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Santa Clarita Valley Family of Water Suppliers WATER USE EFFICIENCY STRATEGIC PLAN

June 24, 2015



WATER USE EFFICIENCY STRATEGIC PLAN

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LIST OF ACRONYMS

AB	Assembly Bill	HECW	high-efficiency clothes washer
AF	acre-foot/acre-feet	HOA	Homeowner’s Association
AFY	acre-foot/acre-feet per year	IA	Irrigation Association
AMI	advanced metering infrastructure	ILI	infrastructure leakage index
AWWARF	American Water Works Association Research Foundation	IND	industrial
BAWSCA	Bay Area Water Supply and Conservation Association	INST	institutional
BLS	U.S. Bureau of Labor Statistics	IRR	irrigation
BC	benefit cost ratio	LACWD	Los Angeles County Waterworks District No. 36
BMP	best management practice	MF	residential multi-family
BVWSD	Buena Vista Water Storage District	MG	million gallons
CCF	hundred cubic feet	MGD	million gallons per day
CCR	California Code of Regulations	MGY	million gallons per year
CII	commercial, industrial, institutional	MOU	Memorandum of Understanding Regarding Urban Water Conservation
CLWA	Castaic Lake Water Agency	MWD	Municipal Water District
COM	commercial	MWM	Maddaus Water Management, Inc.
CUWCC	California Urban Water Conservation Council	NACIS	North American Code Identification System
DMM	demand management measure	NCWD	Newhall County Water District
DOF	Department of Finance	ND	New development
DP	dwelling property	NOAA	National Oceanic and Atmospheric Administration
DSS	Demand Side Management Least Cost Planning Decision Support System	NRW	Non-revenue water
DU	dwelling unit	OVOV	One Valley One Vision
DWR	California Department of Water Resources	PRISM	Parameter-elevation Regression on Independent Slopes Model
EPA	Environmental Protection Agency	psi	pounds per square inch
ESAP	Energy Savings Assistance Program	PV	present value
ETo	reference evapotranspiration	QWEL	Qualified Water Efficient Landscaper program
FY	fiscal year	RRBWSD	Rosedale Rio-Bravo Water Storage District
GPCD	gallons per capita per day	RW	recycled water
gpd	gallons per day	SB	Senate Bill
GPF	gallon per flush	SCV	Santa Clarita Valley
GPM	gallon per minute	SCWD	Santa Clarita Water Division of Castaic Lake Water Agency
HE	high-efficiency	SF	residential single family
HELIUM	High Efficiency Landscape Irrigation Upgrade Measures	SFR	Single Family Residence
HET	high-efficiency toilet	Sq Ft	square feet
HEU	high-efficiency urinal	SWAT	Smart Water Application Technology
		SWP	State Water Project

SWRCB	State Water Resources Control Board	WF	Water Factor
UHET	ultra-high efficiency toilet	WMWD	Western Municipal Water District
ULFT	Ultra Low Flow Toilet	WSA	WaterSMART Allocation program
US EPA	US Environmental Protection Agency	WUE	Water Use Efficiency
UWMP	Urban Water Management Plan	WUE SP	Water Use Efficiency Strategic Plan
VWC	Valencia Water Company	YR	Year
WBIC	Weather Based Irrigation Controller		
WET	Water Efficiency Target		

EXECUTIVE SUMMARY

Water conservation is a priority and long-standing element of the Santa Clarita Valley (Valley) water resource portfolio for Castaic Lake Water Agency (CLWA) and the four water retailers (Retailers): Los Angeles County Waterworks District 36 (LACWD), Newhall County Water District (NCWD), Santa Clarita Water Division (SCWD), and Valencia Water Company (VWC). In 2001, CLWA formally signed the Memorandum of Understanding regarding Urban Water Conservation as overseen by the California Urban Water Conservation Council. With the passage of Senate Bill 7 of Special Extended Session 7 (SB X7-7) in November 2009, water utilities throughout the state, including CLWA and the Retailers, are required to meet specific water conservation savings targets by December 31, 2020 or face potential state judicial or administrative action.

The Santa Clarita Valley presents unique challenges in conservation. The water rates are relatively low compared to other areas in Southern California while the population is relatively affluent. The growth is projected to increase from a population of approximately 260,000 in 2010 to approximately 320,000 by 2020. The existing landscaping was intentionally developed around turf as the primary landscaping material. Additionally, due to a diversified water supply portfolio, there are no local water restrictions in place other than those mandated by the State Water Resources Control Board (as of May 2015). These factors contribute to making conservation in the Santa Clarita Valley relatively unique in its challenges.

An essential theme of the Water Use Efficiency Strategic Plan (WUE SP) is to maximize the use of existing water and fiscal resources and maintain the flexibility to adjust planning to meet changing conditions. This adaptive approach is necessary as CLWA and the Retailers continue to work to address evolving local economic conditions, water demands, climate variability, potential drought conditions and changing state regulations.

The WUE SP provides a comprehensive approach supported by a thorough economic analysis that will guide CLWA's and the Retailers' water conservation efforts in the coming years. The WUE SP also delivers easy-to-understand results and quantifies the benefits of meeting a significant portion of future water demands through water conservation measures compared to the economic benefit of adding recycled water infrastructure. The WUE SP is designed to help optimize the operational programs and decision-making process as staff continue to monitor progress in meeting the Senate Bill X7-7 (SB X7-7) mandate, which is currently based on "Method 1" using a target of 20 percent reduction of baseline per capita water use by 2020.

Many experts and stakeholders collaborated in producing the Plan, particularly the Conservation Coordinators and the Santa Clarita Valley Water Committee (SCV Water Committee). The SCV Water Committee was convened in 2007 during the drought to coordinate outreach efforts among water purveyors.

The WUE SP is directly connected to the 2015 Urban Water Management Plan and is consistent with CLWA's and the Retailers' Strategic Plan Objectives including:

- Ensure long-term average water supply meets current and future demand.
- Meet local Retailers' water demands.
- Achieve the water conservation target of 20 percent per capita by 2020.

The primary objectives of the Project Team used to develop the WUE SP include:

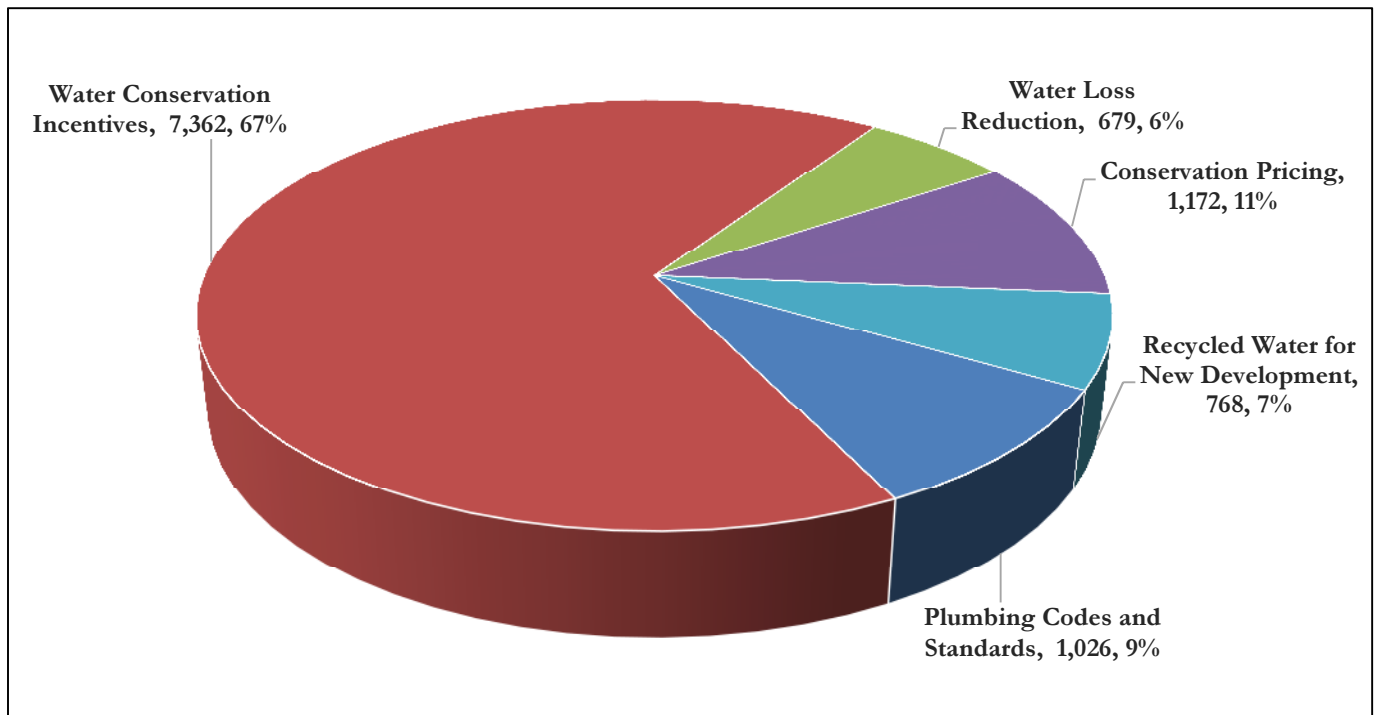
- Deliver cost effective water conservation and water use efficiency measures to maximize opportunities to sustainably meet the future water needs of the valley residents;
- Offset and/or delay the need to construct additional water production capacity in the future;
- Assist with reducing ratepayer costs for the treatment and delivery of water, the treatment of wastewater, and water-related energy consumption;
- Meet state and federal water conservation mandates as follows:

- Achieve 20 percent per capita water use reduction statewide by 2020 or better;
- Maintain commitments to the California Urban Water Management Council, and initiate measures most likely to achieve targets established in the 2010 Urban Water Management Plan;
- Demonstrate environmental stewardship;
 - Foster wise, innovative, responsible and efficient practices; and
 - Establish a Water Conservation Program that helps support the health of the river and groundwater integral to the region’s quality of life.

The WUE SP results illustrate that water conservation will continue to lower projected demands during the next 5-year planning horizon, similar to the benefits that have already accrued in the past two decades. Building upon the success of its previous planning efforts, CLWA and the Retailers established the WUE SP to meet, at a minimum, the required conservation goal of reducing per capita water demands per day (GPCD). Achieving this goal using the Plan’s recommended conservation program of measures is estimated to sustainably reduce each Retailer’s and CLWA overall use from its baseline. Many of the added measures will take time for results to accrue. Therefore, they are planned to be implemented as soon as feasible.

The water conservation planning approach used to develop the WUE SP follows the accepted American Water Works Association (AWWA) Manual of Water Supply Practices, M52, Water Conservation Programs – A Planning Manual. This approach brings the economic benefits of water conservation into the mainstream of each Retailer’s water capital facility planning. Future water demands for the Retailers, particularly for two of the Retailers, are substantial. Strategic use of water conservation will not only help the Retailer and CLWA meet demands in the future and meet SB X7-7 legislative requirements, it will also help extend the value and life of infrastructure assets used in both water supply and wastewater treatment, while extending the beneficial investment of public funds.

The Retailers and CLWA are committed to a water conservation program comprised of multiple water conservation measures including the further implementation of a water loss reduction program. Retailer and CLWA programs include measures to educate, incentivize, or mandate conservation equitably among various types of customers including residential, commercial (COM), institutional (INST) and irrigation (IRR) accounts. Water savings will come from the components of the recommended WUE SP Conservation Program B alternative as noted in Figure ES-1: Automated Meter Infrastructure (AMI) installation and water conservation pricing, system water loss reduction, the successful implementation of programs and measures by Retailer and CLWA conservation measures, and the benefits from existing and new plumbing codes and standards. Water conservation incentive savings include both Retailer-led measure savings and CLWA-led measure savings for overall “valley-wide” estimated water savings planned.

Figure ES-1 Estimated Valley-Wide Water Savings in Year 2020 by Measure Type (AFY)

At the conclusion of the analysis process, three programs were developed and reviewed by CLWA and the Retailers. A consensus was reached on the recommended program. The implementation approach agreed upon is:

- Implement Program B, a more intensive effort of existing measures with new measures added aimed at the Retailers meeting their 20 x 2020 reduction targets;
- Emphasize outdoor conservation measures, given the water savings potential and customer-expressed need, with review and enforcement of the Water Efficient Landscape Ordinance;
- Leverage existing state and federal grants and partnerships to the maximum extent possible through 2020 to continue expansion of the programs;

Table ES-1 Costs and Savings Comparison of Conservation Program Options – Year 2020

Conservation Measure	SB X7-7 2020 Target ^a	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD	Program C 2020 GPCD
LACWD ^b	188	245	240	229	229
NCWD	190	211	201	190	190
SCWD	201	218	204	196	195
VWC	268	303	277	267	267
Valley-Wide^c	225	249	232	222	222

a. Updated targets from 2010 Urban Water Management Plan based on results of Population Assessment and GPCD Review Technical Memorandum (MWM, November 2014).

b. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

c. Valley-wide 2015 and 2020 target GPCDs are based on a weighted average using projected 2015 and 2020 populations for NCWD, SCWD and VWC. Valley-wide baseline GPCD estimate is an average of 80 percent of the calculated 2020 target and 90 percent of the calculated 2015 target. Valley-wide targets do include LACWD GPCD. Population projections and source references are presented in Section 3.3 of this document.

The recommended next steps for the successful implementation of the WUE SP include:

- Reassess program focus and activity levels annually and following the current drought to help decide upon priorities for the next Plan year, using the recommendations from the Plan;
- Prioritize measures for implementation with those that contribute the most to meeting the per capita water use targets with consideration for the lesser cost;
- Strengthen existing partnerships, forge new ones and apply for grants where available;
- Hire highly qualified staff to sustainably implement the recommendations from the Plan and comment on policies from local and state government (e.g., State Water Resources Control Board);
- Conduct a market penetration study within the next few years to determine the saturation of high efficiency fixtures primarily in the single-family sector; and
- Continue engaging regional stakeholders to review and provide input on the Plan progress and schedule to meet the valley-wide GPCD target.

1 INTRODUCTION

The prior Water Use Efficiency Strategic Plan was completed in 2008 prior to the passage in November 2009 of Senate Bill SB X7-7 with requirements for targeted reductions in per capita water use by 2020. As a result, CLWA has engaged in an ongoing process to evaluate its water conservation programs, which has involved the following participating groups:

- Retailer Conservation Program Staff
- SCV Water Committee
- City of Santa Clarita Administrative Services (Landscape Maintenance District)

Both CLWA and the Retailers water conservation programs will be revised periodically as the water savings potential wanes as conservation is achieved and as new opportunities or technologies arise. Any changes in water conservation programs will reflect the benefits (and costs) of water conservation in Santa Clarita Valley, including benefits associated with protecting the valley's quality of life. Moreover, water efficiency measures often have ancillary benefits including reductions in energy use and improvements in water quality. Water conservation is an important measure to both reduce greenhouse gas generation and to adapt to a predicted future outcome – decreased snowpack in the Sierra Nevada.

CLWA and the Retailers will continue to aggressively pursue more efficient water use, and are committed to fully participating in meeting California's statewide reduction goals in per capita water use in a manner that is most cost effective and provides the greatest benefits to the valley's ratepayers.

The success of the WUE SP will require that CLWA and the Retailers be proactive in marketing and educating customers as to the benefits of installing water efficient devices and changing water use habits.

1.1 Drivers for Santa Clarita Valley's Need for Conservation

CLWA and the four water Retailers: LACWD, NCWD, SCWD and VWC are committed to managing and reducing water demands through water conservation and water use efficiency. Water conservation is defined as not using water to perform a task that could be done otherwise (e.g., sweeping instead of using a hose to wash down a sidewalk). Water use efficiency is defined as performing a task that requires water, but doing so using less water (e.g., watering the lawn less each day). CLWA and the Retailers are creating a path that strives to reach their water savings goals by being more efficient with their own operations and maintenance practices, and by using various conservation "measures" to encourage customers to be more conserving and efficient with their water use. As required by the Urban Water Management Planning Act and published in the CLWA's 2010 Urban Water Management Plan (UWMP), each Retailer is expected to reduce baseline per capita water consumption by 2020 according to the requirements of Senate Bill X7-7 (SB X7-7). Each Retailer has a different per capita consumption baseline value and reduction 2020 target. Each Retailer's SB X7-7 targets and plan savings goals are presented in Section 5.2.

CLWA and the Retailers committed to comply with the Best Management Practices (BMPs) in 2001 as voluntary signatories to the Memorandum of Understanding Regarding Water Conservation in California (MOU). In the

CLWA service area, demand management is addressed at both the local (Retailer) and regional (Santa Clarita Valley) levels.

The MOU and BMPs were revised by the California Urban Water Conservation Council (CUWCC) in 2008. The revised BMPs now contain a category of “Foundational BMPs” that signatories are expected to implement as a matter of their regular course of business. The “Foundational BMPs” consist of measures that involve or address utility operations and measures that are better seen as “standard operating procedures”. Utility operation measures include metering, water loss control, water rates and pricing, having a conservation coordinator on staff, wholesale agency assistance programs, and water waste ordinances. Utility operations also include public education initiatives like public outreach and school education programs. “Programmatic” BMPs are categorized into Residential, Large Landscape, and Commercial, Industrial, Institutional (CII) Programs, all of which are similar to the original quantifiable CUWCC BMPs. These revisions are reflected in the CUWCC reporting database (starting with reporting year 2009) and in the 2010 UWMP’s demand management measure (DMM) compliance requirements. The category of foundational BMPs is a significant shift in the revised MOU. For CLWA and other wholesalers, the changes did consolidate and refine the definition of requirements and opportunities for Retailer support. As outlined in Exhibit 1 of the MOU under BMP 1.1¹ (formerly BMP 10), there are five areas of opportunities for voluntary support by wholesalers outlined as follows:

- Financial Investment and Build Partnerships
- Technical Support
- Program Management
- Water Shortage Allocations
- Non-signatory Reporting

A key intent of the 2008 MOU revision was to provide retail water agencies with more flexibility in meeting requirements and to allow them to choose program options most suitable to their specific needs. Therefore, as alternatives to the traditional Programmatic BMP requirements, agencies may also implement the MOU Flex Track or GPCD compliance options. Under the Flex Track option, an agency is responsible for achieving water savings greater than or equal to those it would have achieved using only the BMP list items. The CUWCC has developed three Flex Track Menus – Residential, CII, and Landscape – and each provides a list of program options that may be implemented in part or any combination to meet the water savings goal of that BMP. Custom measures can also be developed and require documentation on how savings were realized and the method and calculations for estimating savings.

The CUWCC GPCD compliance option sets a water use reduction goal of 18 percent reduction by 2018. The MOU defines the variables involved in setting the baseline and determining final and interim targets. The GPCD compliance option is conceptually similar to the requirements of SB X7-7. SCWD, NCWD and VWC have chosen the GPCD compliance option for meeting the MOU’s requirements.

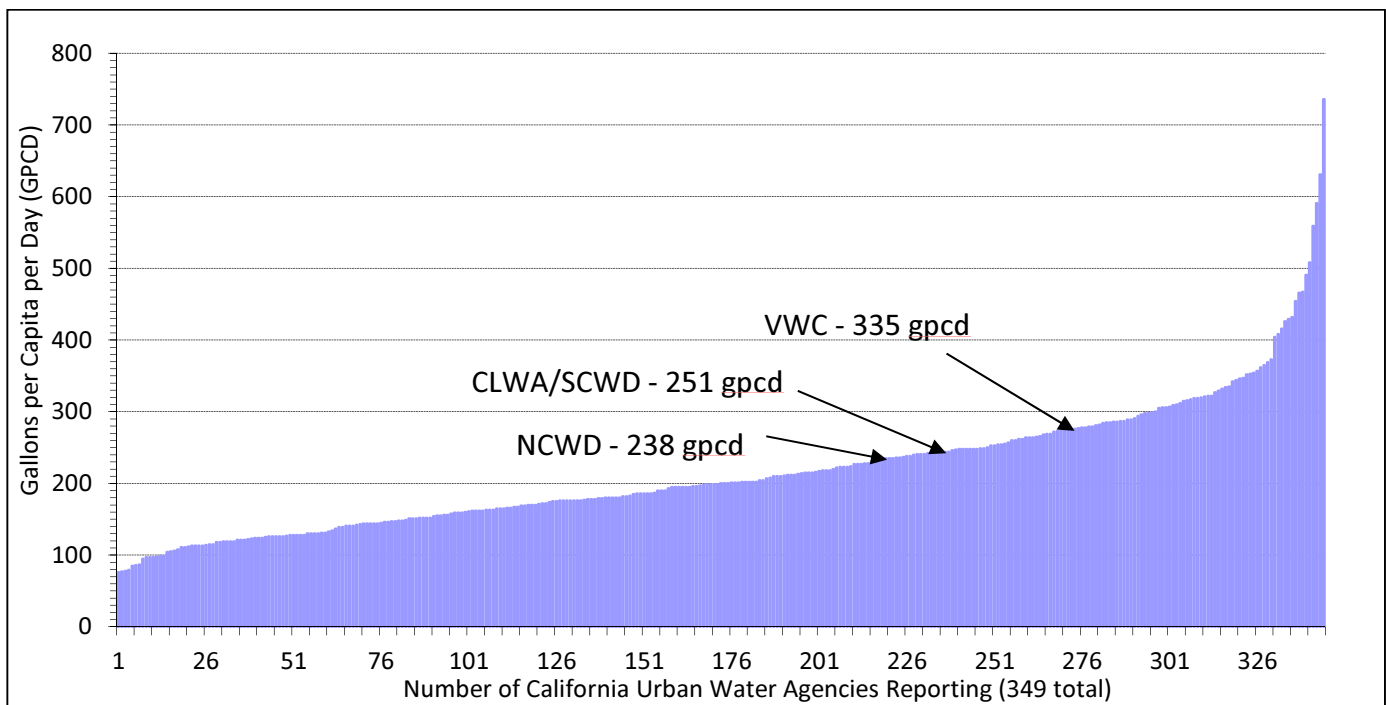
As a wholesaler MOU signatory, CLWA assists SCWD, VWC and NCWD with BMP implementation and reporting, although CLWA files BMP reports only for itself. LACWD BMP implementation and reporting is done by the County of Los Angeles on behalf of all its Waterworks Districts. As the water wholesaler for the region,

¹ <http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-1-Utility-Operations-Programs#BMP%201.1>

CLWA is responsible for the implementation of a subset of the BMPs. However, CLWA in partnership with the Retailers has taken a leadership role in the implementation and support of a number of the BMPs that extend beyond a wholesaler’s responsibilities in the MOU. In addition to meeting its MOU commitments, CLWA is working with the Retailers to identify and implement water use efficiency programs that meet long-term reduction goals.

In May 2015, the California State Water Resources Control Board (SWRCB) adopted new mandates for water use efficiency putting all of California’s water agencies under new emergency drought regulations. With high per capita use compared to the rest of California, the Retailers have a high level of scrutiny on their demand and compliance with regard to meeting the targets. The following figure, provided by DWR in 2012, presents the statewide urban per capita water use (10-year average). The emergency regulations for the drought will be revisited in February 2016. Overall, the focus on reductions for outdoor irrigation is perceived to be permanent by water managers around the state.

Figure 1-1 California Statewide Urban Per Capita Water Use (10-year average)



Sources: California Department of Water Resources, 2013. Updated GPCD targets based on results of Population Assessment and GPCD Review Technical Memorandum (MWM, November 2014).

By implementing a portfolio of water use efficiency measures, CLWA, the Retailers and their customers benefit in a number of ways:

- **Cost Avoidance:** Although the Santa Clarita Valley has projected adequate water supply for the near future, the cost of new water supplies is significantly higher and is expected to continue to rise. A cost effective means to reduce the development of new, expensive, imported and local water supplies is to use less. Additionally, during times of drought, the CLWA accesses water it has stored in groundwater banks at significant cost to its customers. Conservation programs are a cost-effective efficiency mechanism.

- **Limited State Resources:** California’s water resources are becoming increasingly stretched due to economic and population growth, along with the regulatory dedication of greater quantities for environmental purposes. Many sources predict greater variability of available water supplies as a result of climate change. Agencies need to stretch existing water supplies to maintain system reliability.
- **Drought Preparedness:** It is inevitable that southern California, as well as the state, will experience another drought. The big question is when and how severe the next one will be. During droughts, water is taken from surface and groundwater storage programs. One way to lessen the severity of a prolonged drought’s effect on Santa Clarita Valley is to prepare in advance for this event by creating a community that operates at a high level of efficiency. Thus, stored supplies can be stretched.
- **Reduced Carbon Footprint:** The production and delivery of water requires a significant amount of energy on both a statewide and local level. The Santa Clarita Valley can do its part to reduce greenhouse gases by using water more efficiently.
- **Reduced Waste Water Flows:** Sanitation plants and systems must be sized to meet historic and planned wastewater flows. Increasing the efficient use of water reduces wastewater treatment demand.
- **Reduced Urban Runoff:** Achieving increased water use efficiency outdoors means less water running off landscaped areas into the streets, storm drains and ultimately into the Santa Clara River. Education efforts and the installation of efficient technologies will ensure that more water is delivered to appropriate landscaping and less of it becomes urban runoff.
- **Improved and More Accessible Water Use Efficiency Tracking for SWRCB:** At a December 2014 workshop, SWRCB received feedback from water utilities around the state regarding the need for “efficiency targets.” New water efficiency metrics are tracked on a customer sector basis, like indoor GPCD (rather than gross GPCD, which was previously tracked) and landscape water budgets. This and other metrics support the validation and positive determination of the progress made in the Valley when it comes to policy discussions related to SWP contractor issues. By implementing a portfolio of water use efficiency measures and tracking their progress, CLWA will be able to assess if they are on-track and adapt as necessary.
- **Participation in Market Transformation:** DWR and CUWCC is intending to move “market transformation ahead” and help define and set water use and savings metrics. CUWCC has a new Market Transformation Framework with many resources to leverage at the local level. CLWA will be able to influence the following:
 - Regulations, ordinances, and metrics as they are developed
 - How those new metrics are going to affect the CLWA Retailers and their customers
 - The method to calculate metrics

1.2 Plan Development and Defining Authorities

This Water Use Efficiency Strategic Plan (WUE SP) was prepared on behalf of the CLWA and the Retailers, in support of Santa Clarita CLWA and the individual Retailer programs. The WUE SP is an update to the prior plan published in 2008. This Plan was developed as a collaborative effort among staff at CLWA and the Retailers and consultant, Maddaus Water Management, Inc. (MWM). The WUE SP was prepared in close coordination with the

Water Conservation Coordinators Committee and received CLWA and Retailer management buy-in through the Water Committee.

The WUE SP was prepared according to United States Environmental Protection Agency and American Water Works Association (AWWA) guidelines for the development of Water Conservation Plans. This project was supported by using the Demand Side Management Least Cost Planning Decision Support System (DSS) Model, which is proprietary software developed by MWM and licensed to CLWA and the Retailers.

The following are the basic tasks completed for this project:

- Data collection and historical water use analysis
- Review current water use efficiency efforts
- Identify and develop future water use efficiency measures
- Analyze cost effectiveness of measures using the DSS Model
- Create program scenarios of measures
- Optimize recommended measures to meet goals, including GPCD targets
- Achieve buy-in on recommended program
- Prepare Plan document
- Adopt Plan

Successful implementation of the program will depend on sustainable financing and staffing of the Plan. It will be important to monitor the sustained savings to meet GPCD targets by 2020, which includes adapting the Plan based on participation of customers, new innovative technology, or other savings opportunities.

1.3 Objective of Plan

The WUE SP stated objective is to develop a plan to attain the water efficiency goals in the most cost-effective manner for implementation by CLWA and Retailer staff.

Key components of the WUE SP include:

- Updating and further examining the water savings already committed to by CLWA and the Retailers to identify the best path towards achieving those savings and the means for monitoring commitments to the CUWCC's MOU; and
- Developing a long-term plan for complying with SB X7-7's gallons per capita per day (GPCD) target by 2020.

Primary objectives used to develop the WUE SP include:

- Maximize opportunities to sustainably meet the future water needs of the CLWA service area through cost-effective water conservation and water use efficiency;
- Identify strategies to reduce ratepayer costs for the treatment and delivery of water and wastewater, reduce water-related energy consumption, and offset the need to acquire new supplies in the future;
- Maintain commitments to achieving 20 percent GPCD water use reduction statewide by 2020, thereby meeting state mandates;
- Demonstrate environmental stewardship through innovative, responsible and efficient practices;

1.4 SB X7-7 Targets and WUE SP Savings Goals

SB X7-7, or "The Water Conservation Act of 2009," was enacted to ensure California continues to have reliable water supplies, requiring urban water agencies to collectively reduce statewide per capita water use by 20 percent

before December 31, 2020. The law establishes that the base daily per capita use be based on total gross water use divided by the service area population. Complying with SB X7-7 can be accomplished through one of four approved methods. CLWA Retailers plan to use a combination of WUE measures and recycled water to help meet or exceed the per capita water use targets to support the overall goal of more supply reliability for the Santa Clarita Valley. Each Retailer has a different per capita baseline and 2020 target.

In the 2014 CLWA Population Assessment and GPCD Review, MWM prepared an assessment of population for the purpose of tracking water consumption on a gallons per capita per day (GPCD) basis for the Retailers within the CLWA service area. This population assessment updated both population and people-per-household estimates, which supported determining GPCD estimates. More information about this population assessment can be found in that project's report, CLWA Population Assessment and GPCD Review. Baseline GPCD, current 2013 GPCD and GPCD targets for 2015 and 2020 are presented in the following table.

Table 1-1 Retailer Baseline and Target GPCD

Retailer	Baseline ^a	2015 Target	2020 Target ^a	Actual 2013 (Drought Year)	Actual 2014 (Drought Year)
Los Angeles County Waterworks District 36 ^b	235	212	188	227	N/A ^d
Newhall County Water District	238	214	190	207	194
Santa Clarita Water Division	251	226	201	221	206
Valencia Water Company	335	301	268	295	271
Valley-Wide ^c	280	252	225	246	228 ^d

a. Updated targets from 2010 Urban Water Management Plan based on results of Population Assessment project (2014).

b. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

c. Valley-wide 2015 and 2020 target GPCDs are based on a weighted average using projected 2015 and 2020 populations for NCWD, SCWD and VWC. Valley-wide baseline GPCD estimate is an average of 80 percent of the calculated 2020 target and 90 percent of the calculated 2015 target. Valley-wide target calculations do include LACWD GPCD. Population projections and source references are presented in Section 3.3 of this document.

d. Since LACWD actual 2014 GPCD was not available (N/A), actual 2014 Valley-Wide GPCD does not account for LACWD GPCD.

