with Project WET to offer a FREE Water Education Workshop for Tri-City teachers. This online interactive workshop will provide teachers with valuable distance learning activities to engage K-12 students in water education. Activities meet Common Core/NGSS requirements. All attendees will receive a free guidebook filled with STEAM activities and service learning ideas.

Workshop Intro: Thursday, September 17, 2020 - 3:30 p.m. to 5 p.m.

Workshop: Saturday, September 26, 2020 - 9 a.m. to 2 p.m.

Register today at: www.acwd.org/watereducation



THE ACWD CONNECTION

Celebrate Smart Irrigation Month and take advantage of our rebate programs designed to help customers create water-efficient landscapes.

- **Smart Controller Rebates:** Residential customers can receive a Rachio 3 Smart Sprinkler Controller at a discounted price of \$100, visit <https://bawwsc.rachio.com/> to apply.
- Commercial and large landscape customers that replace their existing conventional irrigation controller with a "smart" irrigation controller may qualify for a rebate of up to \$30 per active station.
- **Water-Efficient Landscape (WEL) Rebate Program:** Receive a rebate for converting lawn to a water-efficient landscape. ACWD is currently offering \$1.00/sq.ft. of lawn converted. To be eligible for this rebate, customers must be pre-approved.

For information, visit: www.acwd.org/rebates or call 510.668.4218