1.5 Overview of Water System

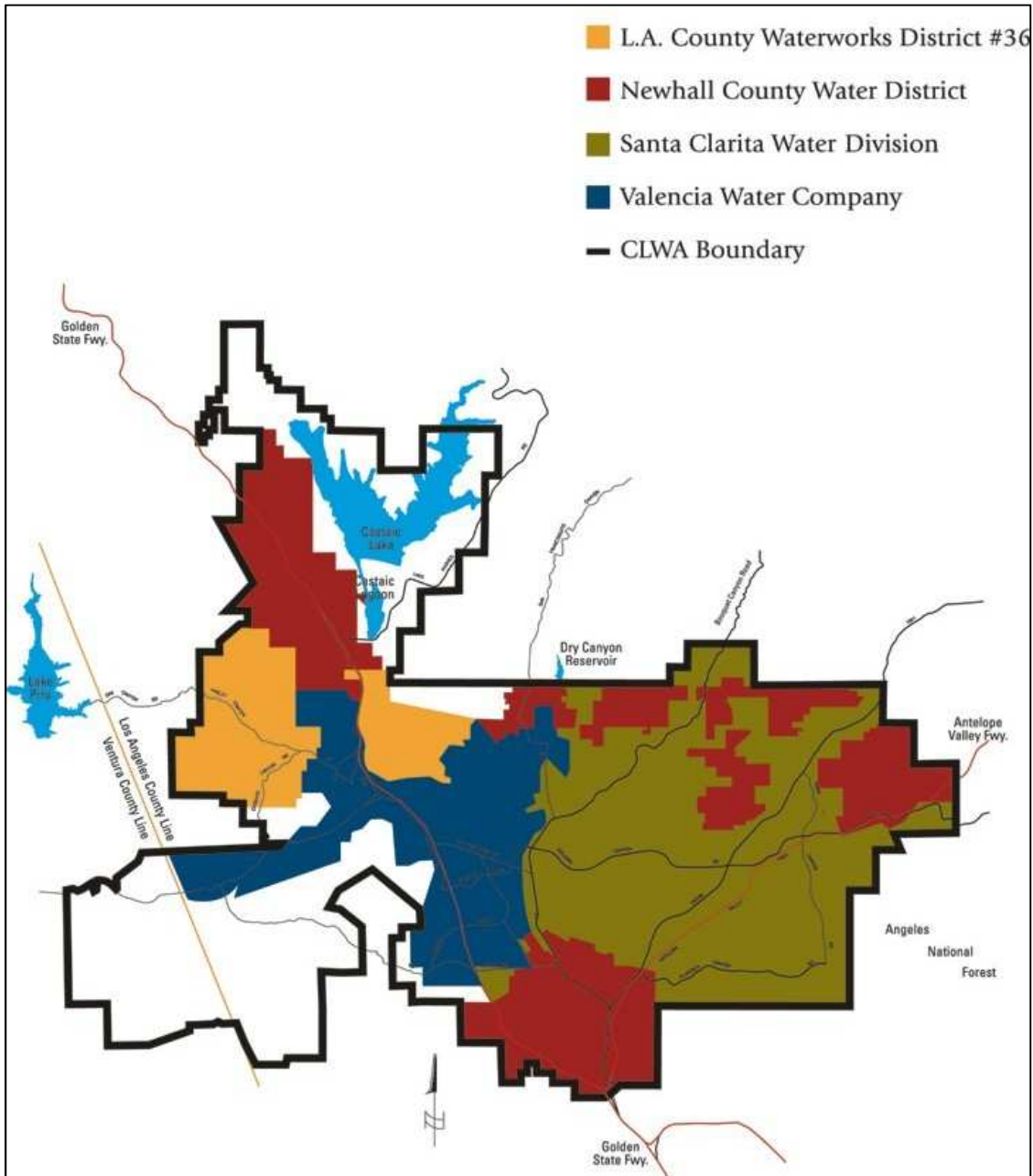
CLWA was formed in 1962 for the purpose of contracting with DWR to acquire and distribute imported State Water Project (SWP) water to the purveyors in Santa Clarita Valley. CLWA serves an area of 195 square miles in Los Angeles and Ventura Counties. Four retail purveyors provide water service to most residents of the Valley.

- LACWD's service area includes the Hasley Canyon area in the unincorporated community of Val Verde. During most years, LACWD obtains its water supply from CLWA and local groundwater.
- NCWD's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Castaic, Newhall, Valencia and Canyon Country. NCWD supplies water from local groundwater and CLWA imported water.
- SCWD's service area includes portions of the city of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Canyon Country, Newhall and Saugus. SCWD supplies water from local groundwater and CLWA imported water.

- VWC’s service area includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Valencia, Stevenson Ranch and portions of Castaic, Saugus and Newhall. VWC supplies water from local groundwater, CLWA imported water and recycled water.

The service area for CLWA and the Retailers is shown on the following figure.

Figure 1-2 CLWA and Retailer Service Areas



The Retailers’ and existing water resources include wholesale (CLWA-imported) supplies, local groundwater, recycled water and water from existing groundwater banking programs. Planned supplies include new groundwater production as well as additional banking programs. Local and imported water resources in the Santa Clarita Valley are managed cooperatively between CLWA and the Retailers.

Table 1-2 Water Supply Portfolio

Santa Clarita Valley Average Year Water Supply (AFY)			
Source of Supply ^a	2015	2020	2025
Groundwater			
Alluvium Existing	24,000	24,000	24,000
Alluvium Future	-	1,000	2,000
Saugus Formation Existing	9,225	10,225	10,225
Saugus Formation Future	1,375	1,375	1,375
Subtotal Groundwater	34,600	36,600	37,600
Recycled Water^b			
Existing	325	325	325
Future	-	675	1,675
Subtotal Recycled Water	325	1,000	2,000
Imported Water			
State Water Project	58,100	57,900	57,600
Buena Vista/Rosedale Purchase	11,000	11,000	11,000
Nickel Water	1,607	1,607	1,607
Subtotal Imported Water	70,707	70,507	70,207
Estimate Average Water Supply			
Total	105,632	108,107	109,807

a. Based on 2010 CLWA Urban Water Management Plan.

b. Recycled water development assumed to be deferred by 5 years.

This section describes the water resources available to CLWA and the purveyors for the next decade.

CLWA's **wholesale imported water supplies** consist primarily of State Water Project (SWP) supplies, which were first delivered to CLWA in 1980. From the SWP, CLWA also has access to water from Flexible Storage Accounts in Castaic Lake, which are planned for dry-year use, but are not strictly limited to it as such. In addition to its SWP supplies, CLWA has an imported surface supply from the Buena Vista Water Storage District (BVWSD) and Rosedale Rio-Bravo Water Storage District (RRBWSD) in Kern County, which was first delivered to CLWA in 2007. CLWA wholesales both these imported supplies to each of the Retailers. Additionally, Newhall Land has acquired a water transfer supply from a source in Kern County. This supply, referred to as Nickel water, would be made available to VWC through CLWA.

The sole source of **local groundwater** for urban water supply in the Valley is the groundwater Basin identified in the DWR Bulletin 118, 2003 Update as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) (Basin No. 4-4.07). The Basin is comprised of two aquifer systems, the Alluvium and the Saugus Formation. The Alluvium generally underlies the Santa Clara River and its several tributaries, to maximum depths of about 200 feet; and the Saugus Formation underlies practically the entire Upper Santa Clara River area, to depths of at least 2,000 feet. There are also some scattered outcrops of Terrace deposits in the Basin that likely contain limited amounts of groundwater.

CLWA is a partner in two existing **groundwater banking** programs, the Semitropic Banking Program and RRBWSD Banking Program. Newhall Land is also a partner in the Semitropic Banking Program, with its supplies assumed to be available to VWC.

CLWA has a current contract with the LACSD for use of up to 1,700 AF per year (AFY) of **recycled water**. CLWA's 2010 UWMP identifies 21,300 AFY of recycled water use at buildout based on CLWA's Draft Recycled Master Plan and Newhall Ranch Specific Plan. Subsequent studies have identified the need for expensive seasonal storage to achieve this level of recycled water storage. CLWA is currently updating its Recycled Water Master Plan and anticipates the study being completed in 2016. The following table presents the agencies participating in valley-wide recycled water use planning:

Table 1-3 Recycled Water Planning Participating Agencies

Participating Agencies	Role in Plan Development
Castaic Lake Water Agency	Wholesale water provider
Newhall County Water District	Retail water provider
Santa Clarita Water Division	Retail water provider
Valencia Water Company	Retail water provider
Los Angeles County Waterworks District No. 36	Retail water provider
Los Angeles County Sanitation District No. 26	Recycled water supplier
Los Angeles County Sanitation District No. 32	Recycled water supplier
Berry Petroleum	Potential recycled water supplier

Source: Table 4-1, 2010 Urban Water Management Plan, CLWA.

More information about water resources planning can be found in AWWA's Manual of Water Supply Practice, M50, Water Resources Planning available on their website at: www.awwa.org/.

1.6 Overview of CLWA Conservation Program and Regional Partnerships Structure

CLWA and the Retailers have had long-standing conservation programs. The Santa Clarita Valley conservation implementation partnership, SCV Water Suppliers, has been on-going for more than a decade to support CLWA programs. More information is available online at <http://www.scvh2o.org/>.

CLWA is partnering with local energy provider Sempra Energy in the Energy Savings Assistance Program (ESAP) which offers no-cost energy-saving home improvements for qualified limited-income renters and homeowners. No-cost energy-saving measures may include high efficiency washers, faucet aerators, thermostatic shower valves and showerheads.

1.7 Laws, Regulations and Agreements

There are a number of water conservation related agreements, laws, codes and regulations that frame the requirements of the Plan; these are listed below. The WUE SP responds to these requirements and includes the conservation measures necessary for CLWA and the Retailers to stay in compliance with the requirements.

- [California State Senate Bill \(SB X7-7\)](#) requires urban water agencies to reduce statewide per capita water consumption 20 percent by 2020.

- [SB 407](#) – Requires single family residential property owners of pre-1994 buildings or dwelling units to replace existing plumbing fixtures with water conserving fixtures by 2017 and multi-family and commercial property owners of pre-1994 buildings to replace fixtures by 2019. Also requires all owners to upgrade existing buildings upon any remodel initiated after January 1, 2014 and authorizes the enactment of local ordinances for greater water savings.
- [Assembly Bill \(AB\) 715](#) – California Plumbing Code includes the new California Code of Regulations (CCR) Title 20 Appliance Efficiency Standards requiring High Efficiency Toilets and High Efficiency Urinals to be exclusively sold in the state by January 1, 2014.
- [AB 1881](#) – State Model Water Efficient Landscape Ordinance adopted by the City of Santa Clarita effective January 1, 2010; improves efficiency in water use in new and existing urban irrigated landscapes.
- [AB 1420](#) – Effective Jan. 1, 2009, eligibility for any water management grant or loan made to an urban water supplier, awarded or administered by the State, is conditioned on the implementation of the Demand Management Measures (DMMs) (the Best Management Practices (BMPs)).
- [AB 2572](#) – Requires the installation of water meters by January 1, 2025; also requires charging upon volume of delivery.
- [AB 797](#) – Urban Water Management Planning Act requires the implementation of either Demand Management Measures or Best Management Practices.
- [California Urban Water Conservation Council \(CUWCC\) 2008 MOU](#) – CLWA and the Retailers have been signatories since 2001 and committed to implementing the Water Conservation Best Management Practices (BMP's).
- [National Plumbing Code](#) – Passed in 1992, has long required more efficient plumbing fixtures to be for sale throughout the United States.
- [SB 610 and 221](#) – Passed in 2003, these bills require coordination between land and water agencies to ensure that adequate water supplies are available before approval of large land development projects.

2 ANALYSIS OF HISTORICAL WATER DEMAND

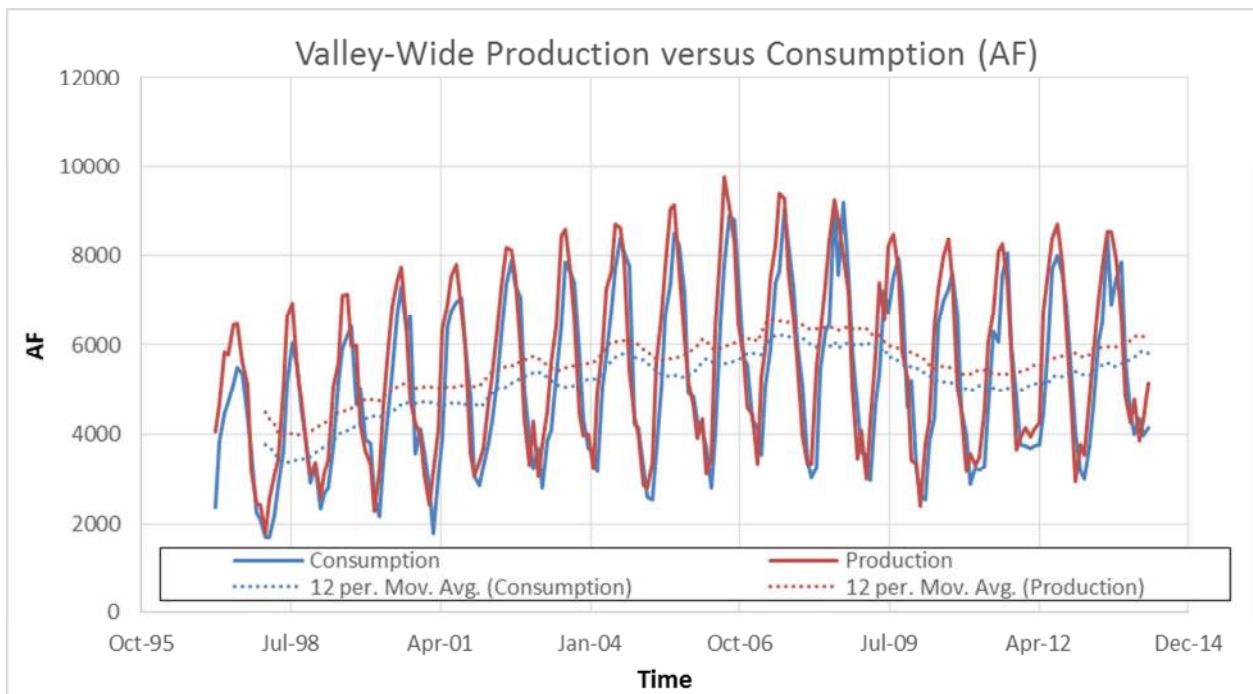
2.1 Introduction

The historical water use patterns for CLWA and the Retailers were analyzed based on water production and consumption data provided by each Retailer. Monthly water consumption and production was analyzed (years 1995 or 1997 through 2013) and a baseline year of 2013 was used to derive an average per account per day water use. Data from each major customer category was analyzed separately. Historical data was segregated into indoor and outdoor water use by customer type using the billing data. The following sections outline the charted billing data and information derived for WUE planning purposes.

2.2 Production versus Consumption

Total water production and consumption (billed water) data were compared over the period 1995-2014. Figure 2-1 illustrates the total production versus total consumption valley-wide. Retailer-specific information can be found in Appendices A-D. Water production data were measured at each Retailer’s respective sources (purchased and transported or well-pumped). Water consumption data were measured at the customer meters. LACWD monthly consumption data were not available before 1997 and therefore are not included. Note the downward trend that began in 2007 and continued to 2011, most likely due to the recession, weather and water rate increases.

Figure 2-1 Total Production vs. Total Consumption – Valley-Wide

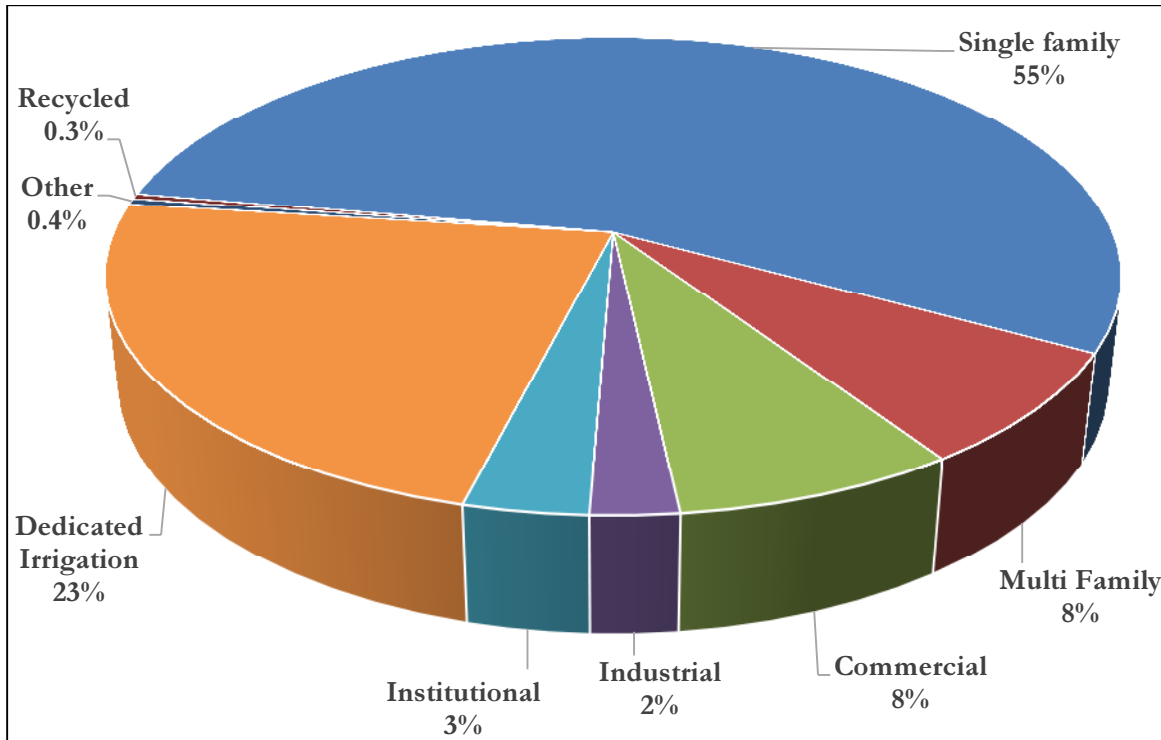


2.3 Consumption by User Category

Santa Clarita Valley water retailers have a variety of customer categories utilized in their billing systems. CLWA and this WUE SP organizes users into single family residential (SF), multi-family residential (MF), commercial, industrial (IND), institutional, irrigation and other categories. The following figure illustrates overall valley-wide water usage

breakdown for all the Retailers based on 2013 water use data. CLWA and for each individual Retailer, single-family water use is the largest category of water users, using over 50 percent of the total water consumed. Retailer-specific information can be found in Appendices A-D.

Figure 2-2 Consumption by Customer Category Based on 2013 Water Use Data – Valley-Wide



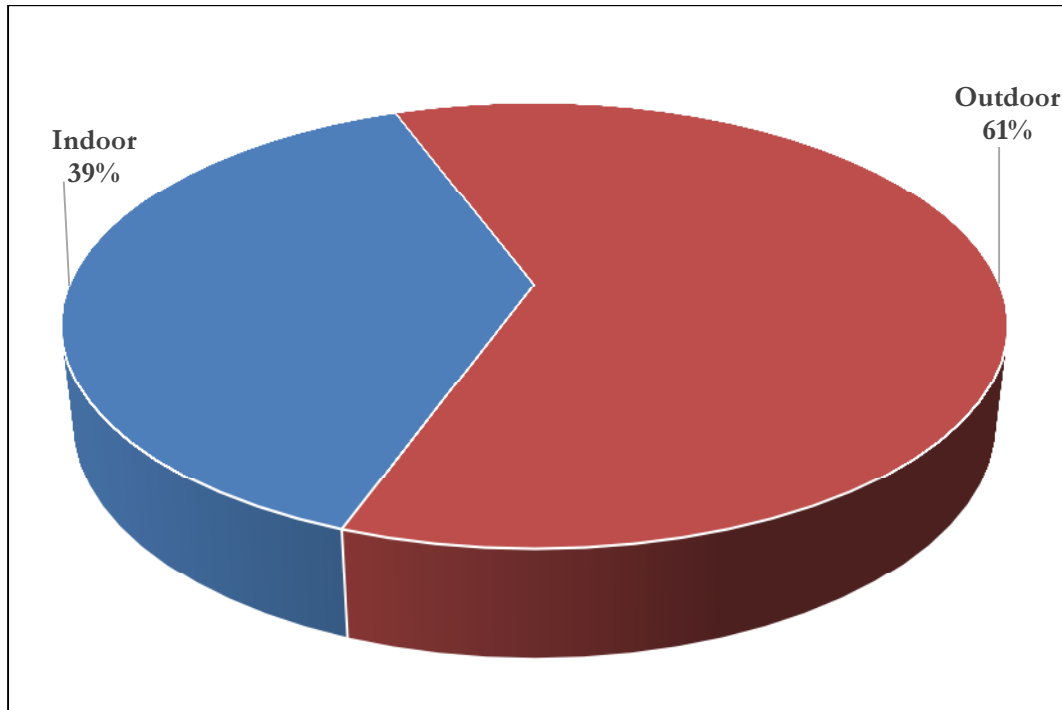
Historical data was segregated into indoor and outdoor water use by customer type using the billing data. The methodology used to determine percent residential indoor water use was to apply each Retailer's irrigation account's lowest month use as a percent of average monthly use yielding an adjustment factor to account for winter watering. This was used to represent the typical winter watering percent to then apply to each customer categories lowest month of water use to separate indoor water use from winter watering. The step-by-step methodology is explained as follows:

1. For customer categories single family, multi-family, commercial, institutional and industrial (NOT irrigation or other), the lowest month's consumption in the last 10 years was determined. This value represents indoor water use plus any winter watering.
2. The lowest month's consumption in the last 10 years was determined for irrigation customers.
3. The average monthly consumption in the last 10 years was determined for irrigation customers.
4. From irrigation customer water use data, an estimated percentage of winter watering was determined based on the percentage of irrigation customer lowest monthly irrigation water use as compared to irrigation average monthly water use.
5. This winter watering percentage was applied to SF and MF's lowest month's consumption to determine how much of that monthly water use represents the minimum month indoor water use versus outdoor winter watering.
6. Indoor water use values were then compared to industry standards to ensure they fell within a reasonable range, as referenced in the Handbook of Water Use and Conservation (Vickers, 2001).

The breakdown of non-residential water use into indoor and outdoor components was based on the assumption that indoor use is approximately equal to the minimum use in the winter. Year 2013 water use was selected for this

profile. While there may be minimal landscape watering in the winter, or leakage from irrigation systems, it is assumed that this is minor, at less than 5-10 percent of the average winter water use. The following figure shows the overall valley-wide breakdown of water use into indoor and outdoor components. This analysis helped understand historical use patterns and allow water conservation planning to focus on the area with the highest overall category of use. Retailer-specific information can be found in Appendices A-D.

Figure 2-3 Overall Use: Indoor vs. Outdoor – Valley-Wide*



* Outdoor water use accounts for estimated winter-watering.

2.4 Analysis of Large Users

An analysis was conducted of the each Retailer's top-100 water users. These users may be single family, irrigation, industrial, commercial, multifamily, or institutional customers. Those users with higher use per day may indicate increased opportunities to save water. One use of this data would be to set a goal of water use reduction through targeted conservation efforts. If the Retailers set a goal to save 10 percent of water use, this goal could be achieved by working with these top-100 high water customers and attempting to reduce each account accordingly. Identifying these additional opportunities for conservation may require a more detailed analysis to determine customer-specific opportunities for water savings. The following table presents the percentage of total demand that is used by each Retailer's 100 top water users.

Table 2-1 Top 100 User Demand

Retailer	Top 100 Large User Demand, AFY	Total CII Demand, AFY	Total Demand, AFY	% Top 100 Large User Use of Total CII Demand	% Top 100 Large User Use of Total Demand
Los Angeles County Waterworks District 36 ^a	393	50	1,067	N/A	37%
Newhall County Water District ^b	3,639	995	8,970	N/A	41%
Santa Clarita Water Division ^c	3,186	2,013	25,488	N/A	12%
Valencia Water Company ^d	2,200	5,671	28,670	39%	8%
Valley-Wide ^e	7,218	8,729	64,195	N/A	11%

a. Based on 2012 top 100 users total demand provided by LACWD, includes SF and MF accounts.

b. Based on 2011 top 100 users total demand provided by NCWD, includes SF and MF accounts.

c. Based on 2012 top 100 users total demand provided by SCWD, includes SF and MF accounts.

d. Based on 2012 top 100 users total demand provided by VWC, includes CII accounts only.

e. Valley-wide estimate based on 2012 top user and total demand from VWC, SCWD, and LACWD; 2011 top user and total demand provided by NCWD.

More information about this large user analysis can be found in Appendix H. This appendix includes details from the analysis on types of commercial customers as well as a refined list of business types to assist with updates to the Retailer's billing systems.

CLWA and the Retailers have future plans to update from Landscape Water Management Districts on dedicated irrigation meters to better understand the City's demands for irrigation water and large sites. Additional tracking of water use by commercial business sector would be useful in developing efficiency targets by type of business to help with cross comparisons of efficient uses on site.

3 PROJECTION OF FUTURE WATER DEMAND

3.1 Introduction

Retailer-specific forecasts of water demand are built from historical monthly data (1995 through 2013) and are split into a short-term forecast (2014 through 2020), and a long-term forecast (2021 through 2050). A key purpose of the WUE SP is to ensure that the CLWA Retailers successfully meet their GPCD targets in 2020 to comply with the requirements of SB X7-7. For this purpose, the WUE SP relies on the short-term demand forecast. The long-term demand forecast is only required for preparing the 2015 Urban Water Management Plan, not the WUE SP. Therefore, demand forecasts past 2020 are not presented.

3.2 Demand Methodology Overview

The demand projection for each Retailer combines the results of two different analytic models – the Econometric Model and the Least Cost Planning Decision Support System Model (DSS Model). The purpose of using these two models is to leverage the strengths of each to obtain the best forecast from 2014 through 2020 and then extended to the year 2050. This approach was reviewed with the Retailers at a meeting on June 19, 2014. The Econometric Model estimates the impact of economic conditions and other factors on water demand. The model can then be used to project, based upon historical patterns, the future rebound in demand associated with economic recovery, while also taking into account other factors, such as rate increases and weather. Since the Econometric Models are calibrated using historical data, their reliability depends on historical relationships between water demand and its influencing factors remaining unchanged during the calibration and forecasting periods. Further into the future, changes in demographics, living patterns, housing stock, and industrial structure can alter these historical relationships; this is why the Econometric Model is not used for forecasting demand past 2020. The final Econometric Model upon which our short-term forecasts are based is labeled “Phase I-Enhanced” in the results section.

The DSS Model incorporates historical data provided by each Retailer to set up a water balance on a monthly time-step. Then the DSS Model can be used to forecast future demand (or to incorporate a previously developed forecast as, for example, from the Econometric Models out to 2020) as the basis for analyzing conservation measures aimed at achieving water savings to meet future gallons per capita per day (GPCD) targets. The DSS Model can accommodate data and assumptions about how future service area and water use characteristics may differ from the past in each Retailer service area. In other words, the DSS Models incorporate short-term forecasts generated by the Econometric Models until 2020 and rely on their own forecasting module from 2021 onward until 2050.

Apart from the ability to forecast demand, the DSS Model also has a conservation component that quantifies savings from plumbing codes and from a user-selected menu of active conservation programs. The conservation modeling capabilities of the DSS Model are used from 2014 onward allowing each Retailer to evaluate its future water demand if it does not undertake any active conservation programs going forward. DSS Model assumptions including details about how plumbing codes are addressed in the DSS Model can be found in Appendix E. Quantification of savings from active conservation programs is presented in Section 6.

The demand analysis for each Retailer has three distinct parts, shown in the Figure 3-1:

1. Historical View – Analysis of historical data between 1995 and 2013 (or a shorter window if the Retailer did not provide complete data going back to 1995). The purpose of this analysis was to identify the impacts of factors such as water rates, economic conditions, and weather on water demands. Data analyzed includes historical system production, water rates, weather (rainfall and reference ETo), population, unemployment rate, and other data as approved and verified by each Retailer. The source data of production and water rates that were provided by the Retailers was compiled into a single MS Excel workbook for each individual Retailer and the data verified by the Retailer staff prior to the modeling effort.
2. Short Term Future – Forecast of demands between 2014 through 2020, assuming normal weather, incorporating economic recovery predictions as well as water rate forecasts and population growth. Normal weather is defined as average reference ETo and rainfall between 1995 and 2006, corresponding roughly to the baseline that water Retailers will choose for testing compliance with SB X7-7. The analysis incorporates the federal government’s projection¹ that the US economy will return to its long-term growth path by 2020, indicated by reaching a national unemployment rate of 5.2 percent, which is roughly the average of the US unemployment rate between 1993 and 2000. The unemployment rate may differ across Retailers at any given point in time. However, movements in this metric for any given Retailer over time parallels movement in the national unemployment rate quite well. Figure 3-2 compares the unemployment rate over time in progressively higher jurisdictions starting with the City of Santa Clarita to the United States as a whole. Unemployment rates over time specific to each Retailer’s service area are not available. Model testing suggested that the unemployment rate for Los Angeles County fit CLWA’s water demand patterns marginally better than the unemployment rate for the City of Santa Clarita. This is not entirely surprising because economic conditions in CLWA’s service area are substantially influenced by economic conditions in the broader region. Therefore, Los Angeles County’s unemployment rate was used for estimating the short-term demand forecast out to 2020. Water rates have been assumed to increase by 1.5 percent per year in real terms between 2013 and 2020. Population projections were developed as a separate component of this overall project, being anchored in the Census for the years 2000 and 2010, and the OVOV population forecast for 2050.
3. Long Term Future – Long term water demand (2021-2050) was forecasted using the DSS Model, which estimates increases in each Retailer’s demand by customer category based upon forecasted increases in population by land-use category. As mentioned earlier, this long-term forecast is not relevant for the development of the WUE SP, thus is not discussed here.

¹ Congressional Budget Office: Testimony – The Budget and Economic Outlook: Fiscal Years 2013 to 2023
Douglas W. Elmendorf, Director Before the Committee on the Budget, United States Senate, February 12, 2013.
Bay Area Council Economic Institute, Recession and Recovery: An Economic Reset, April 2010.

Figure 3-1 Demand Forecasting Methodology

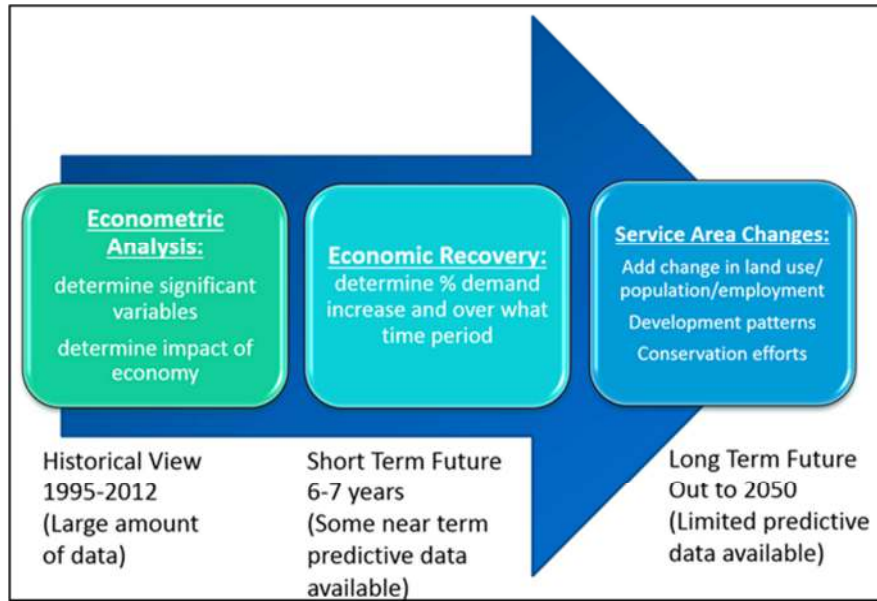
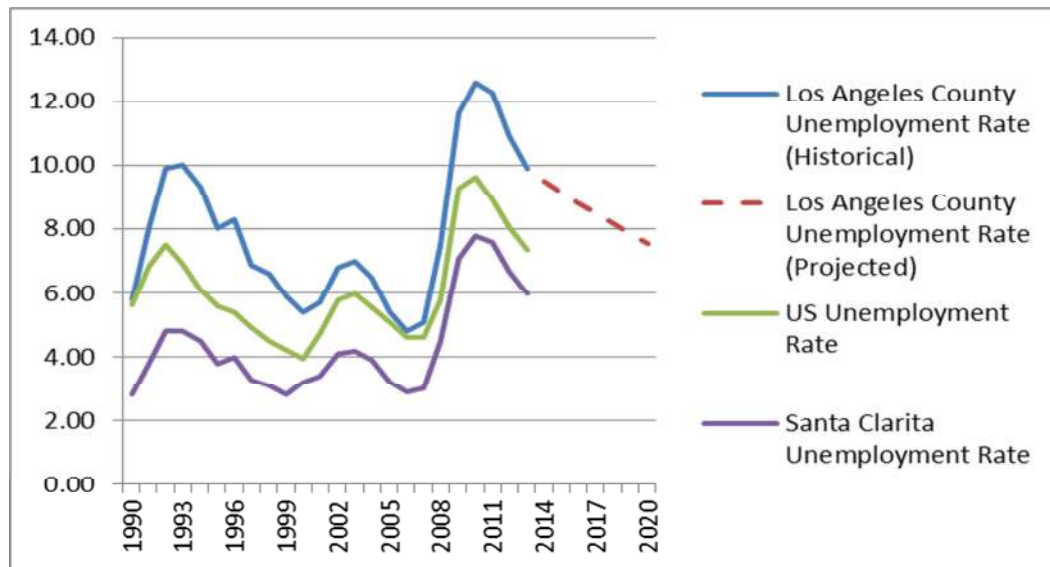


Figure 3-2 Unemployment Rate Comparisons



3.2.1 Econometric Analysis Methodology

As noted previously, this project uses Econometric Models to project demand out to the year 2020. This tool was incorporated into the demand analysis to estimate the relationship between water demand and factors that may be impacting it, such as price, economic conditions, and weather. Relying on knowledge of past historical relationships and assuming that they continue in the short-run, this analysis provided insights into questions associated with demand, such as:

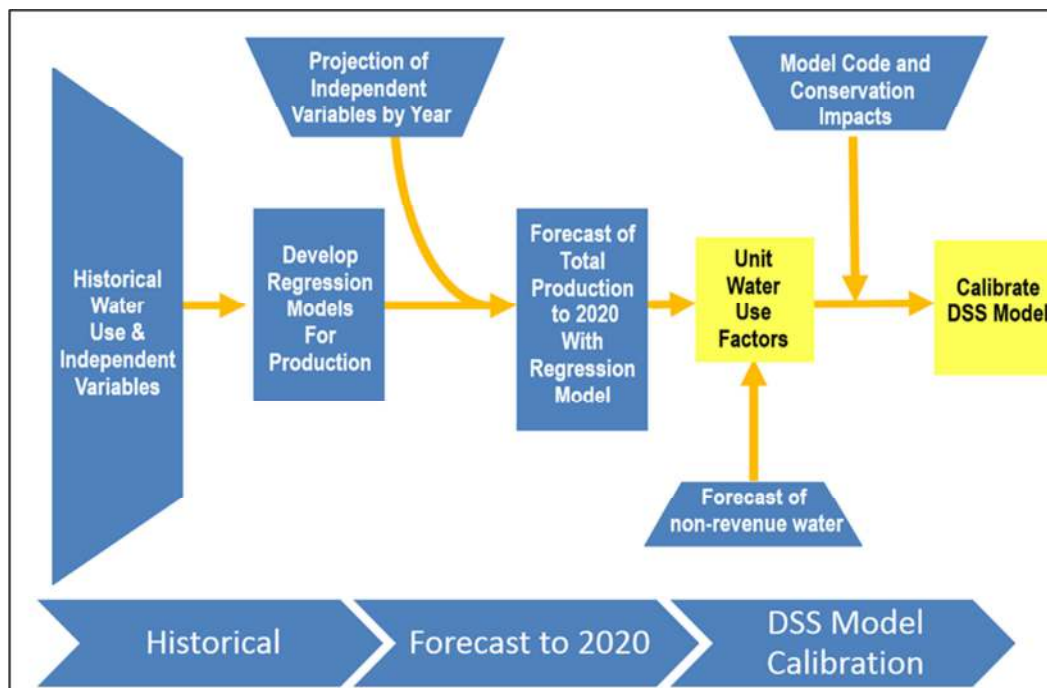
- At what rate will demand rebound as the unemployment rate falls reflecting the economy’s return to its long-term growth path?
- How have price increases depressed demand?

- How has demand responded to weather?

An Econometric Model of water demand was constructed for each Retailer using up to 19 years of monthly production data (where available, data from 1995 through 2013 were used). Each Retailer's Econometric Model utilizes Retailer-specific data to depict retail water rates and population. This data was submitted and verified by each Retailer through the data collection process using a verification of an MS Excel data collection workbook. The model also included additional locally specific data, including reference ETo and rainfall data made available by Department of Water Resources (DWR) through their PRISM weather modeling program. These are the weather data sources that both DWR and CUWCC recommend water suppliers use to weather-normalize their compliance year GPCD in 2015 and 2020. Therefore, there is every reason to favor PRISM over NOAA data. Good NOAA weather data for the Santa Clarita region was unavailable. PRISM weather data was available with a high level of granularity. However, sensitivity analyses did not indicate that any of the four Retailers were sensitive to which PRISM grid was used to model weather impacts. Accordingly, the grid that includes Santa Clarita City Hall was used for all Retailers. Similarly, the Los Angeles County's unemployment rate was used to model economic conditions in each Retailer's service area as mentioned earlier.

After the Econometric Models were developed, they were then used to generate water demand forecasts out to the year 2020. As shown in Figure 3-3, the estimated model coefficient associated with each variable included in the models, such as precipitation, reference ETo, water rates, and the unemployment rate, was also incorporated into the four Retailer DSS models. A more detailed description of the Econometric Modeling framework can be found in Appendix F. All this information was reviewed and calibrated with the DSS Model. This process generated one complete model for each Retailer with data between 2014 and 2050, although only the forecast out to 2020 is relevant for the WUE SP.

Figure 3-3 Econometric Model Flow Diagram



For each Retailer, the econometric analysis estimated the relative impact of various factors on water demand. These Phase I results are provided in the following sections. A more detailed description of the Econometric Modeling framework can be found in Appendix F.

3.2.2 DSS Model Methodology

For the long-term projections (2021 through 2050), the DSS Model was used to generate demand forecasts for each Retailer. The DSS Model also includes a conservation component that quantifies savings from passive conservation (e.g. plumbing codes) and active conservation programs. The DSS Model’s conservation component covers the entire forecast period, 2014-2050. Quantification of savings from active conservation programs will be covered in the following sections of this WUE SP. In this section, only the DSS Model’s estimates of savings from plumbing codes are provided.

The DSS Model prepares long-range water demand and conservation water savings projections. The 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 such as toilets, faucets or irrigation. 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 conservation efforts. The purpose of using end use data 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.

The first step for forecasting water demands using the DSS Model was to gather customer category billing data from each Retailer. The next step was to calibrate the model by comparing water use data with available demographic data to characterize water usage for each customer category (single family, multi-family, commercial, industrial and institutional) in terms of number of users per account and per capita water use. During the model calibration process, data were further analyzed to approximate the indoor/outdoor split by customer category. The indoor/outdoor water usage was 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 were 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 reflects social norms from end use studies on water use behavior (e.g., flushes per person per day).

Following the model calibration, future population and employment projections were incorporated into the DSS model. Each Retailer has confirmed their respective Retailer’s projection forecast as part of this Phase I work effort. These growth projections were used to develop a projected demand for the years 2021 to 2050.

Background information on the DSS Model, as well as a step-by-step guide to operating the model, can be found in the User Manual.

3.3 Future Population Projections

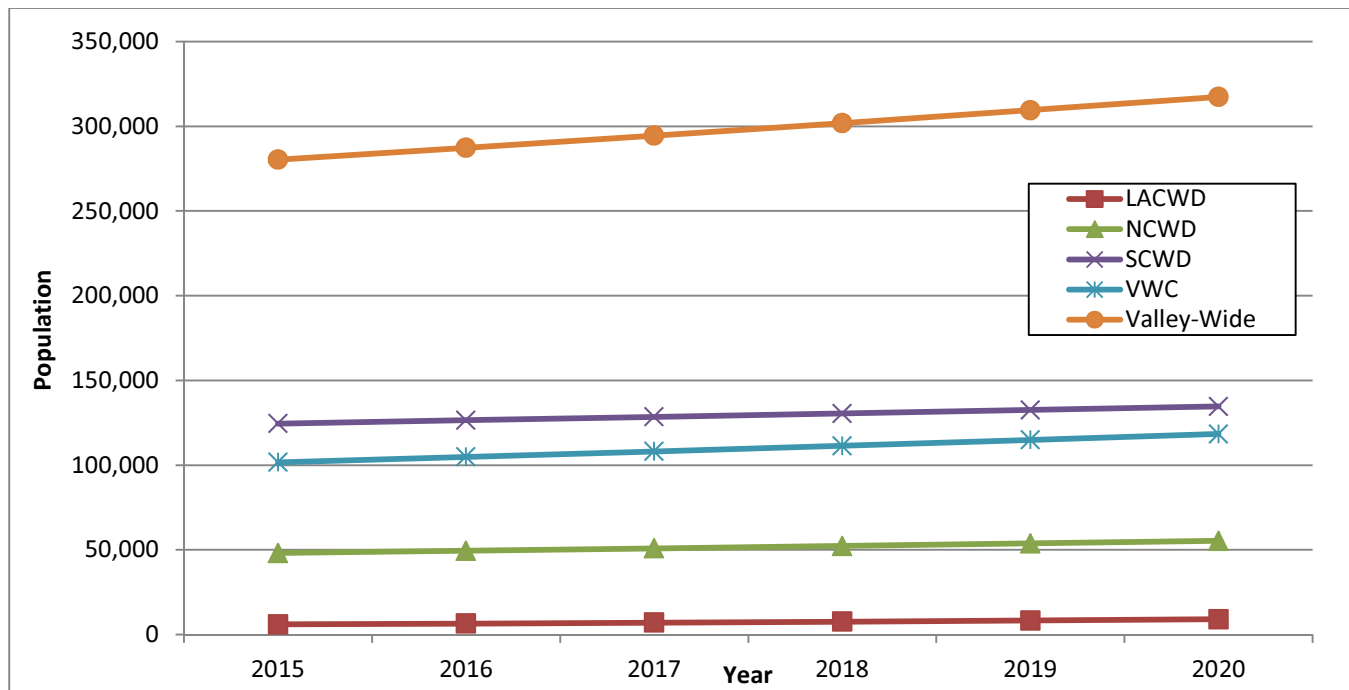
Historical population from 1994 through 2010 was validated through the Population Assessment project in March 2014. The population was then extended from 2010 through 2013 based on new account data using the same assumptions developed for the Population Assessment Project. Future population estimates through 2050 have been confirmed by each Retailer through Phase I of the project. These estimates were obtained by adjusting the year 2010 population for each Retailer to match the outcomes of the Population Assessment project that was validated against the 2010 US Census. We then added on additional future population at the same growth rate from the 2010 Urban Water Management Plan that was previously approved by the Retailers. At full buildout, the total population for the Valley was then verified to match the OVOV High Growth Scenario. These revised population values were reviewed and approved using GOTO Meeting with the CLWA staff. CLWA and individual Retailer population forecasts through year 2020 are presented in the following table and figure.

Table 3-1 CLWA and Individual Retailer Phase I Population Forecast*

Phase I Population Forecast	2015	2016	2017	2018	2019	2020
LACWD	5,992	6,501	7,053	7,652	8,302	9,007
NCWD	48,105	49,461	50,855	52,289	53,763	55,279
SCWD	124,571	126,524	128,508	130,523	132,569	134,648
VWC	101,695	104,839	108,080	111,421	114,866	118,417
CLWA	280,362	287,325	294,496	301,885	309,500	317,351

*Phase I population is based on 2010 US Census and OVOV Plan population projections.

Figure 3-4 Phase I CLWA and Retailer Population Forecast



3.4 Key Assumptions for the DSS Model

The following table shows the key assumptions used in the model. 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. More details on these assumptions can be found in each Retailer’s DSS Model.

Table 3-2 List of Key Assumptions for the DSS Model

Parameter	Model Input Value, Assumptions, and Key References			
	LACWD	NCWD	SCWD	VWC
Model Start Year	2014			
Water Demand Factor Year (Base Year)	2013			
Non-Revenue Water in Start Year	15.6%	6.1%	7.7%	5.1%
	This value can be found in the green NRW section of each Retailer's DSS Model.			
Population Projection Source	OVOV CLWA High Growth Scenario broken down by Retailer based on 2010 UWMP population projection distribution.			
Avoided Cost of Water	\$1,900/AF (\$5,873/MG). This value can be found in the "Avoided Costs" red section of each Retailer's DSS Model.			
Distribution of Water Use Among Categories	See section 2			
Residential End Uses	CA DWR Report "California Single Family Water Use Efficiency Study," 2011, AWWARF Report "Residential End Uses of Water" (DeOreo, 1999, 2015) (2015 AWWARF Report is pending). Retailer supplied data on costs and savings, professional judgment where no published data available. Each Retailer's water end use breakdown can be found in the "End Uses" section of their DSS Model on the "Breakdown" worksheet.			
Non-Residential End Uses, %	AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000). Each Retailer's water end use breakdown can be found in the "End Uses" section of their DSS Model on the "Breakdown" worksheet.			
Efficiency Residential Fixture Current Installation Rates	U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Reference "High Efficiency Plumbing Fixtures - Toilets and Urinals" (Koeller & Company, 2005). Reference Consortium for Efficient Energy (www.cce1.org) This information is included in the "Codes and Standards" green section of each Retailer's DSS Model by customer category fixtures.			
Water Savings for Fixtures, gal/capita/day	AWWARF Report "Residential End Uses of Water" 1999, CA DWR Report "California Single Family Water Use Efficiency Study", 2011. Retailer supplied data on costs and savings, professional judgment where no published data available. This information is included in the "Codes and Standards" green section on the "Fixtures" worksheet of each Retailer's DSS Model.			
Non-Residential Fixture Efficiency Current Installation Rates	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. This information is included in the "Codes and Standards" green section of each Retailer's DSS Model by customer category fixtures.			

Parameter	Model Input Value, Assumptions, and Key References			
	LACWD	NCWD	SCWD	VWC
Residential Frequency of Use Data, Toilets, Showers, Washers, Uses/user/day	Falls within ranges in AWWARF Report “Residential End Uses of Water” 1999. This information is included in the “Codes and Standards” green section on the “Fixtures” worksheet of each Retailer’s DSS Model, and confirmed in each “Service Area Calibration End Use” worksheet by customer category.			
Non-Residential Frequency of Use Data, Toilets and Urinals, Uses/user/day	Estimate based on AWWARF Report “Commercial and Institutional End Uses of Water” 2000. This information is included in the “Codes and Standards” green section on the “Fixtures” worksheet of each Retailer’s DSS Model, and confirmed in each “Service Area Calibration End Use” worksheet by customer category.			
Natural Replacement Rate of Fixtures	Residential Toilets 2% (1.28 gpf and 1.6 gpf toilets), 2.5% (3.5 gpf and higher toilets)			
	Commercial Toilets 2% (1.28 gpf and 1.6 gpf toilets), 2.5% (3.5 gpf and higher toilets)			
	Residential Showers 4%			
	Residential Clothes washers 10%			
	A 4% replacement rate corresponds to 25 year life of a new fixture.			
	A 10% replacement rate corresponds to 10 year washer life based on 2014 AWWARF Report “Residential End Uses of Water” and “Bern Clothes Washer Study,” Final Report, Energy Division, Oak Ridge National Laboratory for U.S. Department of Energy, March 1998. Online: www.energystar.gov			
	This information is included in the “Codes and Standards” green section on the “Fixtures” worksheet of each Retailer’s DSS Model.			
Future Residential Water Use	Increases Based on Population Growth and Demographic Forecast			
Future Non-Residential Water Use	Increases Based on Population Growth and Demographic Forecast			

3.5 Water Demand Projections with and without Plumbing Code

The Econometric Model and DSS Model were used to generate water demand projections for each Retailer. As previously described, the Econometric Model generated water demand projections for the years 2014 to 2020; the DSS Model generated water demand projections for the years 2021 to 2050. The following table and figure presents the valley-wide Phase I demand projections with and without plumbing code savings through 2020. Retailer-specific demand projections can be found in Appendices A-D. Longer-term projections can be found in each Retailer’s DSS Model. The development of Phase I demand projections are based on population projections detailed in the SCV Demand Study - Demand Projection Analysis Update (MWM, June 2015).

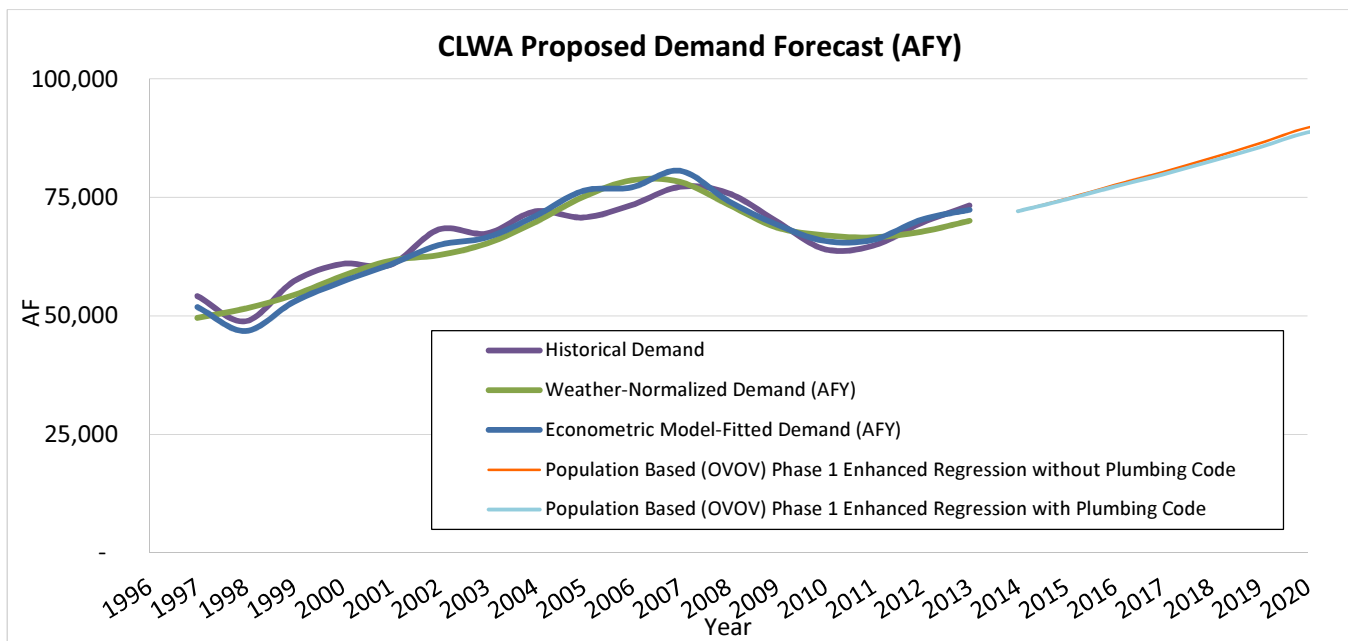
Table 3-3 Demand Projections – Valley-Wide

Draft Demand Forecast	2015	2016	2017	2018	2019	2020
Total Demand with No Plumbing Code Savings (AFY)	74,712	77,574	80,308	83,277	86,368	89,726
Total Demand With Plumbing Code Savings (AFY)	74,551	77,256	79,825	82,624	85,537	88,699

The demand projection graphs in the following figure include the following curves:

- Actual Demand – This is historical demand as submitted in spring 2014 to MWM from each Retailer.
- Model-Fitted Demand – The Retailer Econometric Model preliminary results that try to match actual demand using the regression equation described in Appendix F.
- Phase I Demand - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and 4) no plumbing code.
 - Savings from plumbing codes (also known as “passive conservation”) is based on federal and state legislated efficiency standards pertaining to plumbing fixtures and appliances. The impact of codes quantified here include the Energy Policy Act of 1992, CALGreen Building Code, AB 715, and SB 407, which governs the types of fixtures available on the market for toilets, showers, washers, etc. The curve with “no plumbing code” would be the demand if these laws were not in place.
- Phase I Demand with Plumbing Code - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and (4) plumbing code.

Figure 3-5 Projected Demands – Valley-Wide



4 HISTORICAL AND CURRENT WATER CONSERVATION PROGRAMS

This section will present a summary of each Retailer's historical water conservation activity and water savings due to passive water savings from plumbing codes and active conservation activity from incentive programs, a description of CLWA and each individual Retailer's current conservation programs, and a description of each Retailer's water billing structure.

4.1 Description of Historical Accomplishments

The Santa Clarita Valley Family of Water Suppliers has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help water customers become more water-efficient. Outreach programs started in 1980s. Incentive programs started with toilet rebates and high efficiency faucet & showerhead giveaways in 2006 and continued to expand to over 10 conservation incentive measures being implemented currently. Figure 4-1 presents the Water Conservation Program Timeline as a summary of historical water conservation program activities, which includes the following highlights:

- Long-standing programs dating back to the 1980s:
 - Water loss control including leak repair (1981 start year)
 - Metering with commodity rates (1981 start year)
 - Public information (1981 start year)
- Long-standing program dating back to the 1990s:
 - School education (1990 start year)
- Started in 2000:
 - Hiring Conservation Coordinators
 - Water waste prevention
- Starting after 2006:
 - Retail conservation pricing
 - Numerous incentive programs for rebates on fixtures and appliances
 - Irrigation workshops
 - Landscape ordinance review

In 2008, CLWA developed the Santa Clarita Valley Water Use Efficiency Strategic Plan, the goal of which was to reduce water demand system-wide by 10 percent over the 20 subsequent years. CLWA, NCWD, SCWD, and VWC are also members of the California Urban Water Conservation Council (CUWCC), who are active in promoting water conservation statewide.

In 2009, CLWA and the retailers began to engage in a variety of feedback techniques on outreach. CLWA sponsored a focus group on water use in the Santa Clarita Valley in 2009. In addition, focus groups have been used very successfully in 2013, 2014, and 2015 to provide feedback on current and future programs and test potential messages to identify issues with language. CLWA has also conducted a 300-person phone survey every year to measure awareness of rebates and water use in the Santa Clarita Valley. Periodically, CLWA conducts on-line surveys about program effectiveness, awareness, and satisfaction. The Family of Water Suppliers has also conducted intercept surveys at events, such as the Home & Garden Show and Earth Arbor Day, to measure awareness of rebates and willingness to participate in programs.

Historical water savings both from active and passive conservation activity was determined in order to more accurately understand historical demand trends and better use these trends to project water use without plumbing codes or active conservation. Quantification of historical savings from conservation activity reported to the

CUWCC is provided on the CUWCC’s website. CUWCC active water savings from various BMPs is available annually from 2002 through 2008 for VWC, SCWD, and NCWD. Active water savings are not available from the CUWCC for LACWD.

4.2 Current Conservation Program

Currently, CLWA runs several water conservation programs for all Retailer customers including: weather based irrigation controller rebates, lawn replacement program, and high efficiency clothes washer rebate programs. More information about current conservation opportunities offered by CLWA and the Retailers can be found here: <http://scvh2oprograms.com/>.

In addition to the conservation opportunities available for each Retailer’s customers through SCV’s programs and ongoing water loss maintenance programs, each Retailer aims to reduce water demands by conducting their own “in-house” conservation program.

The following table presents the conservation measures and incentives in each Retailer’s service area as modeled in the DSS Model – some of these are measures led by CLWA, some are Retailer-led. A description of each measure is presented in Table 6-1 in a following section. These measures are presented as Program A in each Retailer’s DSS Models. Though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer’s DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented. The design of each measure will be explained in the following sections.

Table 4-1 Current 2014-2015 Retailer Measures

Measures	LACWD	NCWD	SCWD	VWC
Water Loss (Retailer)	X	X	X	X
Conservation Pricing SF (Retailer)			X	X
Public & School Education (CLWA)	X	X	X	X
Home Water Use Reports (Retailer)				X
SF Turf Replacement Program (CLWA)	X	X	X	X
MF CII Turf Replacement Program (CLWA)	X	X	X	X
SF Drip Irrigation Incentives (Retailer)		X	X	X
MF CII Drip Irrigation Incentives (Retailer)				X
SF WBIC Free Controller Program (CLWA)	X	X	X	X
MF CII WBIC Free Controller Program (CLWA)	X	X	X	X
HECW Rebates (CLWA)	X	X	X	X
UHET Rebates (Retailer)				X
Top User Indoor Surveys and Incentives (Retailer)		X		X
CII Replace Equip and Performance Program (Retailer)		X		X
SF MF Outdoor Surveys (Retailer)	X			X
SF MF Survey Leak & Pressure (Retailer)	X			X
HE Faucet & HE Showerhead Giveaway (Retailer)		X	X	X
Low-Income HE Fixture Installation (CLWA)	X	X	X	X
Sprinkler Nozzle Rebate (Retailer)	X	X	X	X
Irrigation Surveys and Landscape Budgets (Retailer)			X	X
Landscape Ordinance (Retailer)	X	X	X	X

4.3 Water Billing Structures

This section presents three elements to Retailer water billing: setting appropriate rates and mitigating revenue impacts, types of rate structures, and building ongoing conservation into setting rates.

4.3.1 Setting Appropriate Rates and Mitigating Revenue Impacts

Retailer rates can be an important tool for encouraging efficiency in customers' use. Depending upon rate design and the proportion of revenue generated from water usage as compared to fixed fees, the result of increased customer efficiency can result in reduced revenue, which can lead Retailer decision makers to be less supportive of conservation programs. There are three possible ways in which a Retailer's revenue needs and their implementation of a conservation program can interact:

1. When the water rates remain unchanged but an aggressive conservation program is started, there will be *revenue impacts*.
2. Water rates can also be used to encourage conservation. Various rate types send price signals to the customer, encouraging him or her to reduce water use. In this case, lower water sales are an expected outcome of the program and a part of it.
3. A Retailer can use both of the previously mentioned techniques to reduce water use. An aggressive conservation program will include effective programs that reduce water use in a measurable way. An aggressive water rate structure will also encourage water conservation. Following implementation of both, it is challenging to separate the effects of each and ask "How much of the reduction was due to programs and how much was due to raising the price of water or changing the form of the rate structure to encourage conservation?" To answer this challenging question of what motivated the change in fixtures, utilities may provide a questionnaire with their rebate forms or perform a baseline surveys on fixture and appliance fixture technologies.

Because the price charged for water and the nature of the Retailer's conservation programs are often intertwined, it is important to understand how to analyze water savings as a result of programs and price changes separately. The key to managing revenue impacts of a conservation program (lower water sales) is to predict those lower sales and account for them in the rate setting process. The following section presents further explanation of price impacts.

4.3.2 Types of Rate Structures

Price impacts are a function of the type of rate structure employed by the Retailer. Objectives of rate structure design often include the following: (a) basing the rates on the actual cost of service, (b) providing adequate and stable revenues, (c) providing fairness or equitability among customer classes and volume users, (d) water conservation, and (e) ease of implementation and administration. *Principles of Water Rates, Fees and Charges* (M1), by the American Water Works Association (www.awwa.org), discusses water rate design in detail. The following subsections instruct on the use of water rates to create more incentives to reduce water consumption.

Water rates that encourage conservation. These rates provide a financial incentive for customers to reduce water use, usually by applying a surcharge on peak-month usage or by charging a higher unit rate for water as the number of units used increases. Conservation rates must be fair; it is therefore essential that conservation rates be developed through a public process that ensures acceptance of the purpose and design of the rate structure. It is important that regardless of the conservation rate structure selected, greater control can be achieved from a combination of pricing with indoor and outdoor conservation programs than from pricing alone. Conservation pricing as part of a broad demand management program is the most logical approach. Types of conservation promoting water rates include:

- A combination of low rates for baseline minimum water quantity (the same fixed charge every billing cycle for the baseline volume) and high volumetric charges for the amount that the customer uses above the baseline volume
- Inclining tier rates with volume amounts (or blocks) where higher unit charges are triggered at higher levels of use to encourage conservation

- Seasonal rates or excess-use surcharges
- Marginal cost pricing
- Water budget rate structures where tailored allocations are developed for each customer and rates increase as the allocation is used or exceeded
- Rates where the majority of revenue is generated by the volumetric rates instead of the fixed rated or service charge.

The California Urban Water Conservation Council (CUWCC) declares that pricing rates must derive at least 70 percent of revenue from volumetric rates to be considered conservation pricing. The Retailers have uniform rates for all customer classes, with SCWD having a tiered rate structure for single family customers, and VWC having a tiered rate structure for SF, MF and Irrigation customer classes. All the Retailers have the commonly defined “conservation rates” and they meet or come close to meeting the CUWCC’s 70 percent test listed above. According to the CUWCC’s BMP Reporting online database in 2012 VWC reported 73 percent volumetric billing, LACWD reported 70 percent, and SCWD reported 67 percent. According to CLWA’s 2010 UWMP NCWD’s 2010 volumetric-based charges were 70 percent of all revenue. A description of each Retailer’s conservation pricing rate history can be found in Appendices A-D.

Price elasticity. When water rates are raised significantly (beyond an inflationary response), water use often declines. The amount of the decline in demand is called price elasticity, which is the percentage change in consumption per percentage change in price. Price elasticity is normally expressed as a fractional reduction (i.e., an elasticity of -0.1 means that a 1 percent increase in price will stimulate a 0.1 percent decrease in consumption). The econometric analysis completed for the demand forecast portion of this project found that the retail price elasticity was -0.15 , which is typical of these factors found in the literature.

Revenue Concerns with Different Types of Rate Structures. When setting a rate structure a steady and predictable revenue stream is of concern. As the recession of 2009-11 demonstrated, when the economy falters, people use less water and water sales decline. The amount of revenue decline varies with the specific type of rate structure. The most sensitive is tiered rates (or inclining block rates) where, if users in the highest tier use less water, the revenue falls more than the water sales do. The mitigation for this is to have a reserve fund to handle this situation as well as changes in the weather. Weather can also change water sales and cool, wet seasons can lead to lower water use and lower revenues.

4.3.3 Building Ongoing Conservation into Rate Setting

Water rate setting and conservation program implementation are linked, either by design or inadvertently. When rates are used as a part of the process to encourage conservation, it is hard to separate the effects. Setting up a water use tracking model will show the reductions, *regardless of their origin*. Because the goal is to reduce water use, it is essential to know how the total reduction is achieved and how the components that contribute to the total are estimated. More information on the econometric modeling process used in the development of this WUE SP can be found in Section 3.2 and Appendix F.

A by-product of the water use forecasting is the ability to forecast future water savings which use can be translated into a forecast of water revenues. This can be simple for some rate structures and more difficult for multitier rates. Using this forecast of lower water demand, future rate increases can be designed to accommodate lower sales. The lower sales are usually relatively small when viewed on an annual basis, typically between 0.5 to 1 percent per year. Lower sales can likewise be more predictable than the effects of inflation in costs, which also must be factored into the rate-setting process. As the Retailers review their rates, it will become evident that revenue losses caused by a conservation program are very manageable.

A description of each Retailer's conservation pricing rate history can be found in Appendices A-D. More information about best water supply management practices, including water audits and water loss control programs can be found in AWWA's Manual of Water Supply Practice, M36, Water Audits and Loss Control Programs.

5 GOAL SETTING AND POTENTIAL NEW WATER CONSERVATION MEASURES

In order to develop a WUE SP that would result in the greatest ease and efficiency of program administration, the lowest cost of implementation, and the greatest water savings, proposed measures were screened by CLWA and the Retailer staff. The screening reviewed existing implementation methods, and new, additional water use efficiency measures. Based on the results of the screening process, the Project Team identified 32 measures for further evaluation.

5.1 Conservation Planning Goals and Approach

One of the main goals of the WUE SP is to reduce and maintain lower per capita water use. The recent recession and on-going drought have temporarily reduced GPCD and it remains to be seen what the norm for GPCD will return to near term given both conditions are expected to be recovered by 2020 (Section 3). One option to accomplish the goal to lower GPCD both for the drought and on-going to meet state law for per capita targets would be to add new measures to existing programs. For example, new technologies enable customers to be more efficient with their water use without requiring major behavior changes.

Experience by many utilities has shown there is a reasonable limit to how many measures can be feasibly implemented at one time. Programs that consist of a large number of measures are historically difficult to implement successfully. Therefore, prioritization of measures is important both as an outcome of this planning effort and an implementation of the program. The approach to program implementation is viewed as a “living” process where new opportunities may be adopted as new technologies become available over time. Program timelines can also be adjusted, but with the recognition that doing so will impact the savings objectives.

To develop demand forecasts for each agency for both this WUE SP and the 2015 Urban Water Management Plan that account for conservation from both passive (future code and standards) and active conservation programs, the individual Retailer DSS Models were designed to (1) account for passive conservation savings projected through 2050 and (2) analyze potential savings from a variety of water use efficiency measures to facilitate the development of individual Retailer conservation savings estimates through 2050. The WUE SP presents information through 2020 as a focus of meeting state mandated GPCD targets.

Each Retailer’s individual conservation water savings goal was determined in the 2014 Population Assessment and GPCD Review and confirmed by that Retailer. The basis for the individual Retailer goals is the SB X7-7 targets. An explanation of each Retailer’s conservation target setting process and goals can be found in the following section.

5.2 State Mandated Conservation and GPCD Methodology & Targets

CLWA and the Retailers are committed to managing and reducing water demands through water conservation and water use efficiency. Water conservation is defined as not using water to perform a task that could be done otherwise (e.g., sweeping instead of using a hose to wash down a sidewalk). Water use efficiency is defined as performing a task that requires water, but doing so using less water (e.g., watering the lawn less each day).

CLWA and the Retailers are creating a path that will strive to reach their water savings goals by being more efficient with their own operations and maintenance practices and using various conservation “measures” to encourage customers to be more conserving and efficient with their water use. As required by the Urban Water Management

Planning Act and published in the CLWA’s Urban Water Management Plan (UWMP), each Retailer is expected to reduce baseline per capita water consumption by 20 percent by 2020 as per SB X7-7.

In the 2014 CLWA Population Assessment and GPCD Review, MWM prepared an assessment of population for the purpose of tracking water consumption on a gallons per capita per day (GPCD) basis for the Retailers within the CLWA service area. This assessment was conducted using United States Census block data from the years 2000 and 2010. The population assessment was conducted by evaluating the population in each census block to determine what portion of the population residing in that block was located in a particular retail agency service area. The population assessments were verified by using high resolution aerial maps to visually review census blocks which contained more than one service area. This population assessment updated both population and people-per-household estimates which supported determining GPCD estimates. In tracking GPCD, the primary project driver is the SB X7-7 20 x 2020 compliance requirements that require calculation using population in future UWMPs including tracking of baseline GPCD (10 years between 1994 and 2010), a 2015 target and a 2020 target. Since Los Angeles County Water District does not have 3,000 AF served or 3,000 connections, SB X7-7 does not apply. GPCD targets for the Retailers primarily increased given that the adjusted population was less. More information about this population assessment can be found in that project’s technical memorandum, CLWA Population Assessment and GPCD Review. Baseline GPCD, current 2013 GPCD, and GPCD targets for 2015 and 2020 are presented in the following table.

Table 5-1 Retailer Baseline and SB X7-7 Target GPCD

Retailer	Baseline	2015 Target	2020 Target	Current 2013
LACWD ^a	235	212	188	227
NCWD	238	214	190	207
SCWD	251	226	201	221
VWC	335	301	268	295
Valley-Wide ^b	280	252	225	246

a. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

b. Valley-wide 2015 and 2020 target GPCDs are based on a weighted average using projected 2015 and 2020 populations for NCWD, SCWD and VWC. Valley-wide baseline GPCD estimate is an average of 80 percent of the calculated 2020 target and 90 percent of the calculated 2015 target. Valley-wide targets do include LACWD GPCD. Population projections and source references are presented in Section 3.3 of this document.

5.3 Potential New Conservation Measures

New measures were designed with an implementation schedule reflecting dates sometime in the future when CLWA and the Retailers might begin such programs. The first step in the conservation analysis was to review historical CLWA and Retailer water conservation activity and savings. The purpose of this review was to look at historically successful programs, past penetration rates (activity levels) for individual measures, and the types of programs that were implemented (and for which customers—single family, multi-family, commercial, etc.) by each of the Retailers since the 2008 WUE Plan. This information was reviewed on a valley-wide and individual Retailer level. The participation rates were incorporated into the design of each of the conservation measure activity levels in the DSS Model analysis.

6 COMPARISON OF INDIVIDUAL CONSERVATION MEASURES

Following the review of the historical conservation efforts, a list of over 75 potential conservation measures was provided to each Retailer to be considered for further evaluation in the DSS Model. This list of measures was then screened by CLWA and the Retailers to: (1) identify those measures with the highest level of interest and potential for implementation within the Valley and (2) identify which entity (CLWA or individual Retailers) would be best suited to implement each measure. Through this process, a total of 32 measures were selected for analysis in the individual agency DSS models. The screening process and results are described in Appendix G. Table 6-1 below presents a list and description of the 32 potential water use efficiency measures selected for the cost effectiveness analysis.

6.1 Conservation Measure Evaluated

Table 6-1 includes the 32 water use efficiency measures that were included in the DSS Model analysis. The table includes measures, devices and programs (e.g., direct install high efficiency toilets) that can be used to achieve water use efficiency, methods through which the device or program will be implemented and what distribution method, or mechanism, can be used to activate the device or program. The list of potential measures was drawn from MWM, CLWA and Retailer general experience and review of local water agencies’ water use efficiency programs. The measure descriptions apply generally to each Retailer. Retailer-specific measure descriptions can be found in each Retailer-specific DSS Model.

Table 6-1 Water Use Efficiency Measure Descriptions

Measure Name	Description
Water Loss	Retailer Measure. This measure has operations, conservation and finance staff working together to maintain a thorough annual accounting of water production, sales by customer class and quantity of water produced but not sold (non-revenue water). In conjunction with system accounting, audits are performed that will identify and quantify known legitimate uses of non-revenue water in order to determine the remaining potential for reducing real water losses. The goal of this measure is to lower the Infrastructure Leakage Index (ILI) and non-revenue water every year by a pre-determined amount based on cost-effectiveness. This measure also includes continuously analyzing billing data for system errors and under-registering meters and addressing meter testing and repair/replacement to insure more accurate meter reads and revenue collection. Follow-up actions may include meter calibration and an accelerated meter replacement program. This measure covers efforts to find and repair leaks in the distribution system to reduce real water loss. More aggressive actions may include the installation of data loggers and proactive leak detection. Leak repairs would be handled by existing crews. Specific water loss measure goals and methods are specific to each Retailer.
AMI	Retailer Measure: This measure includes retrofitting the existing system with AMI meters and the associated network capable of providing real-time consumption data to Retailer offices. A major conservation benefit is the improved identification of system and customer leaks. Some costs will be offset by operational efficiencies and reduced staffing. AMI enables enhanced billing options and the ability to monitor unauthorized usage. Customer service is improved as staff can quickly access real-time usage records to address customer inquiries. An optional feature is online customer access to their account usage; this has been shown to improve accountability and reduce

Measure Name	Description
	water use. AMI identifies and quickly notifies customers of apparent leaks.
Conservation Pricing	Retailer Measure: Rates must meet Retailer costs, but some features can improve customer accountability by better imposing cost impacts for high water usage. This measure is based on existing and proposed rate structures as well as whether additional conservation is possible through pricing changes that modify behavior. This measure assumes fixture, appliance and irrigation has water savings accounted for in the hardware equipment changes documented in other measures.
Public & School Education	CLWA Measure: This measure continues CLWA's outreach program and considers additional budget or staff support. CLWA currently has K-12 classes, monthly gardening classes, drip irrigation and online WBIC and lawn replacement classes. CLWA may offer a landscaper education program, such as QWEL. Qualified Water Efficient Landscaper (QWEL) Program is recognized as a U.S. Environmental Protection Agency's WaterSense labeled Professional Certification Program. QWEL provides approximately 20 hours of educational materials designed to equip those who complete the program with a better understanding of landscape water management for the landscape industry. CLWA uses a range of printed and online materials, outreach events, etc. to raise awareness of conservation measures available to customers, including incentive programs offered by Utility. This can include newsletters, bill stuffers, brochures (self-developed or purchased), working with local newspapers, signage at Retailers and signs on public buses. Regional participation and development can help assure consistent messaging. Such programs would continue indefinitely. VWC works with Living Wise to promote conservation kits to 5th graders in their service territory and plan to distribute 500 kits annually in partnership with the gas and electric companies. VWC has been conducting the Water Smart Irrigation and Garden Care and Drought Smart Irrigation and Garden Care Workshops since 2012. VWC customers can receive a \$30.00 credit for attending and receive general education regarding VWC and CLWA programs and information on irrigation best practices.
Home Water Use Reports	Retailer Measure: This measure provides detailed customer specific home water use reports with billing information to support the customer making informed choices to conserve. This report is provided as part of monthly or bi-monthly billing. VWC currently generates these reports in-house and contacts approximately 50 percent of SF customers annually.
SF Lawn Replacement Program	CLWA Measure: This measure provides a per square foot incentive for supporting customers' cost to remove turf, replacing it with low-water using plants or permeable hardscape. The rebate is based on dollars per square foot removed and is capped at an upper limit for single family residences. Administration costs include a pre- and post-inspection of the landscape retrofit.
MF CII Lawn Replacement Program	CLWA Measure: This measure provides a per square foot incentive for supporting the customers' cost to remove turf and replace it with low-water using plants or permeable hardscape. The rebate is based on a dollars per square foot removed, and capped at an upper limit for MF CII customers. Administration costs include a pre- and post-inspection of the landscape retrofit. VWC provides additional funding incentive via the HELIUM Drip Conversion \$0.25/sqft rebate.
SF Drip Irrigation Incentives	Retailer Measure: This measure offers drip conversion kits (RainBird 1800 Retro). A Retailer pressure reduction program may be necessary to support this measure. VWC added drip irrigation to its HELIUM (High Efficiency Landscape Irrigation Upgrade Measures) portfolio. NCWD rebates drip irrigation kits at \$0.25/square foot. SCWD gives drip irrigation kits away.
MF CII Drip Irrigation Incentives	Retailer Measure: This measure offers drip conversion kits (RainBird 1800 Retro). A Retailer pressure reduction program may be necessary to support this measure. VWC added drip irrigation to its HELIUM portfolio.
SF WBIC Free Controller	CLWA Measure: This measure provides free weather based controllers (up to 16 stations). This is a current CLWA program. These controllers have on-site weather sensors that modify irrigation times at least once a week. This measure requires a training program.

Measure Name	Description
Prg	
MF CII WBIC Free Controller Program	CLWA Measure: This measure rebates irrigation controllers at \$25/active station with a pre- and post-inspection required. These controllers have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly.
School Building Retrofit	CLWA Measure: The school building retrofit program gives schools a grant to replace fixtures and upgrade irrigation systems. VWC works with schools and provides audit services and rebates via the Water Conservation Works Program.
HECW Rebates	CLWA Measure: This measure provides a rebate for highly efficient washing machines to single family homes, apartment complexes that have common laundry rooms, and CII accounts. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology. This measure will be shorter lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation.
SF MF UHET Rebates	Retailer Measure: This measure provides a rebate or voucher for the installation of an ultra-high efficiency toilet (UHET). UHET's are toilets flushing 1.0 gpf or less and include dual flush technology.
HET Bulk Purchase	CLWA Measure: In this measure, the Retailer buys HETs in bulk and gives them away or sells them at a discounted price to customers who want to replace a 3.5 or greater gallon/flush toilet (pre-1993 home).
Top User Indoor Surveys and Incentives	Retailer Measure: Top water customers from each category are offered a professional water survey that evaluates ways for the business to save water and money. Surveys are for large accounts such as hotels, restaurants, stores, and schools – the emphasis is on supporting the top users for each customer category.
CII Replace Equip and Performance Program	CLWA Measure: This measure provides rebates for a standard list of water-efficient equipment, including x-ray machines, icemakers, air-cooled ice machines, steamers, washers, spray valves, and efficient dishwashers. Rebates are also offered for the replacement of once-through cooling and the addition of conductivity controllers on cooling towers. This incentive is based on the potential for savings over certain years. Eligible project costs include labor and hardware, and may include annual water management fees.
CII UHET Rebates	CLWA Measure: This measure provides a rebate or voucher for the installation of ultra-high efficiency toilets (UHET). UHETs use 1.0 gpf of water or less and include dual flush technology. Rebate amounts would reflect the incremental UHET purchase cost.
HE Urinal Rebates	CLWA Measure: This measure provides a rebate or voucher for the installation of high efficiency urinals. The WaterSense standard is 0.5 gpf or less, though models flushing as low as 0.125 gpf (1 pint) are available and function well.
Pre-Rinse Spray Nozzle	CLWA Measure: This measure provides free 1.3 gpm (or lower) spray nozzles and possibly free installation for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door. This is very cost-effective because it saves hot water.
SF MF Outdoor Surveys	Retailer Measure: This measure provides 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. All single family and multi-family residential would be eligible for free landscape water surveys upon request.
SF MF Survey Leak & Pressure	Retailer Measure: This measure provides indoor water surveys for existing residential customers, targeting those with high water use and providing a customized report to owners. This measure may include the give-away of efficient shower heads, aerators, and toilet devices. Customer leaks can go uncorrected at properties where owners are least able to pay the cost of repairs. These

Measure Name	Description
	programs may require that customer leaks be repaired and the Retailer will either subsidize part of the repair and/or pay the cost with revolving funds that are paid back through water bills over time. This measure provides incentives to install pressure regulating valves on existing properties with pressure exceeding 80 psi.
HE Faucet & HE Showerhead Giveaway	Retailer Measure: The Retailer buys showerheads and faucet aerators in bulk and gives them away (free to the customer) at utility offices or community events. Residential customers would be targeted.
Low-Income HE Fixture Installation	CLWA Measure: This measure includes the direct installation of water and energy saving fixtures in low-income housing operated by a government agency or housing authority. CLWA is partnering with a local energy provider. SoCalGas' Energy Savings Assistance Program (ESAP) offers no-cost, energy-saving home improvements for qualified limited-income renters and homeowners. No-cost, energy-saving measures may include high-efficiency washers, faucet aerators, thermostatic shower valves and showerheads.
Sprinkler Nozzle Rebate	Retailer Measure: This measure provides rebates to replace standard spray sprinkler nozzles with rotating nozzles that have lower application rates. Nozzles cost about \$5 each. VWC offers these rebates through their HELIUM program and freesprinklernozzles.com; NCWD's rebate amount varies per type of HE nozzle; SCWD offers rebates through freesprinklernozzles.com.
Irrigation Surveys and Landscape Budgets	Retailer Measure: Outdoor water audits are offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multi-family residential, CII, and public irrigators of large landscapes are eligible. This measure may include a website that provides feedback on irrigation water use (water budget vs. actual use).
Sub-metering	Retailer Measure: This measure requires a meter or provides a partial cost rebate to meter all remaining mobile home parks, multi-family residences, or homeowners associations that are currently master metered but not separately metered.
Soil Moisture Sensor Rebates	CLWA Measure: This measure provides rebates to install soil moisture sensors.
SF Hot Water on Demand	Retailer Measure: This measure provides a rebate to equip homes with efficient hot water on-demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to reduce hot water waiting times by having an on-demand pump on a recirculation line. Systems can be installed on a kitchen sink or master bath, wherever hot water waiting times are more than 1/2 minute. Systems require an electrical outlet under the sink, which is not common in older home bathrooms but is typically available under kitchen sinks.
Pool Cover Rebates	CLWA Measure: This measure provides a rebate through pool equipment supply stores for the purchase of a swimming pool cover.
Landscape Ordinance	Retailer Measure: Retailers will develop and enforce Water Efficient Landscape Design Standards. These standards specify that development projects are subject to design review and must be landscaped according to climate appropriate principals with appropriate turf ratios, plant selection, efficient irrigation systems, and smart irrigation controllers. The ordinance could require certification of landscape professionals.
Education and Water Waste Enforcement	Retailer Measure: This measure involves assisting customers to reduce water waste. This measure's funding includes the addition of one new staff person who would focus on water waste due to excess irrigation.

6.2 Water Reduction Methodology

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

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

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

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

6.3 Perspectives on Benefits and Costs

The determination of the economic feasibility of water conservation programs involves comparing the costs of the programs to the benefits provided. This analysis was performed using the Decision Support System (DSS) Model developed by MWM. The DSS Model has received the endorsement of the California Urban Water Conservation Council, and calculates 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. Additional detail on the DSS Model and assumptions can be found in Appendix E.

6.4 Assumptions about Avoided Costs

The estimated avoided cost of water is \$1,900/AF. Based on the 2010 CLWA 2010 Urban Water Management Plan the next supply option to meet a growing demand for water will be the expansion of the Valley's recycled water system. The capital facility plan for the expansion was used to determine the unit cost of new water supply. The following table presents the calculation of the avoided cost of recycled water (RW) due to conservation savings. RW Project costs and schedule are based on the 2014 Castaic Lake Water Agency Capital Improvements Project for FY 2014-15 Report and present value (PV) costs. The following is assumed:

- Recycled water capital development cost for Phase II A, B, C projects of \$52.2 million.
- Treated waste water purchase costs from Los Angeles County Sanitation District to make recycled water at \$152/AF.

- Annual operating cost for Phase II A, B, C of \$225,000.
- Recycled water supply provided is 1.7 mgd or 617 MG/yr.
- Valley-wide water demand has been growing historically at approximately 2.4 mgd (861 MGY/yr.) and is assumed to be at this same rate during 2015-2020 time period when the Phase II A, B, and C projects are online.
- The midpoint start date for the Phase II A, B, and C capital recycled water projects is 2020.
- The 0.7 year delay from the deferral of building this project has been rounded to one year. This means that if water conservation can cause a delay in building the capital project of one year (i.e. from 2020 to 2021) then the cost savings can be used as a basis of the benefits or avoided cost of water conservation programs.
- This value of the annual recycled water supply divided by the annual demand growth is 617 MG/861 MG; this is 0.7 years multiplied by the cost of the project to calculate the avoided cost of delaying one year (2020 to 2021).

Table 6-2 Avoided Cost Calculation

	2014 PV Cost Based on 2020 or 2021 Costs	2020 Projected Cost	2021 Projected Cost	Notes
PV of Capital Cost of 1.7 mgd of RW based on 2020 Project Start	\$45,596,700	\$52,200,000*	NA	Total capital cost of Phase II A, B and C projects (3 projects). Assumes 3 percent discount rate and 6 year PV factor of 0.8735.
PV of Capital Cost of 1.7 mgd of RW based on 2021 Project Start	\$42,443,820	NA	\$52,200,000	Total capital cost of Phase II A, B and C projects (3 projects). Assumes 3 percent interest and 7 year PV factor of 0.8131.
Difference 2020 PV and 2021 PV Costs in 2014 Dollars	\$3,152,880	NA	NA	Difference in PV of capital costs.
Annual RW Operational Costs	\$182,948	NA	\$225,000*	Annual operational cost for each Phase II project is \$75,000/project. 3 projects Phase II A, B, & C. Assumes 3 percent discount rate and 7 year PV factor of 0.8131.
RW Purchase Cost from San. District, \$/MG	\$467*	NA	NA	Source: Email from Jeff Ford September 16, 2014 and 2014 Castaic Lake Water Agency Capital Improvements Project for FY 2014-15 Report.
Total Avoided Cost per MG of Delaying RW One Year	\$5,873.17	NA	NA	Total avoided cost per MG of recycled water supply being delayed one year.
Total Avoided Cost per AF of Delaying RW One Year	\$1,913.71	NA	NA	Total avoided cost per AF of recycled water supply being delayed one year.

*Source: 2014 Castaic Lake Water Agency Capital Improvements Project for FY 2014-15 Report.

Again, this calculation determines that the average cost of offsetting the Phase II Recycled Water projects during the 2014-2050 period by saving water with various conservation measures is approximately \$1,900/AF. This value is typical of what MWM has seen recently in the cost of developing new water supplies in California and is appropriate to use in this project for making benefit-cost calculations.

6.5 Measure Assumptions

In Appendices A-D, the assumptions and inputs used in each Retailer's DSS Model to evaluate each water conservation measure are presented. 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 and contractors hired (by Retailer or CLWA) to implement measures. The assumed dollar values for the measure unit costs were closely reviewed by staff and are found to be adequate for each individual measure. The values in the majority of cases are in the range of what is currently offered by other water utilities in the region.
- Retail Customer Unit Cost – Cost for implementing measures that is paid by retail customers (i.e., the remainder of a measure's cost that is not covered by a utility rebate or incentive).
- Utility Administration and Marketing Cost – The cost to the utility for administering the measure, including consultant contract administration, marketing and participant tracking. The mark-up is sufficient (in total) to cover conservation staff time and general expenses and overhead.

The unit costs vary according to the type of customer account and implementation method being addressed. For example, a measure might cost a different amount for a residential single family account, than a residential multi-family account, and for a rebate versus an ordinance requirement or a direct installation implementation method. Typically water utilities have found there are increased costs associated with achieving higher market saturation, such as more surveys per year. The DSS Model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

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

6.6 Comparison of Measures

This section presents a comparison of the 13 CLWA measures for all four Retailers. Annual individual measure utility costs, administrative costs, water savings and targeted accounts for each of the 13 CLWA measures through 2020 are totaled for all of the four Retailers and presented in the following tables. A benefit cost analysis for all Program B measures modeled in each Retailer's DSS Model can be found in Appendices A-D. Annual individual measure inputs can be found in each Retailer's DSS Model. Annual measure results including utility costs, administrative costs, water savings, and targeted accounts for all Program B measures for each of the four Retailers are presented in Appendices A-D as well as in each Retailer's DSS Model.

As shown in Table 6-3, each CLWA measure's utility costs are those costs that CLWA as a water wholesaler would incur to operate the measure, including administrative costs, rebates, etc. Table 6-4 presents the administrative portion of these costs. Annual customer costs for each measure are represented in Table 6-5. Table 6-6 shows the annual water savings for each CLWA measure for all the Retailers. Table 6-7 presents the number of accounts targeted annually for each CLWA measure for all four Retailers. It is important to note that one targeted account may represent more than one measure incentive (i.e., two clothes washers per HECW targeted multi-family account).

Annual total values for measure parameters are only relevant for measure costs since 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. For example, if two measures are planned to address the same end use, and both save 10 percent of the prior water use, then the net effect is not the simple sum (20 percent). Rather, it is the cumulative impact of the first measure reducing the use to 90 percent of what it was without the first measure in place and then reducing the use another 10 percent to result in the use being 81 percent of what it was

originally. In this example the net savings is 19 percent, not 20 percent. Using impact factors, the model computes the reduction as follows: $0.9 \times 0.9 = 0.81$ or 19 percent water savings. Since interaction between measures has not been accounted for in the following conservation measure costs and savings tables, it is **not** appropriate to include totals at the bottom of the table.

Table 6-3 CLWA Measure Utility Costs for All Retailers*

Measure	2015	2016	2017	2018	2019	2020
Public & School Education	\$186,954	\$191,699	\$196,589	\$201,630	\$206,828	\$212,189
SF Turf Replacement Program	\$503,004	\$516,152	\$529,711	\$543,699	\$558,132	\$573,029
MF CII Turf Replacement Program	\$739,571	\$753,468	\$767,526	\$781,751	\$796,150	\$810,729
SF WBIC Free Controller Program	\$318,325	\$325,414	\$332,729	\$340,279	\$348,075	\$356,128
MF CII WBIC Free Controller Program	\$102,145	\$104,094	\$106,056	\$108,030	\$110,018	\$112,019
School Building Retrofit *	-	-	\$127,095	\$129,830	\$132,632	\$135,504
HECW Rebates	\$474,917	\$486,416	\$498,217	-	-	-
CII UHET Rebates *	-	-	\$19,010	\$19,381	\$19,754	-
HE Urinal Rebates *	-	-	\$20,107	\$20,499	\$20,894	-
Pre-Rinse Spray Nozzle *	-	-	\$29,611	\$30,189	\$30,771	-
Low-Income HE Fixture Installation	\$119,600	\$122,954	\$126,439	-	-	-
Soil Moisture Sensor Rebates*	-	-	\$272,226	\$279,186	\$286,361	\$293,759
Pool Cover Rebates *	-	\$61,577	\$63,150	\$64,772	\$66,444	\$68,168
Total	\$2,444,517	\$2,561,774	\$3,088,465	\$2,519,247	\$2,576,058	\$2,561,524

* Years with no utility costs for a measure represent no planned measure implementation that year. See Figure 8-1 for the proposed implementation schedule for CLWA-led measures for all four Retailers.

Table 6-4 CLWA Measure Administration Costs*

Measure	2015	2016	2017	2018	2019	2020
Public & School Education	\$43,143	\$44,238	\$45,367	\$46,530	\$47,730	\$48,967
SF Turf Replacement Program	\$130,409	\$133,817	\$137,333	\$140,959	\$144,701	\$148,563
MF CII Turf Replacement Program	\$191,741	\$195,343	\$198,988	\$202,676	\$206,409	\$210,189
SF WBIC Free Controller Program	\$131,075	\$133,994	\$137,006	\$140,115	\$143,325	\$146,641
MF CII WBIC Free Controller Program	\$29,184	\$29,741	\$30,302	\$30,866	\$31,434	\$32,005
School Building Retrofit *	-	-	\$25,419	\$25,966	\$26,526	\$27,101
HECW Rebates *	\$43,174	\$44,220	\$45,292	-	-	-
CII UHET Rebates *	-	-	\$4,387	\$4,473	\$4,559	-
HE Urinal Rebates *	-	-	\$1,828	\$1,864	\$1,899	-
Pre-Rinse Spray Nozzle *	-	-	\$7,677	\$7,827	\$7,978	-
Low-Income HE Fixture Installation *	\$28,048	\$28,871	\$29,727	-	-	-
Soil Moisture Sensor Rebates *	-	-	\$54,445	\$55,837	\$57,272	\$58,752
Pool Cover Rebates *	-	\$15,697	\$16,065	\$16,443	\$16,832	\$17,233
Total	\$596,774	\$625,922	\$733,835	\$673,555	\$688,665	\$689,450

* Years with no administrative costs for a measure represent no measure implementation that year. See Figure 8-1 for the proposed implementation schedule for CLWA-led measures for all four Retailers.

Table 6-5 CLWA Measure Customer Costs

Measure	2015	2016	2017	2018	2019	2020
Public & School Education ^a	-	-	-	-	-	-
SF Turf Replacement Program	\$372,596	\$382,335	\$392,379	\$402,740	\$413,431	\$424,466
MF CII Turf Replacement Program	\$2,191,323	\$2,232,496	\$2,274,150	\$2,316,300	\$2,358,964	\$2,402,159
SF WBIC Free Controller Program	\$55,074	\$56,300	\$57,565	\$58,872	\$60,221	\$61,614
MF CII WBIC Free Controller Program	\$145,921	\$148,706	\$151,508	\$154,329	\$157,168	\$160,027
School Building Retrofit ^b	-	-	\$101,676	\$103,864	\$106,106	\$108,403
HECW Rebates ^b	\$1,177,998	\$1,206,561	\$1,235,882	-	-	-
CII UHET Rebates ^b	-	-	\$29,246	\$29,817	\$30,391	-
HE Urinal Rebates ^b	-	-	\$54,836	\$55,906	\$56,983	-
Pre-Rinse Spray Nozzle ^a	-	-	-	-	-	-
Low-Income HE Fixture Installation ^a	-	-	-	-	-	-
Soil Moisture Sensor Rebates ^b	-	-	\$217,780	\$223,349	\$229,089	\$235,007
Pool Cover Rebates ^b	-	\$198,814	\$204,037	\$209,425	\$214,984	\$220,722
Total	\$3,942,911	\$4,225,213	\$4,719,060	\$3,554,601	\$3,627,335	\$3,612,398

a. Measures with no customer costs in any year indicate that CLWA is providing 100% of the incentive costs for that measure. See Table 6-1 for a description of these measures. See each Retailer's DSS Model for more information about each measure's customer cost per target customer category.

b. Years with no customer costs for measures with costs in some years represent that there was no measure implementation that year. See Figure 8-1 for the proposed implementation schedule for CLWA-led measures for all four Retailers.

Table 6-6 CLWA Measure Savings (AFY) for All Retailers

Measure	2015	2016	2017	2018	2019	2020
Public & School Education	101	104	108	111	115	119
SF Turf Replacement Program	21	33	45	57	70	84
MF CII Turf Replacement Program	96	148	203	261	323	388
SF WBIC Free Controller Program	30	45	62	78	96	114
MF CII WBIC Free Controller Program	13	20	27	35	43	52
School Building Retrofit	0	0	24	50	76	104
HECW Rebates	72	110	150	152	153	155
CII UHET Rebates	0	0	2	4	5	6
HE Urinal Rebates	0	0	2	5	8	8
Pre-Rinse Spray Nozzle	0	0	6	13	20	21
Low-Income HE Fixture Installation	28	43	59	59	60	61
Soil Moisture Sensor Rebates	0	0	20	41	64	87
Pool Cover Rebates	0	9	18	28	38	48

Notes:

1. Years with no savings for a planned measure indicate that the measure had not yet come online. See Figure 8-1 for the proposed implementation schedule for CLWA-led measures for all four Retailers.
2. Annual total values for savings are not directly additive since savings from measures, which address the same end use(s), are not additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. Reference CLWA Program B savings in the following section in Table 7-1 for total Program B savings.

Table 6-7 CLWA Measure Targeted Accounts for all Retailers

Measure	2015	2016	2017	2018	2019	2020
Public & School Education	16,277	16,690	17,116	17,556	18,008	18,475
SF Turf Replacement Program	149	153	157	161	165	170
MF CII Turf Replacement Program	110	112	114	116	118	120
SF WBIC Free Controller Program	734	751	768	785	803	822
MF CII WBIC Free Controller Program	37	37	38	39	39	40
School Building Retrofit	0	0	20	21	21	22
HECW Rebates	1,824	1,870	1,917	0	0	0
CII UHET Rebates	0	0	15	15	15	0
HE Urinal Rebates	0	0	37	37	38	0
Pre-Rinse Spray Nozzle	0	0	73	75	76	0
Low-Income HE Fixture Installation	305	314	322	0	0	0
Soil Moisture Sensor Rebates	0	0	379	389	399	410
Pool Cover Rebates	0	612	628	644	661	679
Total	19,436	20,539	21,584	19,838	20,343	20,738

Notes:

1. Years with no targeted accounts for a measure indicate that the measure had not yet come online. See Figure 8-1 for the proposed implementation schedule for CLWA-led measures.
2. A targeted account may represent more than one measure incentive (i.e., two clothes washers per one multi-family account). This helps with administrative planning in providing the number of accounts planned to participate. This also represents the basis for number of accounts used in the DSS Model, which calculates water savings on a per-account basis.

7 RESULTS OF CONSERVATION PROGRAM EVALUATION

7.1 Selection of Measures for Programs

The conservation measures were incorporated into each Retailer's DSS Model for cost-benefit analysis and selection of a conservation program to meet the Retailer's goals. Included in each Retailer's DSS Model was a list of measures in each of three alternative conservation programs (Programs A, B, and C), which were designed to illustrate a range of various measure combinations and resulting water savings. Four key items were taken into consideration during measure selection for Programs A, B and C:

- Existing agency water use efficiency measures;
- Programs run by CLWA;
- Measures focused on Programmatic BMP defined by the CUWCCs Memorandum of Understanding if the individual agency had reported on a measure; and
- New and innovative measures.

7.2 Menu of Water Conservation Alternative Programs

These programs are not intended to be rigid frameworks but rather to demonstrate the range in savings that could be generated if selected measures were run together. For each Retailer the three Program scenarios are organized as follows:

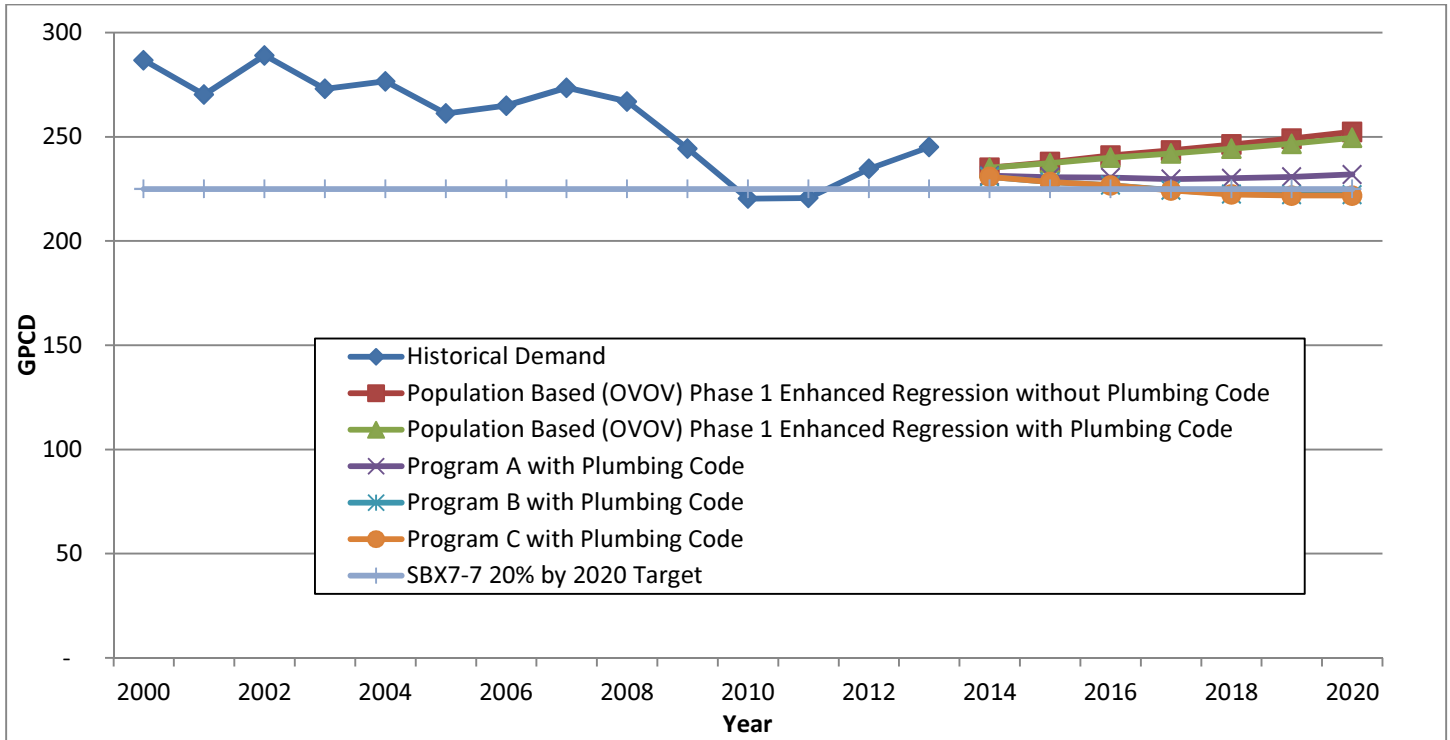
- **Program A:** "Existing Program" option includes the measures that the Retailer currently offers. These measures are not necessarily designed the way they are currently implemented having, in some cases, more aggressive annual account targets. Again, though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer's DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented.
- **Program B:** "Enhanced Program" includes all measures in Program A plus those additional measures that are planned by the Retailer or CLWA. These are typically both cost-effective and save significant amounts of water. Key benchmarks for the proposed strategies include: (1) cost-effectiveness, (2) compliance with CUWCC's BMPs, (3) ability to help achieve water use reduction targets by 2020 (SB X7-7) if applicable for the individual Retailer.
- **Program C:** "All Measures Analyzed" presents a scenario where all measures are implemented. Though it is unlikely that a Retailer would elect to implement all the measures, this program offers the opportunity to explore what the water savings (and costs) would potentially be should such an extensive conservation program be pursued.

Each Retailer's DSS Model presents estimated average per capita per day savings with the plumbing codes only, and each of the alternative programs (Program A, B, and C). Plumbing code includes current state and federal standards (including CALGreen, Senate Bill 407 and Assembly Bill 715) for items such as toilets, showerheads, faucets, pre-rinse spray valves. SB 407 and AB 715 require the replacement of non-water conserving plumbing fixtures with water-conserving fixtures.

7.3 Progress to Date in Planning Per Capita Use

The following figure presents a valley-wide estimate of average per capita per day use without conservation, with the plumbing codes only, and each of the three alternative programs at the valley-wide level. Plumbing code includes retrofits to current state and Federal standards for items such as toilets, urinals, showerheads, and clothes washers.

Figure 7-1 Valley-Wide Per Capita Water Use



Per capita water use projections for each Retailer can be found in Appendices A-D.

The following table presents year 2020 GPCD targets and Program A, B, and C GPCD estimates for CLWA and the Retailers. LACWD GPCD is included in the valley-wide estimate though they are not required to meet any targets as an agency.

Table 7-1 GPCD Target – Year 2020

Conservation Measure	SB X7-7 2020 Target	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD ^b	Program C 2020 GPCD
LACWD ^a	188	245	240	229	229
NCWD	190	211	201	190	190
SCWD	201	218	204	196	195
VWC	268	303	277	267	267
Valley-Wide	225	249	232	222 ^b	222

a. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

b. Recommended implementation strategy is based on Program B.

8 RECOMMENDED CONSERVATION PROGRAM

This section presents an overview of the conservation plan options for the service area. The WUE SP includes several elements, including: (1) program staffing needs; (2) overall benefits of the plan; and (3) recommended next steps.

8.1 Selection Criteria and Process

The measures analyzed in this WUE SP were selected at a “Measure Screening Workshop” held in 2013, which included representatives from CLWA and each Retailer. MWM finished the population assessment to update GPCD target values to assist with completing the WUE SP and provided that the population was more than 10 percent difference for some Retailers, MWM then proceeded to update the water demand forecasts. Based on the completion of both projects, MWM then collaborated with CLWA and the Retailers to finish the DSS Models. To accomplish buy-in, each Retailer was provided a copy of its DSS Model to review the conservation program options described in Section 7, work with MWM to tailor the programs to meet its needs, plans and preferences, and select which measures fit its individual water savings goals and budgets. MWM presented the results of the evaluation of water conservation issues and options at the end of March 2015. Retailer management approval on each DSS Model was provided between May 1, 2015 and May 4, 2015.

8.2 Description of Recommended Program Measures

The measures each Retailer is committed to is provided in Program B “enhanced program” to be comprehensive in serving all customer sectors. More details can be found in the Retailer-specific Appendices A-D. For more specific details, each Program B’s measure’s design inputs as well as water savings and benefits outputs can be found in each Retailer’s DSS Model. Program B Retailer-led measure utility costs, administrative costs, water savings, and account targets are all calculated in their respective DSS Models. The reasons that each Retailer selected a particular suite of measures varied and included:

- Measure cost-effectiveness to Retailer
- Applicability to service area
- Amount of water savings generated
- Cost to Retailer
- Ease of implementation for Retailer and staffing required
- Whether the measure was being run by CLWA
- Local preferences by customers

The following table displays the conservation measures included in each Retailer’s Program B.

Table 8-1 Recommended Measures (Program B Scenario) – Valley-Wide

Conservation Measure	LACWD	NCWD	SCWD	VWC	CLWA
Water Loss (Retailer)	X	X	X	X	
AMI (Retailer)					
Conservation Pricing (Retailer)	X	X	X	X	
Public & School Education (CLWA)	X	X	X	X	X
Home Water Use Reports (Retailer)	X	X	X	X	
SF Turf Replacement Program (CLWA)	X	X	X	X	X
MF CII Turf Replacement Program (CLWA)	X	X	X	X	X
SF Drip Irrigation Incentives (Retailer)	X	X	X	X	
MF CII Drip Irrigation Incentives (Retailer)		X	X	X	
SF WBIC Free Controller Program (CLWA)	X	X	X	X	X
MF CII WBIC Free Controller Pgm (CLWA)	X	X	X	X	X
School Building Retrofit (CLWA)	X	X	X	X	X
HECW Rebates (CLWA)	X	X	X	X	X
UHET Rebates (Retailer)				X	
UHET Targeted Incentive (Retailer)					
Top User Indoor Surveys and Incentives (Retailer)		X		X	
CII Replace Equip and Performance Program (Retailer)		X		X	
CII UHET Rebates (CLWA)	X	X	X	X	X
HE Urinal Rebates (CLWA)	X	X	X	X	X
Pre-Rinse Spray Nozzle (CLWA)	X	X	X	X	X
SF MF Outdoor Surveys (Retailer)	X	X	X	X	
SF MF Survey Leak & Pressure (Retailer)	X	X	X	X	
HE Faucet & HE Showerhead Giveaway (Retailer)		X	X	X	
Low-Income HE Fixture Installation (CLWA)	X	X	X	X	X
Sprinkler Nozzle Rebate (Retailer)	X	X	X	X	
Irrigation Surveys and Landscape Budgets (Retailer)	X	X	X	X	
Submetering (Retailer)	X		X		
Soil Moisture Sensor Rebates (CLWA)	X	X	X	X	X
SF Hot Water on Demand (Retailer)				X	
Pool Cover Rebates (CLWA)	X	X	X	X	X
Landscape Ordinance (Retailer)	X	X	X	X	
Education and Water Waste Enforcement (Retailer)		X	X	X	

The following table presents year 2020 SB X7-7 GPCD targets and Program B GPCD estimates for CLWA and the Retailers. CLWA GPCD estimates include LACWD's water use and population though LACWD is NOT required to meet any targets.

Table 8-2 Year 2020 GPCD Target and Recommended Program Estimate

	2020 SB X7-7 Target	2020 Estimated Program B GPCD
LACWD*	188	229
NCWD	190	190
SCWD	201	196
VWC	268	267
Valley-Wide	225	222

* Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

8.3 Projected Water Savings of Recommended Program

A high percentage of the Retailer service area's water usage is associated with residential water use. Consequently, residential and irrigation conservation programs will produce the most savings. None of the Retailer service areas contain intensive industrial activity (where CII is less than 10 percent of valley-wide total water use), and as a result the conservation potential for this sector is less than in other communities. Some overall conclusions are:

- The total range of savings from Program A to Program C is 7-11 percent of total valley-wide production in 2020.
- All Programs have the possibility to reduce per capita water use in a cost-effective manner based on the implementation level on the plan. For example, with Program B, approximately 9,600 AFY could be saved valley-wide in 2020. This does not include the approximately 1,100 AFY saved from plumbing codes and standards.

8.4 Potential Implementation Strategy

There are a myriad of opportunities to support utilities and their customers become water efficient. Programs continue to evolve as customers save more (i.e., market saturation of new more efficient devices), utilities become more efficient (i.e., reduce real water losses), new technologies come on the market. In general, there are three broad ways customers change their water using behaviors or equipment to be more efficient, which include:

- **Education** – where utilities offer online, print material and classes to inform to assist with customers understanding specific actions to save. This also includes public awareness campaigns and voluntary equipment labeling programs (i.e., US EPA WaterSense labeled products)
- **Incentives** – where utilities assist with funding to change out expensive equipment or landscape practices to more efficient models.
- **Mandates** – where all customers would need to comply (i.e., Title 20 Appliance Efficiency Standards, plumbing codes that dictate how much fixtures and appliances can be used by standard care with the water as beneficial and reasonable use).

These key areas can and often do overlap depending on the cost or time involved in the upgrade and reliability of water savings long term. Table 8-3 below presents the suggestions for each measure based on current technologies and information. As the program is reviewed each year, this list should also be updated with new technologies or opportunities for saving water as they become available. Elements that are not achieving goals should be terminated in favor of new elements that show more promise.

Table 8-3 Implementation Suggestions for Recommended Program Measures

Conservation Measure	Overall Implementation Strategy	Key Assumptions	Potential Cost Savings Strategies
Water Loss (Retailer)	To reduce real water losses, the water loss control program should continue according to the AWWA M36 Manual guidance.	Real losses are reduced and maintained through continued monitoring and leak repair.	Most cost effective when using a “District Metering Areas” (DMAs) approach to monitor changes in leakage. DMAs that see an unexplained increase in demands, especially nighttime demands, can then be targeted for leak detection and repair. Have focused field operations team on water loss control program.
Conservation Pricing (Retailer)	The strategy to price water such that the customer has an incentive to conserve water will continue to be implemented.	This measure is modeled to match current plans for rate adjustments according to rate studies and/or management guidance.	A “bill frequency analysis” will be performed to track customer levels to maintain equity so that customers using more are paying more. Rate studies will be updated on an as-needed basis, approximately every 3-5 years.
Public & School Education (CLWA)	The public awareness programs will continue to be expanded.	The Communications program is under-going an update. It is assumed that new staff are being added to increase outreach to improve customer participation.	This measure seeks to economize on media buys. Targeted outreach for programs may gain more participation in conservation measures. Investments will be tracked to determine which ones seem to be driving participation.
Home Water Use Reports (Retailer)	The water budget reports provided to customers are useful. This can be outsourced to software providers as needed.	Two Retailers are doing this in-house and two are looking to outsource it.	Once water budget reports are set-up, they can be streamlined to maintain information sharing with customers and target customer outreach.
SF Turf Replacement Program (CLWA)	Landscape conversions will be marketed and customers will be assisted with these conversions	More specialized staff knowledgeable in landscape design and equipment will be needed to ensure the CLWA investment is	This incentive program is the most expensive but is also seen as providing one or many benefits as more neighborhoods participate and change landscapes due to benefits experienced by others. This is the experience in Orange County and elsewhere in Southern California. This will gain an

Conservation Measure	Overall Implementation Strategy	Key Assumptions	Potential Cost Savings Strategies
	through incentive programs to partially fund turf removal.	wisely spent, including field verification.	economy of scale when done at the wholesaler level.
MF CII Turf Replacement Program (CLWA)	Landscape conversions will be marketed and customers will be assisted with these conversions through incentive programs to partially fund turf removal.	This is more complicated and larger scale than single family (SF) properties. A landscape professional review will be needed.	This measure will involve more turf removal with potentially less customer interaction, given that the sites are usually professionally designed and maintained. This will gain an economy of scale when done at the wholesaler level.
SF Drip Irrigation Incentives (Retailer)	The main focus will be converting shrubs on spray irrigation to drip.	Manufacturer provided kits will be used for easier conversions.	This measure is low cost and provides significant savings. It may be part of turf removal projects.
MF CII Drip Irrigation Incentives (Retailer)	The main focus will be converting shrubs on spray irrigation to drip.	Manufacturer provided kits will be used for easier conversions.	This measure is low cost and provides significant savings. It may be part of turf removal projects.
SF WBIC Free Controller Program (CLWA)	The education program will continue.	This measure will target higher users for significant water savings.	This measure will continue with the current education program approach in order to target higher use homeowners. It may be combined with other landscape incentive programs. It will gain an economy of scale when done at the wholesaler level.
MF CII WBIC Free Controller Pgm (CLWA)	It is assumed that this will be part of other landscape incentive programs.	It is important to monitor larger site landscape budgets so all landscape incentives are well invested for on-going water savings.	This measure will be easier to administer with a reimbursement program. It still requires education and outreach for controllers to be properly used for savings. It will gain an economy of scale when done at the wholesaler level.
School Building Retrofit (CLWA)	This targets schools with higher use (i.e., higher student population or older schools with	This measure will involve working with local school districts using CLWA outreach program	This measure will gain an economy of scale when done at the wholesaler level.

Conservation Measure	Overall Implementation Strategy	Key Assumptions	Potential Cost Savings Strategies
	older fixtures).	contacts.	
HECW Rebates (CLWA)	This uses the on-going rebate program.	This will sunset when new federal standards come online in 2018.	This is a cost-effective measure and is not perceived as saturated based on the market penetration studies in California.
UHET Rebates (Retailer)	This uses a rebate incentive program.	It will allow lower flush volume toilets beyond state toilet water use standards of 1.28 gpf.	This is a relatively cost-effective measure, given year-round indoor water savings.
Top User Indoor Surveys and Incentives (Retailer)	More in-depth surveys will be provided to high-use customers.	This is supported by water-budget-based billing reports.	This measure will target higher use customers, which assists with achieving higher savings on a per-survey basis.
CII Replace Equip and Performance Pgm (Retailer)	This will target incentives to CII customers for replacing inefficient equipment.	This will be follow-up from the Top Users survey or based on a menu of equipment rebates.	Cost-effective replacement of CII equipment can be done on a case-by-case basis, supported by using payback calculations from surveys. This measure may assess incentive levels based on paying on a per-ccf basis of water savings (i.e., similar to Santa Clara Valley Water District: http://valleywater.org/Programs/CommercialRebates.aspx)
CII UHET Rebates (CLWA)	Rebate incentives will be provided.	This will target higher usage accounts.	This measure will gain economy of scale with a wholesaler program.
HE Urinal Rebates (CLWA)	Rebate incentives will be provided.	This will target higher usage accounts.	This measure will gain economy of scale with a wholesaler program.
Pre-Rinse Spray Nozzle (CLWA)	A low-cost device will be provided as a “give-away” to CII accounts during surveys.	This will target customers who have larger numbers of valves or higher dishwashing needs (i.e., grocery stores, restaurants)	This will be a cost-effective program given the low device cost of <\$50 per valve. This involves high hot water usage and therefore will result in high energy costs savings.
SF MF Outdoor	Surveys will be offered, especially	Customer service and water efficiency	This measure is the most effective targeted outreach, based on higher account usage, to gain

Conservation Measure	Overall Implementation Strategy	Key Assumptions	Potential Cost Savings Strategies
Surveys (Retailer)	to higher use accounts, to adjust irrigation schedules.	benefits will provide customers with tailored advice.	more significant water savings. It will seek opportunities to gain customer participation in other incentive programs or change equipment and behaviors.
SF MF Survey Leak & Pressure (Retailer)	This will involve the indoor part of a survey when an indoor leak is suspected (i.e., toilet leak).	It may be an added service when doing an outdoor survey, if warranted.	This measure assumes the targeting of older homes with fixtures or appliances that are not yet updated.
HE Faucet & HE Showerhead Giveaway (Retailer)	This is part of the outreach and education programs.	WaterSense-labeled products would be promoted and provided.	This measure will provide education on how to test for inefficiency before installation. It will also provide an offer to return equipment if not yet installed.
Low-Income HE Fixture Installation (CLWA)	The existing outsourced partnership under CLWA contract will continue.	This is a direct-install program.	Low administrative support will be required for this measure due to the contractual relationship.
Sprinkler Nozzle Rebate (Retailer)	This is a rebate incentive program.	This retrofit program is easier for existing lawns in functional areas.	This measure will involve low administrative costs for water savings achieved through lower precipitation rate on turf watering. It will seek to minimize replacement on ornamental turf areas.
Irrigation Surveys and Landscape Budgets (Retailer)	This is important for water budget tracking and water budget rates.	This adheres to Irrigation Association (IA) standards.	This measure targets larger sites for more water savings. A landscape professional should be on the CLWA staff for economy of scale and for expertise to perform surveys in-house, as well as assist with incentives for program administration.
Submetering (Retailer)	This provides incentives for installing new meters on private properties.	Meters may be read by private parties for allocation system to encourage conservation.	This measure targets larger properties, like mobile home parks and HOAs. It is modeled after other submetering programs.
Soil Moisture	This is a rebate	The equipment	This measure is relatively less expensive and

Conservation Measure	Overall Implementation Strategy	Key Assumptions	Potential Cost Savings Strategies
Sensor Rebates (CLWA)	incentive program. The education program will continue (i.e., weather based controllers)	specifications meet IA's Smart Water Application Technology (SWAT) program.	another alternative to smart controllers. Southern Nevada Water Authority has a similar program.
SF Hot Water on Demand (Retailer)	This is a rebate incentive program.	There is limited application in a retrofit situation. This is used on more prominent faucets (i.e., master bath, kitchen).	It is assumed that new construction would be less expensive than retrofit.
Pool Cover Rebates (CLWA)	This is a rebate incentive program.	It saves evaporation. There is a limited useful life.	This is a cost-effective program and popular with more safety features on new pool covers.
Landscape Ordinance (Retailer)	The local ordinance for water efficient landscapes will be enforced.	This will meet the Model Landscape Ordinance in 2010 and may be updated.	New development and landscape permit requests will need to be processed. Preparation for this must take place.
Education and Water Waste Enforcement (Retailer)	Staff water waste patrols will be needed to educate customers and, as necessary, enforce water waste ordinance or water service rules.	Public perception is important. Specifically, staff are needed to support this program. Participation in conservation measures can be encouraged.	This measure is dependent on the number of properties with runoff issues compared to the staff needed to patrol and to process water waste notices. This is more cost-effective when fees are charged to recover the costs for additional staff and administrative time.

8.5 Implementation Schedule

The following figure presents the proposed implementation schedule for the 13 CLWA Measures. This schedule applies to CLWA and all the Retailers. These measures will be run by CLWA and rolled-out in the same time frame among the four Retailers. Individual Retailer measure start years and time periods can be found with all other measure input parameters in each Retailer's DSS Model.

Table 8-4 Proposed Implementation Schedule for CLWA Measures*

Measure	Year					
	2015	2016	2017	2018	2019	2020
Public & School Education						
SF Turf Replacement Program						
MF CII Turf Replacement Program						
SF WBIC Free Controller Program						
MF CII WBIC Free Controller Program						
School Building Retrofit						
HECW Rebates						
CII UHET Rebates						
HE Urinal Rebates						
Pre-Rinse Spray Nozzle						
Low-Income HE Fixture Installation						
Soil Moisture Sensor Rebates						
Pool Cover Rebates						

* Year 2017 is a transition year with some conservation measures ramping down and others ramping up.

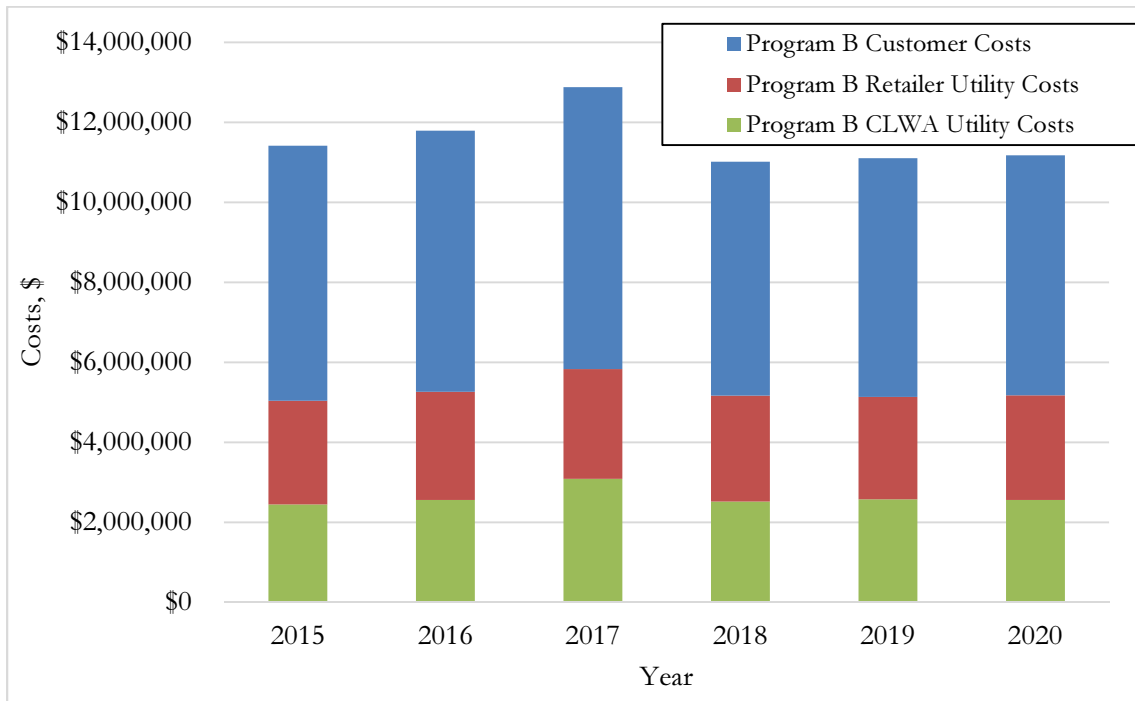
8.6 Estimated Implementation Budget

The following table and figure presents the proposed implementation budget for the 13 CLWA measures as well as the Retailer-led Program B measures. Customer costs for ALL Program B measures, both CLWA-led and Retailer-led, are also shown. Similar to presented above, the budget includes the CLWA-led measure utility costs and the Retailer-led measure utility costs for all four Retailers for Program B. Utility costs include unit costs (incentives and rebates) as well as administrative costs. Individual Retailer-led measure costs (including utility costs, administrative costs and customer costs) can be found in each Retailer's measure input sheets in Appendices A-D.

Table 8-5 Program B CLWA, Retailer, and Customer Costs

	2015	2016	2017	2018	2019	2020
Program B Retailer Utility Costs	\$2,591,081	\$2,697,704	\$2,739,100	\$2,647,146	\$2,559,150	\$2,617,170
Program B CLWA Utility Costs	\$2,444,517	\$2,561,774	\$3,088,465	\$2,519,247	\$2,576,058	\$2,561,524
Program B Total Utility Costs	\$5,035,599	\$5,259,478	\$5,827,565	\$5,166,392	\$5,135,208	\$5,178,694
Program B Customer Costs	\$6,376,445	\$6,530,235	\$7,053,326	\$5,849,537	\$5,966,777	\$5,996,968
Program B Total Costs	\$11,412,044	\$11,789,713	\$12,880,891	\$11,015,930	\$11,101,984	\$11,175,662

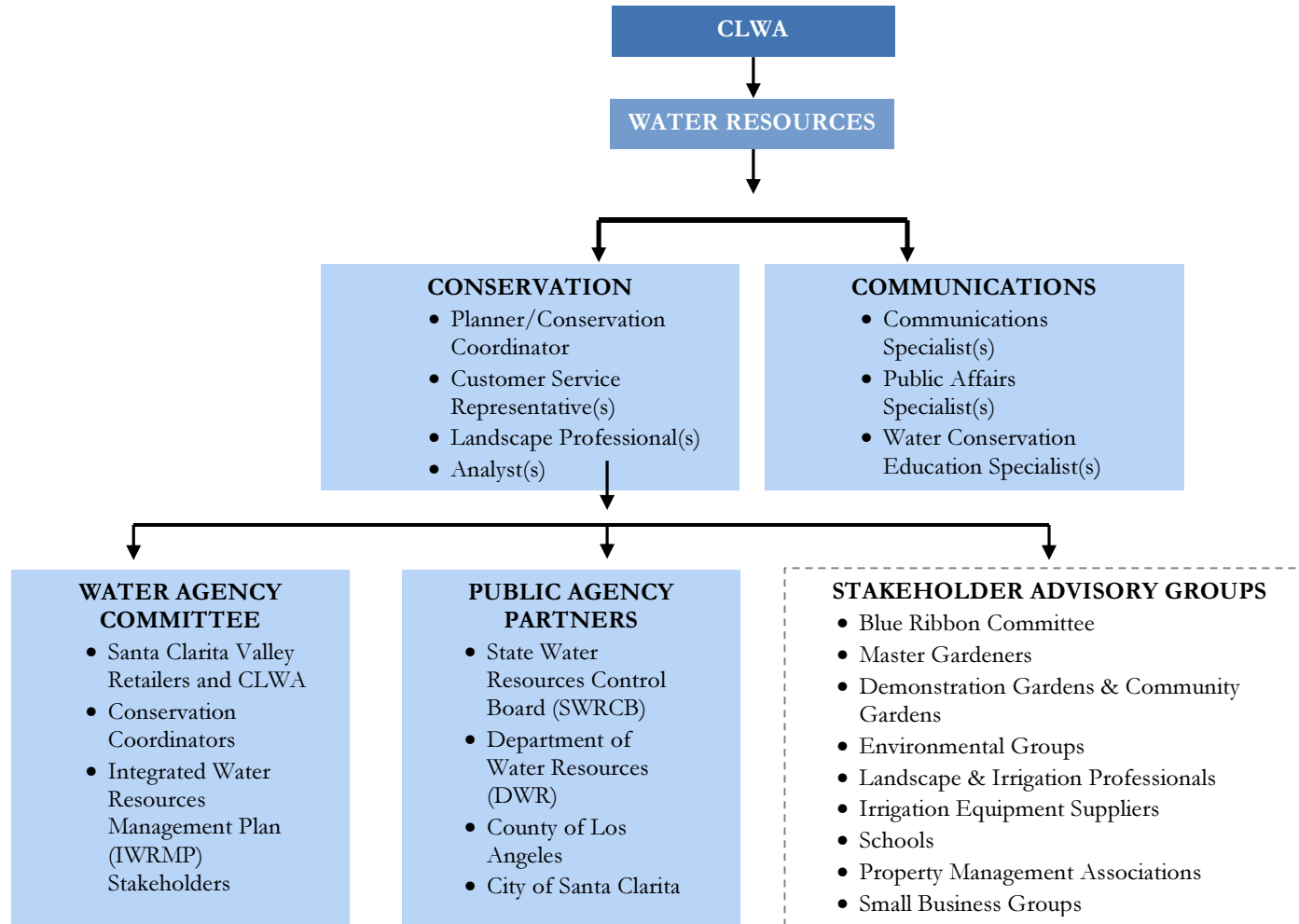
Figure 8-1 Annual Estimated Conservation Program B Costs



8.7 Staffing Needs

As part of this planning effort, consideration has been given to program staffing levels. Addressing the initiatives needed to reduce water demand is applicable across many departments at the wholesale level for CLWA and each Retailer’s staff and will require a coordinated effort. Figure 8-3 below has an organizational chart reflecting each type of key staff member who will have important roles and responsibilities in support of meeting the state mandates to reduce water demand. The organizational chart also presents a summary of key external voluntary organizations (e.g., Master Gardeners) that are now involved and may expand their role or may need to join in the effort.

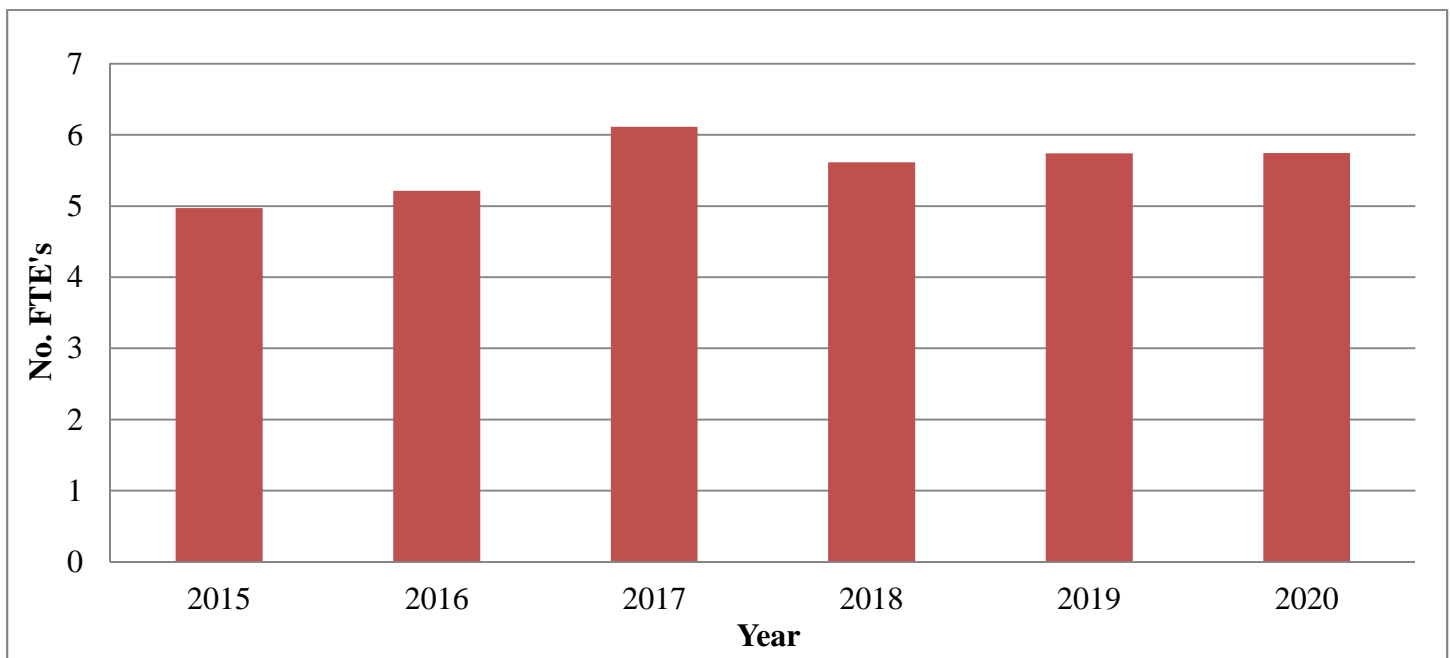
Figure 8-2 CLWA Organizational Chart for Conservation and Communications Program



Current and proposed future needs for staff support of the conservation program is presented in this section.

The following figure presents the proposed implementation staffing needs for CLWA for implementing the 13 CLWA measures. This estimate includes staffing needs to address all four Retailer’s 13 CLWA measures. These measures are all run by CLWA; they will be rolled-out in the same time frame among the Retailers. Individual Retailer measure staffing needs can be found in the Retailer-specific Appendices A-D. CLWA staffing needs for CLWA measures for all four Retailers were calculated by dividing annual administrative costs by an average annual CLWA salary of \$85,000 per staff person; or \$120,000 burdened. For example, approximately five staff would support the over \$600,000 in administrative costs to run the CLWA-led measures in 2015. Annual utility costs are presented in Figure 8-1 and CLWA staff are listed in Figure 8-2 and Table 8-5. Administrative costs were derived for each measure by taking a percentage of each measure utility costs. Note that 2017 is a transitioning year with some conservation measures finishing and some new ones beginning.

Figure 8-3 Proposed Staffing for CLWA Measures



CLWA plans to develop consistent staff to manage the emerging and permanent water conservation needs recognizing the specialized skill set necessary. The following table presents the proposed water conservation staff roles in order to handle customer needs and reach water savings goals.

Table 8-6 Recommendations for Conservation and Communications Staffing Roles and Responsibilities

Staff Role	Position Descriptions
Planner/ Conservation Coordinator	This WUE SP has a lot of moving parts and will need oversight to be implemented successfully. Furthermore, CLWA needs a supervisor role, someone to track and implement policies, track and coordinate with Retailers on their conservation programs, and oversee grant application and reporting efforts, as well as needing to provide oversight for everything associated with valley-wide water use efficiency.
Customer Service Representative(s)	CLWA needs to have a helpful staff point person to field customer inquiries concerning rebate and incentive forms, including appliance and fixture questions. CLWA is ramping up incentive programs, which means increased customer interactions. Though participation is higher due to the current drought, these levels of participation need to be maintained for valley-wide programs to meet short- and long-term water savings goals.
Communication Specialist(s)	This full-time position manages two social marketing campaigns and organizes and oversees social media (Facebook, Twitter, Pinterest, and Instagram).
Public Affairs Specialist(s)	This full-time position conducts high-level public affairs work, including working strategically with the Blue Ribbon Committee and Speakers Bureau, as well as writing press releases and news articles. The person in this position would also participate in the Speakers Bureau as a speaker frequently in public events. (Note: The Speakers Bureau currently provides speakers at 50 events per year).
Water Conservation Education Specialist(s)	This half-time position organizes and supports outreach activities, including providing support for the Blue Ribbon Committee and Speakers Bureau and writing and editing a monthly newsletter.
Landscape Professional(s)	Industry knowledge is critical to all conservation efforts, but given the amount of outdoor water use in the Santa Clarita Valley, landscaping expertise is also critical. Tasks facing CLWA include: 1) increased education, including speaking roles; 2) inspections to confirm benefits are derived from the millions of dollars being invested in turf replacement; 3) installation and proper maintenance of landscape equipment; and 4) landscapes are professionally managed to “keep them green” and “keep them efficient.” CLWA needs to continue to disseminate the information about new technology in order to encourage customers to continue to increase their efficiency.
Analyst(s)	CLWA needs support to understand, design, and evaluate the progress being made as it is now being graded on its performance on a monthly basis.

CLWA is going to need dedicated and knowledgeable staff. Consistency of implementation for water efficiency is the Valley’s path to success in meeting water demands sustainably for the long-term. Water use efficiency requires continuous support and maintenance and cannot be perceived as a “one-and-done” program. Technological advances and behavioral changes will continue to occur and CLWA and the Retailer staff need to continue to adapt to changes both in opportunities and challenges to reduce and maintain lower GPCD.

8.8 Monitoring Progress

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

As the CLWA and the Retailers further implements its water conservation programs, progress will be made and the CLWA and the Retailers will evaluate this progress in terms of meeting the 2020 SB x7-7 per capita use targets and striving towards other CUWCC MOU Compliance goals.

Given the requirements for the program are to have reduced water demand based on a gallons per capita per day target, the CLWA and the Retailers are following a “water savings based performance approach.” This allows the CLWA and the Retailers flexibility in pursuing measures that are the most effective for achieving its goals. This is a significant change from the “best management practice activities based approach.” The BMP activities-based approach had specific numerical targets calculated for how many of what type of activity had to be done (e.g., 15 percent of all single family residential accounts were to be surveyed). This BMP approach was traditionally followed by all Group 1 Water Utilities, including the Retailers, prior to the 2008 CUWCC MOU update. When the MOU was updated both new “Flexible Track” and “GPCD” compliance options were added. In addition, with the passage of SB X7-7 in November 2009, the Retailers now has ability to adjust its budget, staffing and outreach efforts to those measures that can (a) save the most water, (b) are the most cost effective, and/or (c) can be more easily implemented to obtain higher participation rates. Some measures may perform better than others given the volunteer nature of customer participation for many of these measures that drives the ability to lower demands (and meet targets).

The overarching theme from state agencies (State Water Resources Control Board and Department of Water Resources) is to increase emphasis for the water conservation program on outdoor conservation measures rather than indoor measures. This is logical for the following reasons:

- The highest potential for water savings is with implementation of utility operations and outdoor conservation measures (which is an opportunity to save on peak water treatment plant capacity while reducing peak energy demand and greenhouse gas emissions).
- Indoor measures have pending increasingly stringent laws and codes that will provide passive water savings (from replacement by higher efficiency fixtures and appliances in the coming three-five years).
- It is the greatest perceived need by CLWA, based on interactions with customers, for curbing residential outdoor irrigation. This need will in turn likely drive the most customer participation in the water conservation program by implementing outdoor measures.

Based on this feedback, the CLWA and Retailer managers made the decision that even though the indoor measures are more cost effective, that the CLWA would also continue to increase support for outdoor measures and public outreach and education. As a result, the Plan reflects the CLWA and the Retailer’s intention to make a gradual shift from indoor measures that are being implemented now to emphasize the more costly outdoor measures starting in July 2015 (the start of FY 2016).

An annual work plan and budget will be brought before the Water Committee to reconfirm the goal of meeting this SB X7-7 mandate and CUWCC MOU goals, as well as other CLWA and the Retailer goals (i.e., for the Water Master Plan). As part of this planning process, an annual evaluation of progress will be important given the water demand for the Retailers’ customers fluctuates year to year based predominately on climate conditions (weather) and other external factors such as economic conditions and, as a result, the annual average per capita use will fluctuate. It will be important to track activities, water demand, climatic variation, economic conditions, and other factors impacting demands on an annual basis to understand the level of progress being made in reducing and/or maintaining overall targets. If tools are not provided by the state or CUWCC, the CLWA will need to revisit the analysis provided by the MWM Team or develop a detailed methodology to analyze annual per capita water use and explain variations and isolate the demand reductions that can be attributed to the Plan. Periodic adjustments to the level of conservation activities planned and budgeted for the next year are expected to be made by the CLWA and the Retailers’ management.

8.9 Overall Recommended Next Steps

MWM recommends that CLWA and the Retailers consider the following:

- Continue working collaboratively throughout the Santa Clarita Valley Water Committee on CLWA measures such as rebates and other existing conservation programs to minimize administrative costs and prioritize staff time.
- Staff conservation programs appropriately so that customer participation is successful. Both the WUE SP and meeting state mandates is largely driven by voluntary customer changes in equipment and behaviors that need to be permanent (including following the drought).
- Seek testimonials of success to help with outreach materials and presentations to garner more and consistent customer participation.
- Look for new or expanded partnerships with local irrigation equipment contractors.
- Seek additional new funding sources, such as Proposition 1E, 84, Cap & Trade and/or US Bureau of Reclamation funds to support Plan budget needs. The existing budgets may be used as cost share to leverage into funding more activities, especially the less cost-effective measures.
- Strengthen relationships with landscape professional associations, non-profits (e.g., University of California Cooperative Extension (UCCE), Native Plant Society, etc.) to gain more word of mouth exposure to the community that is installing new or re-landscaping their properties to capture the maximum water savings from the point of initial installation of new landscapes and meeting Santa Clarita Valley stormwater permit needs.
- Market conservation opportunities through accredited program membership lists as a low-cost means to spread the word to other professionals in the water industry (e.g., Green Plumbers, WaterSense Partners, Irrigation Association Certified Professionals, etc.)

The Retailers will be preparing comprehensive water conservation pricing and rate studies periodically. In addition, staff will work with CLWA, the City, and the County to initiate a review of the Santa Clarita's Model Efficient Landscape Ordinance, including enforcement. CLWA will also actively pursue applications for state and federal grants, and partnering opportunities.

WATER USE EFFICIENCY STRATEGIC PLAN

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APPENDIX A LACWD-SPECIFIC INFORMATION FOR THE WUE STRATEGIC PLAN

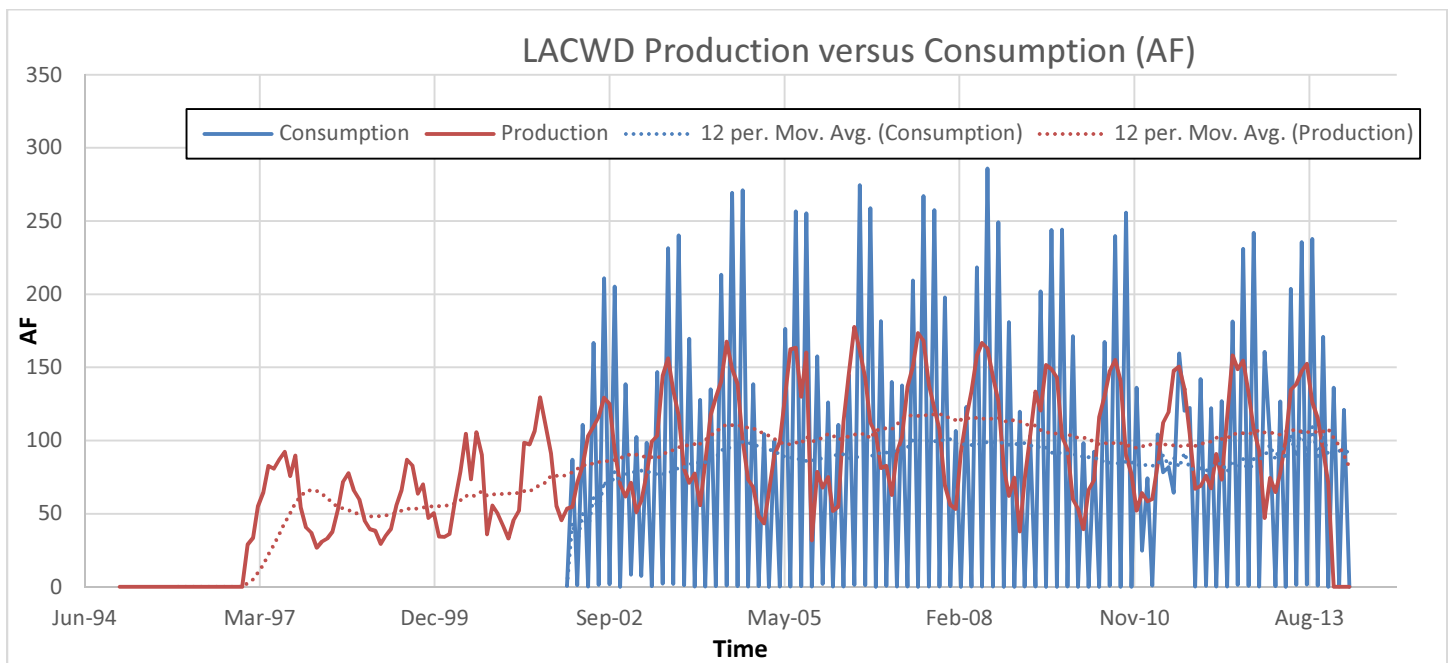
This appendix presents Retailer-specific information for the Water Use Efficiency Strategic Plan. The following sections are presented in the main body of the WUE SP at the CLWA level with a reference to more Retailer-specific information being found in this appendix.

A.1 Production versus Consumption

Total water production and consumption (billed water) data was compared over the period 2002-2014. The following figure illustrates the total production versus total consumption. Water production data was measured at the source (purchased and transported or well-pumped). Water consumption data was measured at the customer meters.

Since LACWD tracks consumption bimonthly, it's important to note the parallel pattern of both the production and consumption 12-month average trend lines; the difference between them represents non-revenue water.

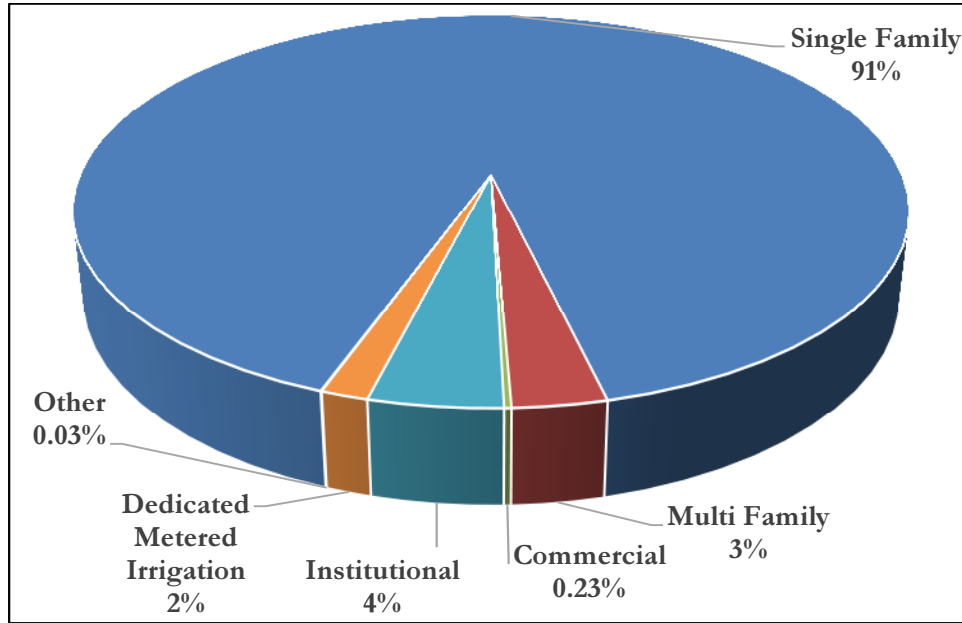
Figure A-1 Total Production vs. Total Consumption – LACWD



A.2 Consumption by User Category

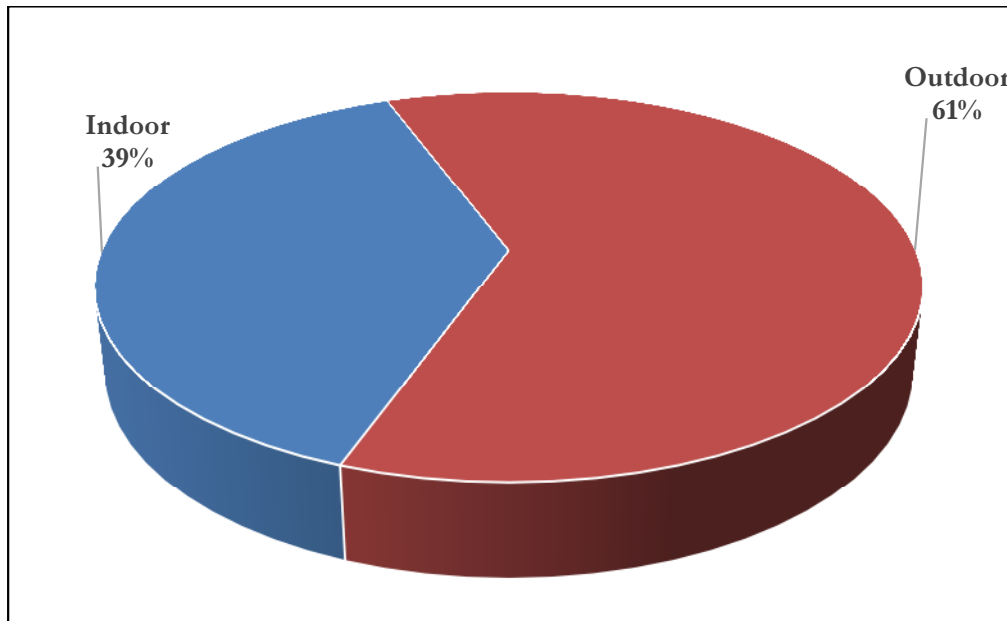
The following figure presents this Retailer's water usage breakdown based on 2013 water use data. Single family water use is the largest category of water users, using over 90 percent of the total water consumed.

Figure A-2 Consumption by Customer Category Based on 2013 Water Use Data – LACWD



The following figure shows the breakdown of total water use into indoor and outdoor components. Year 2013 water use was selected for this profile. A more detailed explanation of the methodology used for determining the percentage of indoor water use can be found in the main body of the WUE SP.

Figure A-3 Overall Use: Indoor vs. Outdoor – LACWD



A.3 Water Demand Projections with and without Plumbing Code

As more thoroughly explained in Section 3 of the main body of this WUE SP, the Econometric Model and DSS Model were used to generate water demand projections for each Retailer. The Econometric Model generated water demand projections for the year 2014 to 2020 and the DSS Model generated water demand projections for the year

2021 to 2050. The following table and figure present the Retailer demand projections with and without plumbing code savings through 2020.

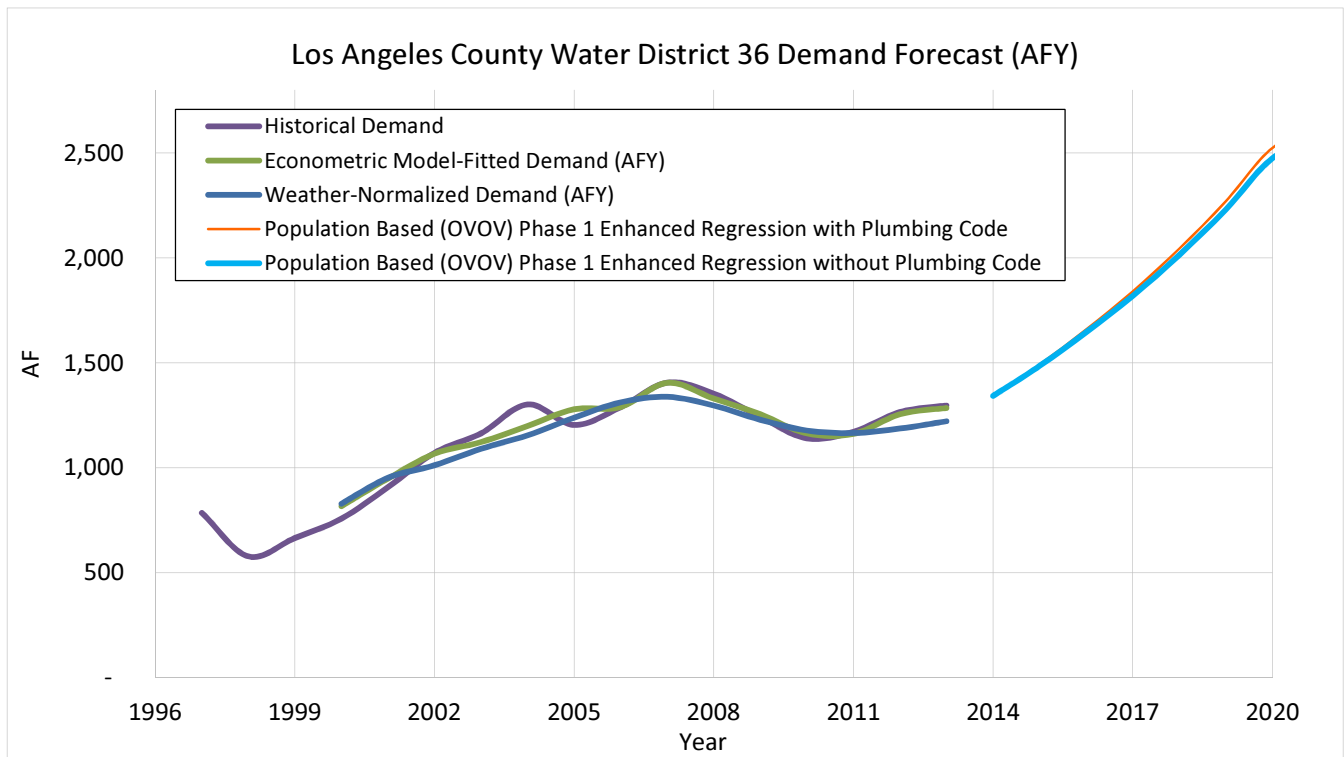
Table A-1 Demand Projections With and Without Plumbing Codes – LACWD

Draft Demand Forecast	2015	2016	2017	2018	2019	2020
Total Demand with No Plumbing Code Savings (AFY)	1,491	1,659	1,840	2,043	2,269	2,523
Total Demand With Plumbing Code Savings (AFY)	1,485	1,646	1,819	2,014	2,230	2,474

The demand projection graphs in the following figure include the following curves:

- Actual Demand – This is historical demand as submitted in spring 2014 to MWM from each Retailer.
- Model-Fitted Demand – The Retailer Econometric Model preliminary results that try to match actual demand using the regression equation described in Appendix F.
- Phase I Enhanced Demand - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and 4) no plumbing code.
 - Savings from plumbing codes (also known as “passive conservation”) is based on federal and state legislated efficiency standards pertaining to plumbing fixtures and appliances. The impact of codes quantified here include the Energy Policy Act of 1992, CALGreen Building Code, AB 715, and SB 407 which governs the types of fixtures available on the market for toilets, showers, washers, etc. The curve with “no plumbing code” would be the demand if these laws were not in place.
- Phase I Enhanced Demand with Plumbing Code - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and (4) plumbing code.

Figure A-4 Projected Demands – LACWD



A.4 Historical and Current Conservation

In addition to the conservation opportunities available for each Retailer's customers through SCV's programs and ongoing water loss maintenance programs, each Retailer aims to reduce water demands by conducting their own "in-house" conservation program.

Per their website <http://dpw.lacounty.gov/wwd/web/Conservation/RebateProgram.aspx> LACWD customers are eligible for CLWA incentives and up to 25 free high efficiency sprinkler nozzles through partner www.freesprinklernozzles.com.

Table 4-1 in the main body of the WUE SP presents the conservation measures and incentives in the Retailer's service area – some of these are measures led by CLWA, some are Retailer-led. A description of each measure is presented in Table 6-1. These measures are presented as Program A in the Retailer's DSS Model. Though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer's DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented. The design of each measure was explained in the previous sections.

A.5 Water Billing Structure

LACWD has a monthly base charge based on meter size and number of billing units plus for each hundred cubic feet (ccf) of water used in excess of the monthly allowance a fixed usage amount. The monthly allowance is calculated based on number of billing units multiplied by 5 ccf. This fixed usage rate is for all customer categories. According to the CUWCC's BMP Reporting online database in 2012 LACWD reported 70 percent volumetric-based billing.

A.6 Estimated Conservation Measure Costs and Savings

This section presents a benefit cost analysis for all the measures modeled in each Retailer's DSS Model.

Since the region's buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents long-term benefits and costs. The benefit cost analysis presents how much water each measure would save through 2050, how much they would cost, and what cost of saved water per unit volume if the measures were implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use(s)). Cost categories are defined below:

- Utility Costs - those costs that each Retailer as a water utility would incur to operate the measure, including administrative costs.
- Utility Benefits - the avoided cost of producing water at the identified rate of \$1,900 per AF.
- Customer Costs - those costs customers would incur to implement a measure and maintain its effectiveness over the life of the measure.
- Customer Benefits - the savings other than from reduced water/sewer utility bills, such as energy savings resulting from reduced use of hot water. Conservation program participants would see lower water and sewer bills but overall there would be no net customer benefit.
- Community Costs and Benefits - Community Costs and Benefits include Utility Costs plus Customer Costs, and Utility Benefits plus Customer Benefits, respectively.

The column headings in the following benefit cost analysis table are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits (\$) = the present value of the 37-year time stream of annual costs or benefits, discounted to the base year.
- Utility Benefit-Cost (BC) ratio = PV of Utility Costs divided by PV of Utility Benefits over 37 years.
- Community Benefit-Cost ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (sum of PV of Utility Costs plus PV of Customer Costs), over 37 years.

- Five Years Total Cost to Utility (\$) = the sum of the annual Utility Costs for the years from 2015 to 2020. Note not all measures start in the year 2015. The measures start in the years as specified for each measure can be found in each Retailer's DSS Model measure input parameter worksheet.
- Utility Cost of Water Saved per Unit Volume (\$/AF) = PV of Utility Costs over 37 years divided by the 37-Year Water Savings. This value is compared to the utility's avoided cost of water as one indicator of the cost effectiveness of conservation efforts. It should be noted that the value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

As explained in Section 6 of the WUE SP, annual total values for measure parameters are only relevant for measure costs. Savings from measures which address the same end use(s) are not additive.

Table A-2 Estimated Conservation Measure Costs and Savings – LACWD

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Water Loss (Retailer)	\$577,691	\$577,691	\$2,217,566	\$2,217,566	0.3	0.3	\$500,000	10.10	\$4,096
AMI (Retailer) ^b	\$350,856	\$350,856	\$490,283	\$1,152,200	0.7	0.3	-	-	\$1,359
Conservation Pricing	\$24,640	\$24,640	\$252,217	\$252,217	0.1	0.1	\$50,000	13.22	\$568
Public & School Education (CLWA)	\$248,076	\$317,954	\$185,111	\$185,111	1.3	1.7	\$24,402	4.41	\$791
Home Water Use Reports (Retailer)	\$3,617,927	\$4,556,809	\$188,268	\$188,268	19.2	24.2	\$17,200	67.03	\$53
SF Turf Replacement Program (CLWA)	\$431,710	\$431,710	\$544,451	\$947,748	0.8	0.5	\$71,771	3.14	\$1,175
MF CII Turf Replacement Program (CLWA)	\$504,297	\$504,297	\$209,199	\$829,046	2.4	0.6	\$27,577	3.60	\$386
SF Drip Irrigation Incentives (Retailer)	\$149,903	\$149,903	\$35,201	\$63,362	4.3	2.4	\$15,949	2.24	\$249
MF CII Drip Irrigation Incentives (Retailer)	\$11,835	\$11,835	\$24,383	\$43,890	0.5	0.3	\$11,048	0.17	\$2,185
SF WBIC Free Controller Prg (CLWA)	\$282,812	\$282,812	\$108,901	\$127,742	2.6	2.2	\$46,093	4.40	\$412
MF CII WBIC Free Controller Prg (CLWA)	\$8,560	\$8,560	\$3,924	\$9,530	2.2	0.9	\$1,661	0.13	\$490
School Building Retrofit (CLWA)	\$6,350	\$9,345	\$26,968	\$48,542	0.2	0.2	\$18,750	0.15	\$4,596
HECW Rebates (CLWA)	\$129,697	\$275,587	\$35,331	\$123,659	3.7	2.2	\$28,871	3.29	\$313
UHET Rebates (Retailer)	\$59,992	\$59,992	\$7,215	\$23,865	8.3	2.5	\$7,917	1.63	\$135
UHET Targeted Incentive (Retailer)	\$80,387	\$80,387	\$5,468	\$18,592	14.7	4.3	\$6,001	2.18	\$76
Top User Indoor Surveys and Incentives (Retailer)	\$350,099	\$539,341	\$294,926	\$521,793	1.2	1.0	\$39,692	4.11	\$845

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
CII Replace Equip and Performance Pgm (Retailer)	\$21,540	\$31,459	\$40,836	\$73,505	0.5	0.4	\$5,496	0.14	\$1,750
CII UHET Rebates (CLWA)	\$1,714	\$1,714	\$432	\$1,097	4.0	1.6	\$487	0.05	\$277
HE Urinal Rebates (CLWA)	\$2,213	\$2,213	\$457	\$1,704	4.8	1.3	\$516	0.06	\$227
Pre-Rinse Spray Nozzle (CLWA)	\$1,757	\$5,665	\$673	\$673	2.6	8.4	\$759	0.05	\$421
SF MF Outdoor Surveys (Retailer)	\$168,177	\$168,177	\$51,803	\$89,755	3.2	1.9	\$6,972	2.94	\$318
SF MF Survey Leak & Pressure (Retailer)	\$106,622	\$130,494	\$51,803	\$99,242	2.1	1.3	\$6,972	1.87	\$501
HE Faucet & HE Showerhead Giveaway (Retailer)	\$31,948	\$59,791	\$2,300	\$6,132	13.9	9.7	\$359	0.28	\$74
Low-Income HE Fixture Installation (CLWA)	\$201,108	\$393,139	\$34,817	\$34,817	5.8	11.3	\$28,452	5.10	\$199
Sprinkler Nozzle Rebate (Retailer)	\$1,329,592	\$1,329,592	\$66,043	\$102,462	20.1	13.0	\$14,528	12.20	\$49
Irrigation Surveys and Landscape Budgets (Retailer)	\$218,563	\$218,563	\$30,462	\$54,831	7.2	4.0	\$28,125	14.73	\$211
Submetering (Retailer)	\$211,197	\$308,000	\$19,437	\$34,987	10.9	8.8	\$20,625	5.60	\$106
Soil Moisture Sensor Rebates (CLWA)	\$119,133	\$119,133	\$103,584	\$186,451	1.2	0.6	\$35,887	3.47	\$1,180
SF Hot Water on Demand (Retailer)	\$43,815	\$81,936	\$90,147	\$210,344	0.5	0.4	\$23,863	0.43	\$2,085
Pool Cover Rebates (CLWA)	\$13,489	\$13,489	\$7,654	\$34,187	1.8	0.4	\$6,629	1.45	\$892
Landscape Ordinance	\$227,730	\$227,730	\$4,011	\$36,095	56.8	6.3	\$1,195	3.10	\$18

Measure (Retailer)	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Education and Water Waste Enforcement (Retailer)	\$251,857	\$251,857	\$210,824	\$275,693	1.2	0.9	\$27,791	4.31	\$871


a. Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value (PV) costs, benefits, benefit cost (BC) ratios, and costs of savings over the evaluation period.

b. AMI does not start until after year 2020 so there are no costs or savings associated with the measure during the 2015-2020 timeframe.

A.7 Program Scenario Measures

The following figure displays the conservation measures included in each conservation program scenario. These programs are not intended to be rigid frameworks but rather to demonstrate the range in savings that could be generated if selected measures were run together. A description of how the program scenarios are organized can be found in Section 7.

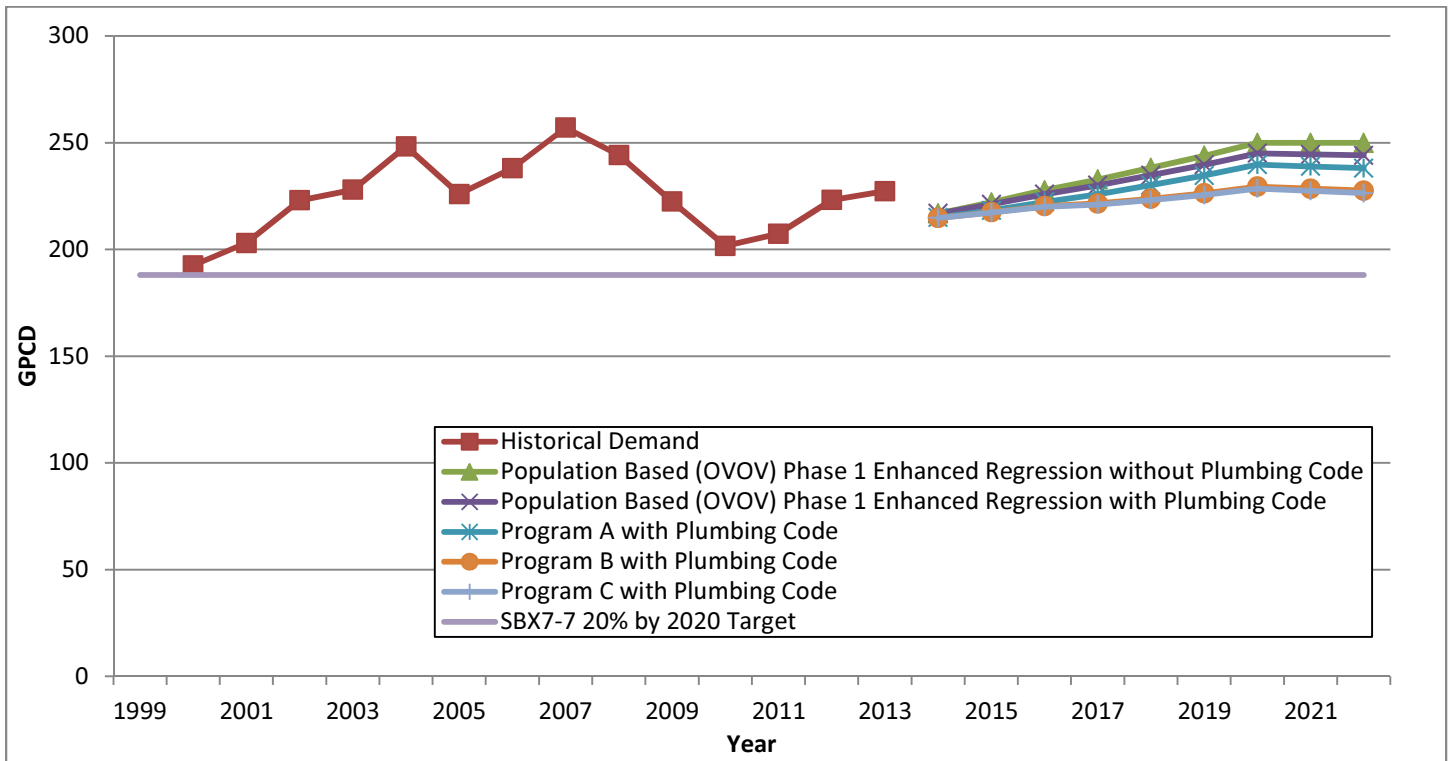
Figure A-5 Program Scenario Measures – LACWD

 Program Scenarios	Measures	Program A	Program B	Program C
	Water Loss (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AMI (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Public & School Education (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Home Water Use Reports (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Drip Irrigation Incentives (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Drip Irrigation Incentives (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
SF WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
School Building Retrofit (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HECW Rebates (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Rebates (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Targeted Incentive (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Top User Indoor Surveys and Incentives (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
CII Replace Equip and Performance Pgm (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
CII UHET Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Urinal Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Pre-Rinse Spray Nozzle (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Outdoor Surveys (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Survey Leak & Pressure (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Faucet & HE Showerhead Giveaway (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Low-Income HE Fixture Installation (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Sprinkler Nozzle Rebate (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Irrigation Surveys and Landscape Budgets (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Submetering (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Soil Moisture Sensor Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Hot Water on Demand (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Pool Cover Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Landscape Ordinance (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Education and Water Waste Enforcement	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

A.8 Per Capita Water Use with Different Program Options

The following figure presents an average annual Retailer per capita per day use without conservation, with the plumbing codes only, and each of the three alternative programs at the Retailer level.

Figure A-6 Per Capita Water Use with Different Program Options – LACWD*



* Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

The following table presents year 2020 GPCD target and Program A, B, and C GPCD estimates for the Retailer.

Table A-3 GPCD Target – Year 2020

Conservation Measure	SB X7-7 2020 Target	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD ^b	Program C 2020 GPCD
LACWD ^a	188	245	240	229	229

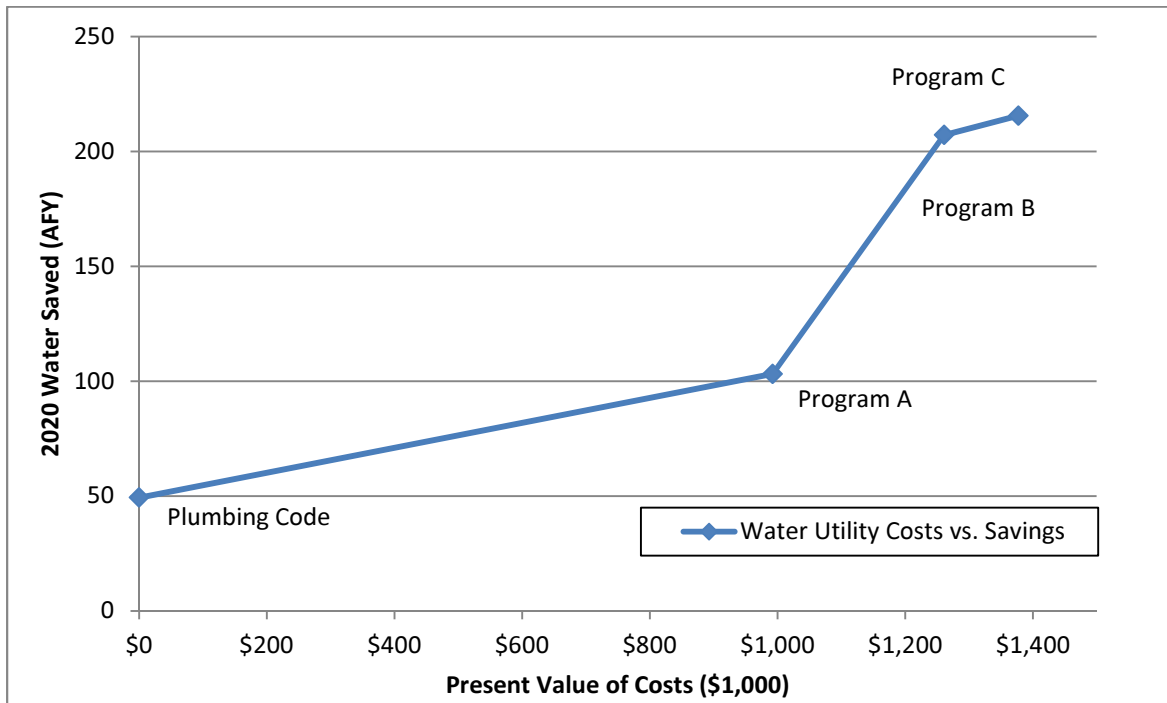
a. Since Los Angeles County Waterworks District 36 does not have 3,000 AF served or 3,000 connections, SB X7-7 targets do not apply.

b. Recommended implementation strategy is based on Program B.

A.9 Present Value of Utility Costs vs. Water Saved in 2020

The following figure illustrates how marginal returns change as more money is spent to achieve water savings is also found. As the figure demonstrates, the costs increase as the water savings increase from Program A to B which corresponds to increasing the budget, staffing and participation in the conservation programs. Present value costs and savings are over a 6-year time-span (2014-2020).

Figure A-7 Present Value of Utility Costs vs. Water Saved in 2020 – LACWD*



*Present value costs and savings are over a 6-year time-span (2014-2020).

A.10 Program Cost and Savings Comparison

The following table shows the estimated benefits, costs and savings for all three Retailer programs.

Table A-4 Comparison of Program Estimated Costs and Water Savings - LACWD

Conservation Program	Water Savings (AFY)						Water Utility Benefit to Cost Ratio*	Community Benefit to Cost Ratio*	Present Value of Water Savings*	Present Value of Utility Costs*
	2015	2016	2017	2018	2019	2020				
Program A with Plumbing Code	26	40	55	70	86	103	1.18	0.95	\$4,138,469	\$3,512,960
Program B with Plumbing Code	31	54	88	124	163	207	2.11	1.81	\$8,808,837	\$4,178,314
Program C with Plumbing Code	32	56	92	129	171	215	1.89	1.49	\$9,707,915	\$5,133,873

* Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value costs, benefits, benefit cost ratios, and costs of savings over the 37-year evaluation period.

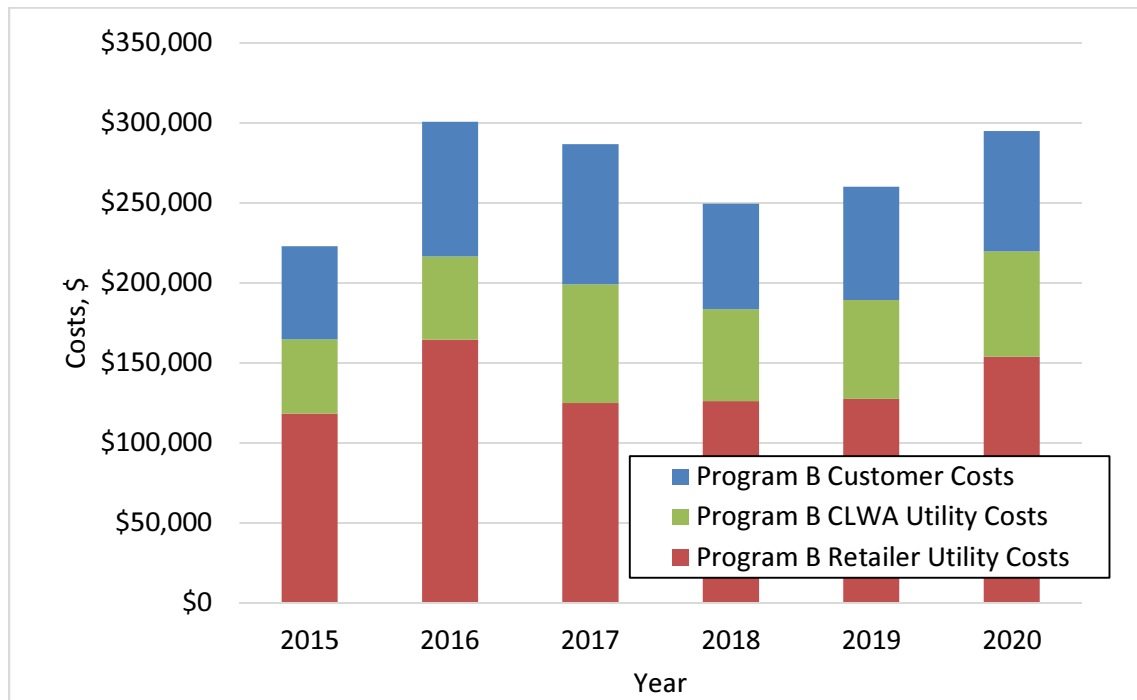
A.11 Program Implementation Budget

The following table and figure present the proposed implementation costs for the Retailer’s CLWA-led and Retailer-led Program B measures. This budget includes CLWA utility costs, Retailer utility costs and customer costs. Utility costs include unit costs (site audit costs, incentives, rebates, etc.) as well as administrative costs.

Table A-5 Program B CLWA, Retailer, and Customer Costs - LACWD

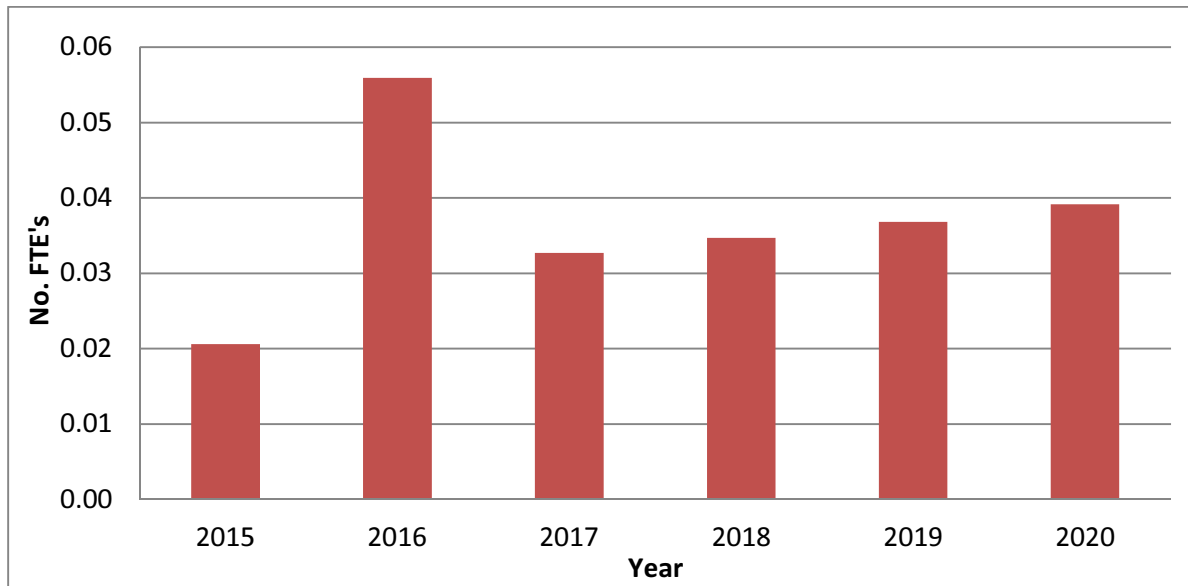
	2015	2016	2017	2018	2019	2020
Program B Retailer Utility Costs	\$118,324	\$164,603	\$124,961	\$126,178	\$127,499	\$153,932
Program B CLWA Utility Costs	\$ 46,520	\$ 51,932	\$ 74,134	\$ 57,459	\$ 61,808	\$ 65,837
Program B Total Utility Costs	\$164,845	\$216,535	\$199,095	\$183,637	\$189,307	\$219,769
Program B Customer Costs	\$ 58,198	\$ 84,321	\$ 87,661	\$ 66,042	\$ 70,845	\$ 75,211
Program B Total Costs	\$223,042	\$300,856	\$286,756	\$249,679	\$260,152	\$294,980

Figure A-8 Program B CLWA, Retailer, and Customer Costs – LACWD



A.12 Program Staffing Needs

As part of this planning effort, consideration has been given to program staffing levels. Current and proposed future needs for staff and/or outsourcing support of the conservation program is presented in this section. The following figure presents the proposed implementation staffing needs for the Retailer for implementing the Retailer-led measures in their Program B. This estimate includes staffing needs to address the Retailer-led measures that the Retailer plans to implement as part of Program B. These measures are all run in-house. Staffing needs were calculated by dividing annual administrative costs by an average annual CLWA salary of \$85,000 per staff person; or \$120,000 burdened. New development landscape plan review following the City and County’s Landscape Ordinance is completed by Retailer staff.

Figure A-9 Proposed Staffing for Program B Retailer-Led Measures* - LACWD

*Estimated department staffing based on \$120,000 average annual burdened salary.

A.13 DSS Model Conservation Measure Results

The DSS Model presents the input parameters for each individual measure modeled for the Retailer. Summary cost, savings and benefit cost ratio results are also shown. Annual costs, targets, and savings are available by measure in the Retailer's DSS Model.

This section presents a results summary of the Retailer-led measures in the Retailer's Program B. Annual individual measure utility costs, administrative costs, water savings, and targeted accounts for each of the Retailer-led measures in Program B through 2020 are totaled and presented in the following tables.

Each measure's utility costs are those costs that the Retailer as a water utility would incur to operate the measure, including administrative costs, rebates, etc. Table A-6 presents the administrative portion of these costs. Table A-7 shows the annual water savings for each Retailer-led Program B measure. Table A-8 presents the number of accounts targeted annually for each Program B Retailer-led measure. It is important to note that one targeted account may represent more than one measure incentive (i.e., 2 clothes washers per HECW targeted multi-family account).

Table A-6 Retailer-Led Program B Measure Utility Costs - LACWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
Conservation Pricing	\$5,000	\$30,000	\$5,000	\$5,000	\$5,000	\$30,000
Home Water Use Reports ^a	-	-	\$5,273	\$5,721	\$6,206	\$6,734
SF Drip Irrigation Incentives	\$2,692	\$2,921	\$3,169	\$3,438	\$3,730	\$4,047
SF MF Outdoor Surveys	\$1,177	\$1,277	\$1,385	\$1,503	\$1,630	\$1,769
SF MF Survey Leak & Pressure	\$1,177	\$1,277	\$1,385	\$1,503	\$1,630	\$1,769
Sprinkler Nozzle Rebate	\$2,452	\$2,660	\$2,886	\$3,132	\$3,398	\$3,686
Irrigation Surveys and Landscape Budgets	\$5,625	\$5,625	\$5,625	\$5,625	\$5,625	\$5,625
Submetering ^b	-	\$20,625	-	-	-	-
Landscape Ordinance	\$202	\$219	\$237	\$258	\$279	\$303
Total	\$118,324	\$164,603	\$124,961	\$126,178	\$127,499	\$153,932

a. The Home Water Use report measure does not come online till year 2017.

b. LACWD's Submetering measure would only be conducted in year 2016. One mobile home park is the likely site for this retrofit project. LACWD's one multi-family account is Hasley Canyon Mobile Estates with approximately 110 units.

Table A-7 Retailer-Led Program B Measure Administration Costs - LACWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	-	-	-	-	-	-
Conservation Pricing ^a	-	-	-	-	-	-
Home Water Use Reports ^b	-	-	\$1,217	\$1,320	\$1,432	\$1,554
SF Drip Irrigation Incentives	\$538	\$584	\$634	\$688	\$746	\$809
SF MF Outdoor Surveys	\$272	\$295	\$320	\$347	\$376	\$408
SF MF Survey Leak & Pressure	\$272	\$295	\$320	\$347	\$376	\$408
Sprinkler Nozzle Rebate	\$223	\$242	\$262	\$285	\$309	\$335
Irrigation Surveys and Landscape Budgets	\$1,125	\$1,125	\$1,125	\$1,125	\$1,125	\$1,125
Submetering ^c	-	\$4,125	-	-	-	-
Landscape Ordinance	\$40	\$44	\$47	\$52	\$56	\$61
Total	\$2,470	\$6,709	\$3,925	\$4,163	\$4,421	\$4,700

a. The Water Loss and Conservation Pricing measure design does not include administrative costs.

b. The Home Water Use report measure does not come online till year 2017.

c. LACWD's Submetering measure would only be conducted in year 2016. One mobile home park is the likely site for this retrofit project. LACWD's one multi-family account is Hasley Canyon Mobile Estates with approximately 110 units.

Table A-8 Retailer-Led Program B Measure Savings (AFY) - LACWD^a

Measure	2015	2016	2017	2018	2019	2020
Water Loss	6.7	7.3	7.9	8.6	9.3	10.1
Conservation Pricing	2.9	4.5	6.4	8.4	10.7	13.2
Home Water Use Reports ^b	-	-	13.9	29.5	47.1	67.0
SF Drip Irrigation Incentives	0.3	0.6	0.9	1.3	1.7	2.2
SF MF Outdoor Surveys	0.4	0.9	1.4	2.0	2.7	2.9
SF MF Survey Leak & Pressure	0.3	0.6	0.9	1.3	1.7	1.9
Sprinkler Nozzle Rebate	2.5	4.1	5.7	7.6	9.8	12.2
Irrigation Surveys and Landscape Budgets	2.2	4.6	7.0	9.5	12.0	14.7
Submetering ^c	-	5.3	5.3	5.4	5.5	5.6
Landscape Ordinance	0.7	1.0	1.5	1.9	2.5	3.1

a. Annual total values for savings are not directly additive since savings from measures which address the same end use(s) are not additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. Reference Program B savings above in Table A-3 for total Program B savings.

b. The Home Water Use report measure does not come online till year 2017.

c. LACWD's Submetering measure would only be conducted in year 2016.

Table A-9 Retailer-Led Program B Measure Targeted Accounts - LACWD*

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	0	0	0	0	0	0
Conservation Pricing ^a	0	0	0	0	0	0
Home Water Use Reports ^b	0	0	338	367	398	432
SF Drip Irrigation Incentives	14	16	17	18	20	22
SF MF Outdoor Surveys	9	9	10	11	12	13
SF MF Survey Leak & Pressure	9	9	10	11	12	13
Sprinkler Nozzle Rebate	22	24	26	28	30	33
Irrigation Surveys and Landscape Budgets	3	3	3	3	3	3
Submetering ^c	0	1	0	0	0	0
Landscape Ordinance	2	2	2	2	2	2
Total	59	64	406	440	477	518

a. The Water Loss and Conservation Pricing measure target overall production and consumption, respectively, to lower GPCD.

b. The Home Water Use report measure does not come online till year 2017.

c. LACWD's Submetering measure would only be conducted in year 2016.

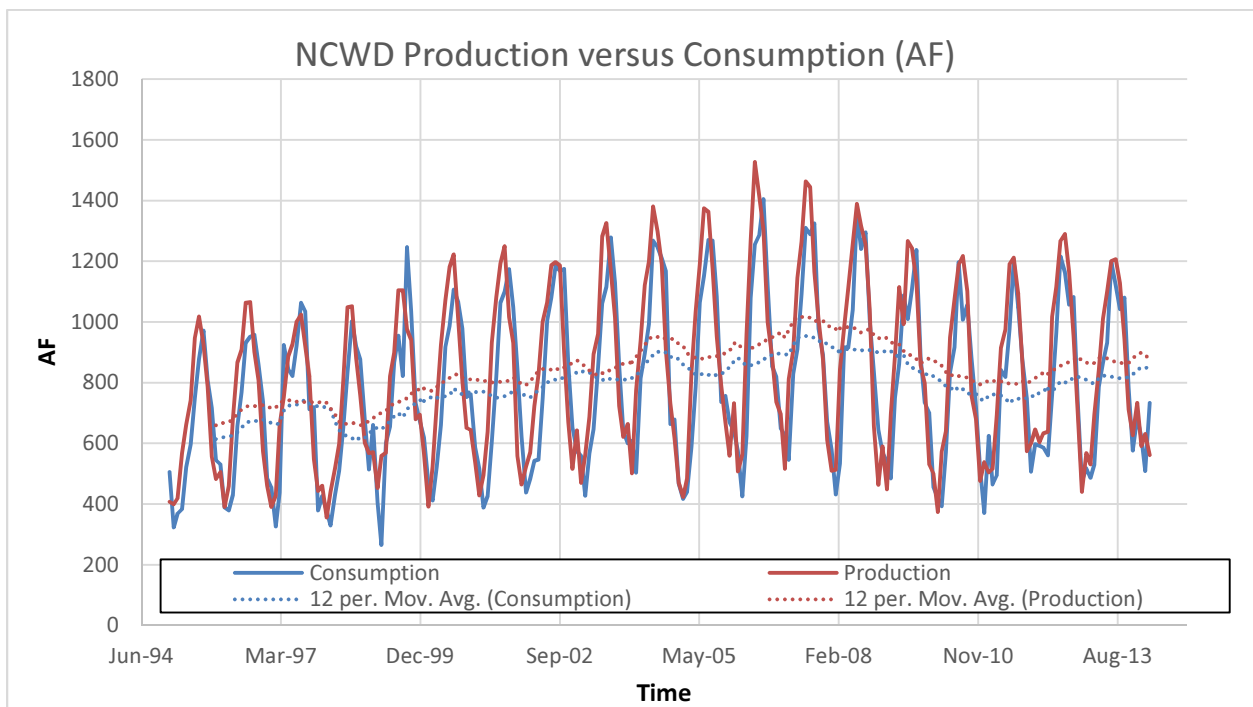
APPENDIX B NCWD-SPECIFIC INFORMATION FOR THE WUE STRATEGIC PLAN

This appendix presents Retailer-specific information for the Water Use Efficiency Strategic Plan. The following sections are presented in the main body of the WUE SP at the CLWA level with a reference to more Retailer-specific information being found in this appendix.

B.1 Production versus Consumption

Total water production and consumption (billed water) data was compared over the period 1995-2014. The following figure illustrates the total production versus total consumption. Water production data was measured at the source (purchased and transported or well-pumped). Water consumption data was measured at the customer meters.

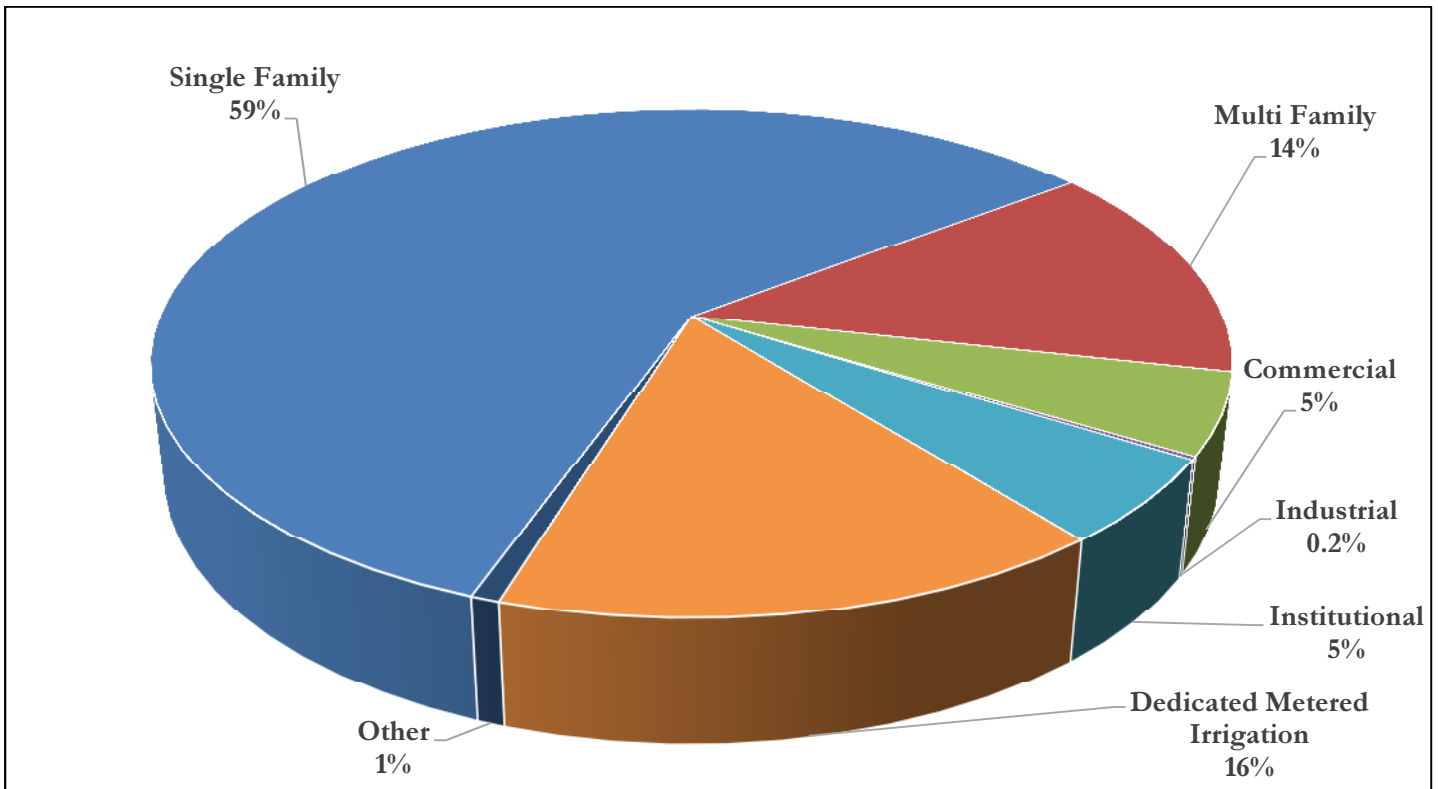
Figure B-1 Total Production vs. Total Consumption – NCWD



B.2 Consumption by User Category

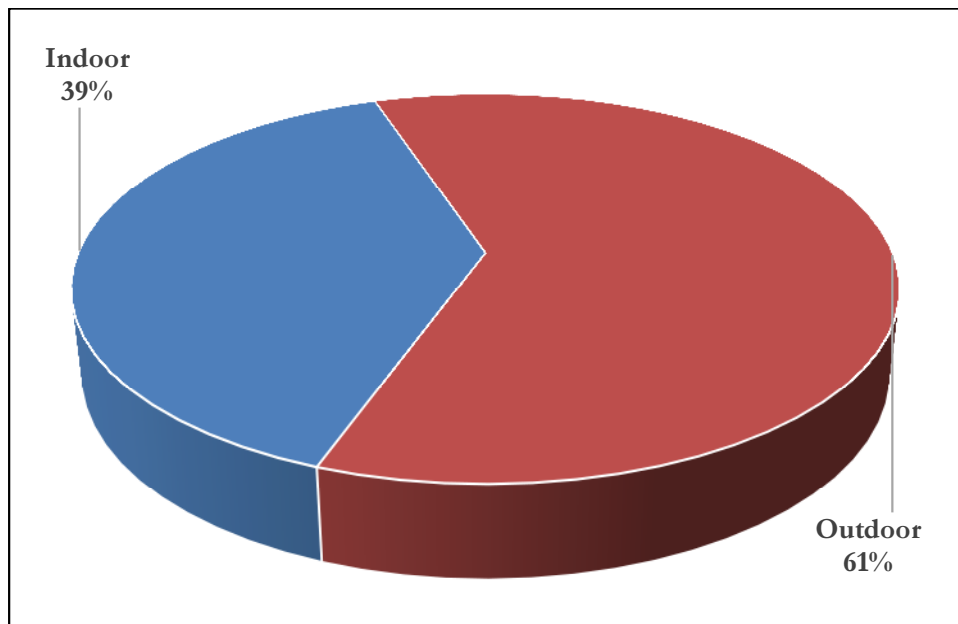
The following figure presents this Retailer’s water usage breakdown based on 2013 water use data. Single family water use is the largest category of water users, using over 50 percent of the total water consumed.

Figure B-2 Consumption by Customer Category Based on 2013 Water Use Data – NCWD



The following figure shows the breakdown of total water use into indoor and outdoor components. Year 2013 water use was selected for this profile. A more detailed explanation of the methodology used for determining the percentage of indoor water use can be found in the main body of the WUE SP.

Figure B-3 Overall Use: Indoor vs. Outdoor - NCWD



B.3 Water Demand Projections with and without Plumbing Code

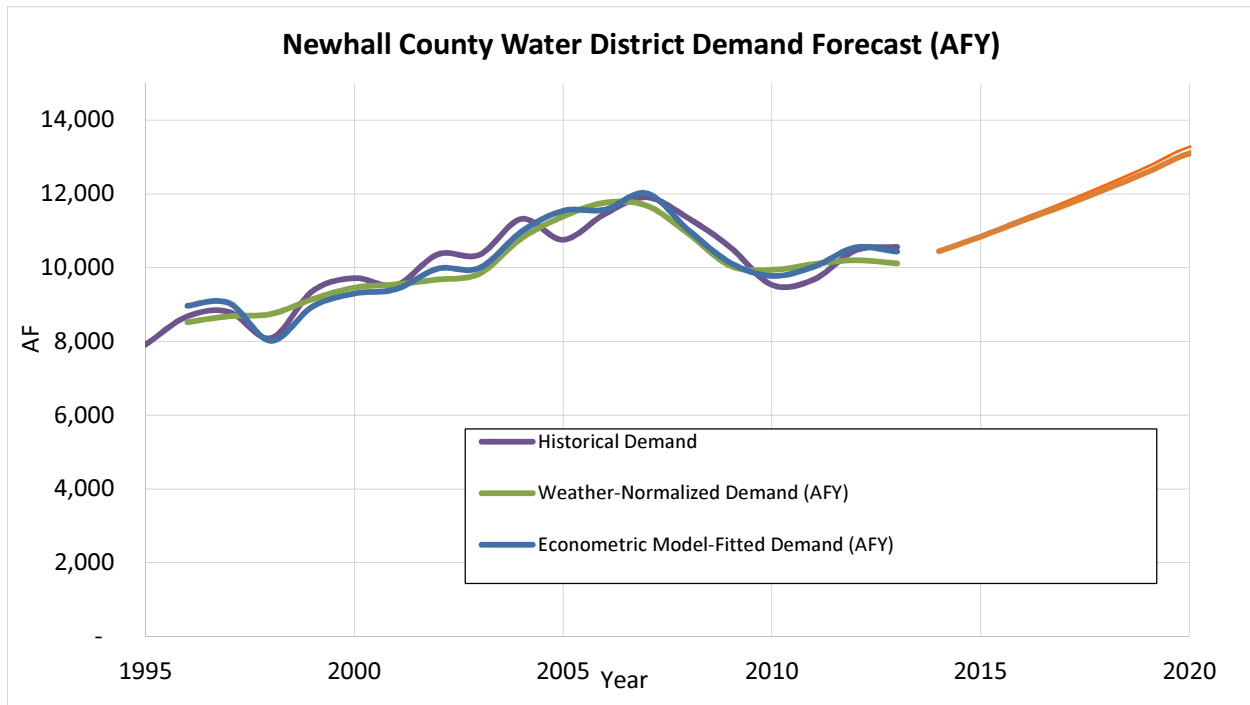
As more thoroughly explained in Section 3 of the main body of this WUE SP, the Econometric Model and DSS Model were used to generate water demand projections for each Retailer. The Econometric Model generated water demand projections for the year 2014 to 2020 and the DSS Model generated water demand projections for the year 2021 to 2050. The following table and figure present the Retailer demand projections with and without plumbing code savings through 2020.

Table B-1 Demand Projections With and Without Plumbing Codes – NCWD

Draft Demand Forecast	2015	2016	2017	2018	2019	2020
Total Demand with No Plumbing Code Savings (AFY)	10,869	11,329	11,769	12,246	12,741	13,277
Total Demand With Plumbing Code Savings (AFY)	10,840	11,271	11,682	12,129	12,593	13,095

The demand projection graphs in the following figure include the following curves:

- Actual Demand – This is historical demand as submitted in spring 2014 to MWM from each Retailer.
- Model-Fitted Demand – The Retailer Econometric Model preliminary results that try to match actual demand using the regression equation described in Appendix F.
- Phase I Enhanced Demand - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and 4) no plumbing code.
 - Savings from plumbing codes (also known as “passive conservation”) is based on federal and state legislated efficiency standards pertaining to plumbing fixtures and appliances. The impact of codes quantified here include the Energy Policy Act of 1992, CALGreen Building Code, AB 715, and SB 407 which governs the types of fixtures available on the market for toilets, showers, washers, etc. The curve with “no plumbing code” would be the demand if these laws were not in place.
- Phase I Enhanced Demand with Plumbing Code - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and (4) plumbing code.

Figure B-4 Projected Demands – NCWD

B.4 Historical and Current Conservation Program

In addition to the conservation opportunities available for each Retailer’s customers through SCV’s programs and ongoing water loss maintenance programs, each Retailer aims to reduce water demands by conducting their own “in-house” conservation program.

Historical activity and water savings from conservation programs was reported to the CUWCC and is available on their website. CUWCC water savings from various BMPs is available annually from year 2002.

NCWD residential and commercial customers currently have access to a high efficiency sprinkler rebate program, drip irrigation conversion rebates, and a “You Save, We Pay” customized water efficiency program that offers rebates for water saving devices and technologies that are not included in any other NCWD or CLWA program. More information about current conservation opportunities offered by NCWD can be found here: <http://www.ncwd.org>.

Table 4-1 in the main body of the WUE SP presents the conservation measures and incentives in the Retailer’s service area – some of these are measures led by CLWA, some are Retailer-led. A description of each measure is presented in Table 6-1. These measures are presented as Program A in the Retailer’s DSS Model. Though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer’s DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented. The design of each measure was explained in the previous sections.

B.5 Water Billing Structure

Since 2014, NCWD has employed a uniform volumetric rate structure for all accounts. All accounts are charged a flat fee for water availability and a variable charge based on usage for purchased water from CLWA. Newhall County Water District has recently completed the creation of a water budget structure. The Water Efficiency Target (WET) goals are provided to most individually metered residential homes and are based on the specific indoor and outdoor water needs of each individual residence. Residential customers began seeing their target data

on their bills in January 2015. NCWD is currently completing targets for all individually metered landscape accounts. The targets will give NCWD the ability to appropriate a relative charge to customers that require a higher priced water supply due to inefficient usage. It is important to note that the uniform volumetric rate and water availability charge are based on actual water costs and meet or exceed the California Urban Water Conservation Council BMP 1.4 70/30 model.

B.6 Estimated Conservation Measure Costs and Savings

This section presents a benefit cost analysis for all the measures modeled in each Retailer's DSS Model.

Since the region's buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents long-term benefits and costs. The benefit cost analysis presents how much water each measure would save through 2050, how much they would cost, and what cost of saved water per unit volume if the measures were implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use(s)). Cost categories are defined below:

- Utility Costs - those costs that each Retailer as a water utility would incur to operate the measure, including administrative costs.
- Utility Benefits - the avoided cost of producing water at the identified rate of \$1,900 per AF.
- Customer Costs - those costs customers would incur to implement a measure and maintain its effectiveness over the life of the measure.
- Customer Benefits - the savings other than from reduced water/sewer utility bills, such as energy savings resulting from reduced use of hot water. Conservation program participants would see lower water and sewer bills but overall there would be no net customer benefit.
- Community Costs and Benefits - Community Costs and Benefits include Utility Costs plus Customer Costs, and Utility Benefits plus Customer Benefits, respectively.

The column headings in the following benefit cost analysis table are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits (\$) = the present value of the 37-year time stream of annual costs or benefits, discounted to the base year.
- Utility Benefit-Cost ratio = PV of Utility Costs divided by PV of Utility Benefits over 37 years.
- Community Benefit-Cost ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (sum of PV of Utility Costs plus PV of Customer Costs), over 37 years.
- Five Years Total Cost to Utility (\$) = the sum of the annual Utility Costs for the years from 2015 to 2020. Note not all measures start in the year 2015. The measures start in the years as specified for each measure can be found in each Retailer's DSS Model measure input parameter worksheet.
- Utility Cost of Water Saved per Unit Volume (\$/AF) = PV of Utility Costs over 37 years divided by the 37-Year Water Savings. This value is compared to the utility's avoided cost of water as one indicator of the cost effectiveness of conservation efforts. It should be noted that the value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

As explained in Section 6 of the WUE SP, annual total values for measure parameters are only relevant for measure costs. Savings from measures which address the same end use(s) are not additive.

Table B-2 Estimated Conservation Measure Costs and Savings – NCWD

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Water Loss (Retailer)	\$4,425,051	\$4,425,051	\$2,907,839	\$2,907,839	1.5	1.5	\$696,000	93	\$725
AMI (Retailer) ^b	\$2,090,331	\$2,090,331	\$2,563,430	\$7,121,911	0.8	0.3	-	-	\$1,196
Conservation Pricing (Retailer)	\$255,637	\$255,637	\$401,717	\$401,717	0.6	0.6	\$50,000	133	\$89
Public & School Education (CLWA)	\$977,661	\$1,278,831	\$781,995	\$781,995	1.3	1.6	\$139,032	21	\$893
Home Water Use Reports (Retailer)	\$14,448,907	\$18,121,501	\$193,770	\$193,770	74.6	93.5	\$35,615	320	\$15
SF Turf Replacement Program (CLWA)	\$1,538,717	\$1,538,717	\$2,226,855	\$3,876,378	0.7	0.4	\$395,915	14	\$1,383
MF CII Turf Replacement Program (CLWA)	\$5,117,183	\$5,117,183	\$2,023,581	\$8,019,376	2.5	0.6	\$365,643	46	\$378
SF Drip Irrigation Incentives (Retailer)	\$211,020	\$211,020	\$252,040	\$300,432	0.8	0.7	\$128,306	3	\$1,278
MF CII Drip Irrigation Incentives (Retailer)	\$376,350	\$376,350	\$239,147	\$717,440	1.6	0.5	\$123,337	6	\$679
SF WBIC Free Controller Prg (CLWA)	\$951,905	\$951,905	\$444,236	\$521,093	2.1	1.8	\$216,750	17	\$506
MF CII WBIC Free Controller Prg (CLWA)	\$372,161	\$372,161	\$131,337	\$318,961	2.8	1.2	\$61,885	6	\$380
School Building Retrofit (CLWA)	\$1,058,093	\$1,216,525	\$138,347	\$249,025	7.6	4.9	\$93,905	24	\$141
HECW Rebates (CLWA)	\$702,377	\$1,515,983	\$200,583	\$697,478	3.5	2.2	\$159,627	18	\$329
UHET Rebates (Retailer)	\$431,121	\$431,121	\$42,263	\$139,792	10.2	3.1	\$46,230	12	\$110
UHET Targeted Incentive (Retailer)	\$431,121	\$431,121	\$31,259	\$106,282	13.8	4.1	\$34,194	12	\$82
Top User Indoor Surveys and Incentives (Retailer)	\$216,387	\$370,635	\$72,551	\$128,360	3.0	2.9	\$13,069	4	\$355
CII Replace Equip and	\$431,498	\$773,950	\$646,939	\$1,164,490	0.7	0.7	\$117,513	4	\$1,432

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Performance Pgm (Retailer)									
CII UHET Rebates (CLWA)	\$24,041	\$24,041	\$8,732	\$22,165	2.8	1.1	\$9,832	1	\$400
HE Urinal Rebates (CLWA)	\$36,879	\$36,879	\$9,235	\$34,423	4.0	1.1	\$10,399	1	\$276
Pre-Rinse Spray Nozzle (CLWA)	\$151,914	\$614,766	\$13,601	\$13,601	11.2	45.2	\$15,315	4	\$99
SF MF Outdoor Surveys (Retailer)	\$1,549,160	\$1,549,160	\$771,368	\$1,166,942	2.0	1.3	\$141,777	35	\$537
SF MF Survey Leak & Pressure (Retailer)	\$696,232	\$865,778	\$719,944	\$983,660	1.0	0.9	\$132,325	16	\$1,115
HE Faucet & HE Showerhead Giveaway (Retailer)	\$1,457,465	\$2,720,441	\$101,965	\$271,908	14.3	10.0	\$79,669	40	\$79
Low-Income HE Fixture Installation (CLWA)	\$359,379	\$697,771	\$76,654	\$76,654	4.7	9.1	\$60,962	9	\$246
Sprinkler Nozzle Rebate (Retailer)	\$23,274,320	\$23,274,320	\$1,763,824	\$6,783,647	13.2	3.4	\$476,496	254	\$76
Irrigation Surveys and Landscape Budgets (Retailer)	\$511,847	\$511,847	\$260,036	\$437,615	2.0	1.2	\$238,023	54	\$825
Submetering (Retailer)	\$223,802	\$332,931	\$238,498	\$429,296	0.9	0.8	\$217,607	6	\$1,193
Soil Moisture Sensor Rebates (CLWA)	\$386,089	\$386,089	\$298,725	\$537,706	1.3	0.7	\$115,566	12	\$1,056
SF Hot Water on Demand (Retailer)	\$37,871	\$70,399	\$100,116	\$233,603	0.4	0.3	\$19,530	0.3	\$2,590
Pool Cover Rebates (CLWA)	\$57,931	\$57,931	\$40,141	\$179,296	1.4	0.3	\$35,675	6	\$1,094
Landscape Ordinance (Retailer)	\$7,713,164	\$7,713,164	\$63,167	\$568,502	122.1	13.6	\$17,020	100	\$8

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Education and Water Waste Enforcement (Retailer)	\$1,350,002	\$1,350,002	\$910,919	\$1,191,202	1.5	1.1	\$162,065	29	\$736
Conservation Pricing - IRR (Retailer)	\$194,093	\$194,093	\$217,975	\$217,975	0.9	0.9	\$55,000	113	\$58

a. Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value (PV) costs, benefits, benefit cost (BC) ratios, and costs of savings over the evaluation period.

b. AMI does not start until after year 2020 so there are no costs or savings associated with the measure during the 2015-2020 timeframe.

B.7 Program Scenario Measures

The following figure displays the conservation measures included in each conservation program scenario. These programs are not intended to be rigid frameworks but rather to demonstrate the range in savings that could be generated if selected measures were run together. A description of how the program scenarios are organized can be found in Section 7.

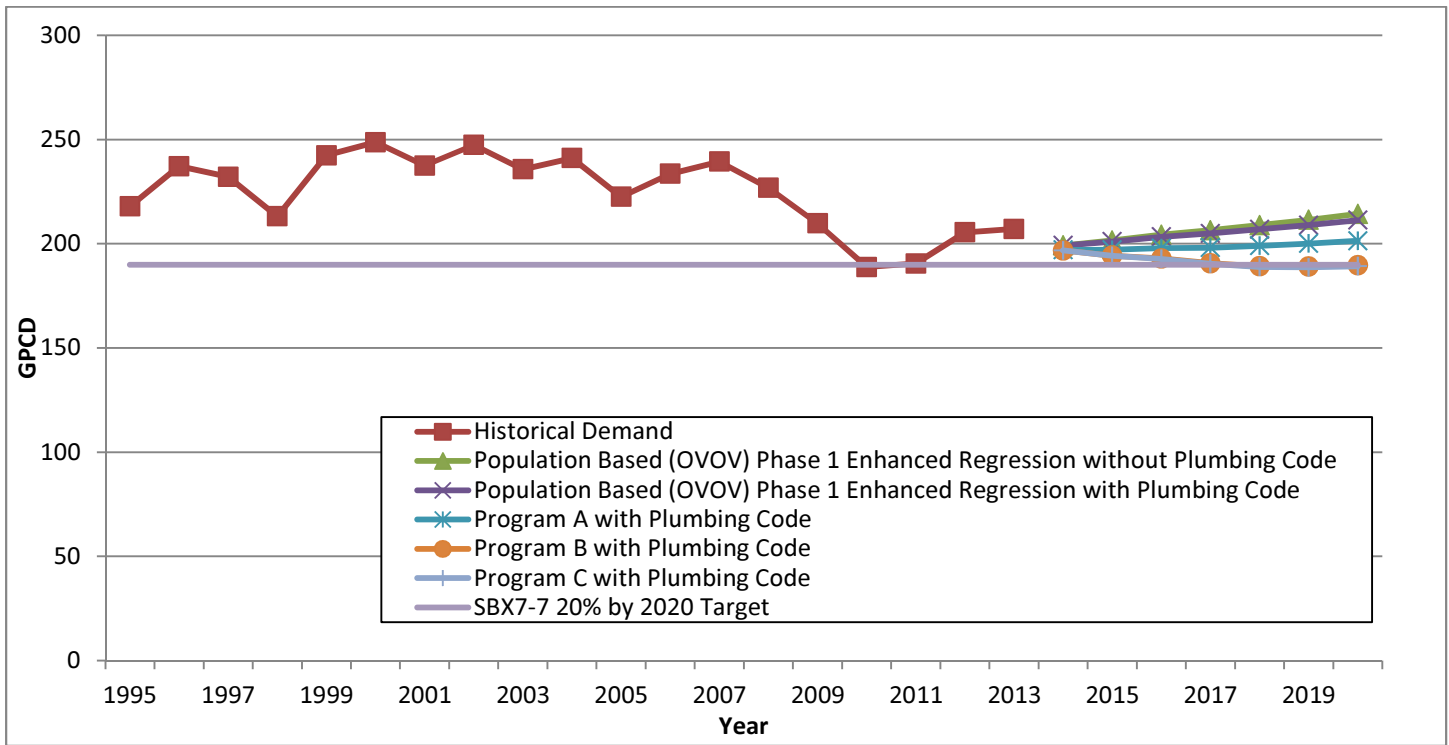
Figure B-5 Program Scenario Measures – NCWD

 Program Scenarios	Measures	Program A	Program B	Program C
	Water Loss (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AMI (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Public & School Education (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Home Water Use Reports (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Drip Irrigation Incentives (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Drip Irrigation Incentives (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
School Building Retrofit (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HECW Rebates (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Rebates (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Targeted Incentive (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Top User Indoor Surveys and Incentives (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CII Replace Equip and Performance Pgm (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CII UHET Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Urinal Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Pre-Rinse Spray Nozzle (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Outdoor Surveys (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Survey Leak & Pressure (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Faucet & HE Showerhead Giveaway (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Low-Income HE Fixture Installation (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Sprinkler Nozzle Rebate (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Irrigation Surveys and Landscape Budgets (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Submetering (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Soil Moisture Sensor Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Hot Water on Demand (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Pool Cover Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Landscape Ordinance (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Education and Water Waste Enforcement (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing - Irr (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

B.8 Per Capita Water Use with Different Program Options

The following figure presents an average annual Retailer per capita per day use without conservation, with the plumbing codes only, and each of the three alternative programs at the Retailer level.

Figure B-6 Per Capita Water Use with Different Program Options – NCWD



The following table presents year 2020 GPCD target and Program A, B, and C GPCD estimates for the Retailer.

Table B-3 GPCD Target – Year 2020

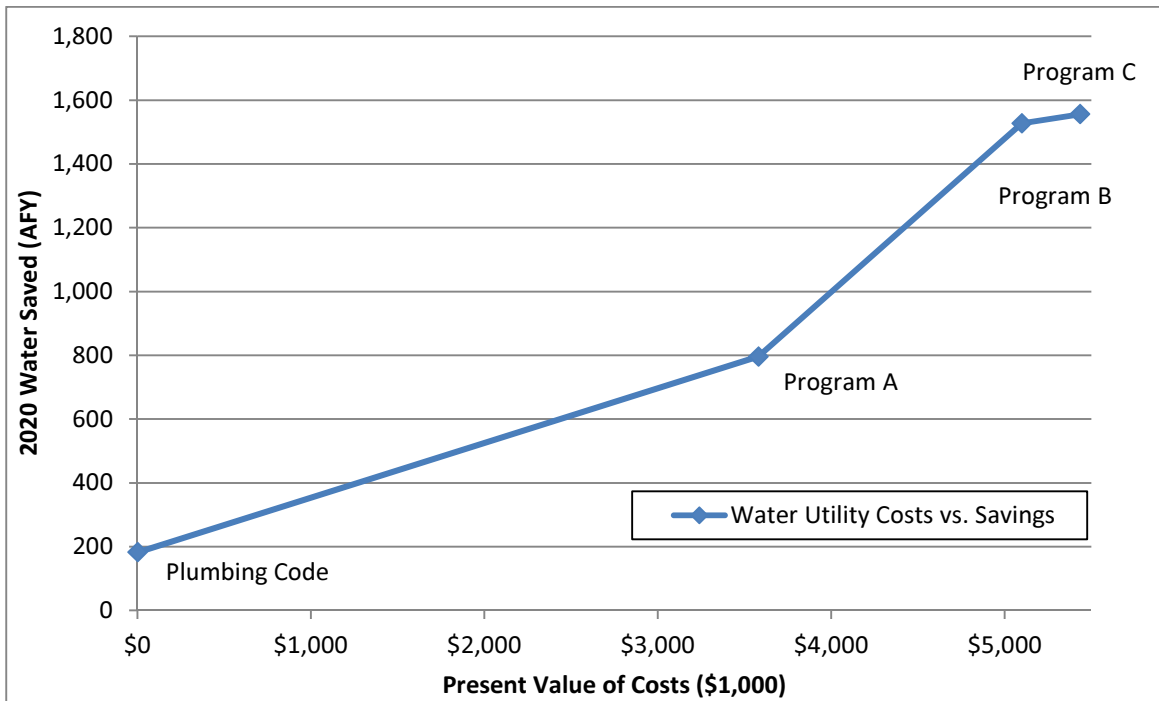
Conservation Measure	SB X7-7 2020 Target	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD ^a	Program C 2020 GPCD
NCWD	190	211	201	190	190

a. Recommended implementation strategy is based on Program B.

B.9 Present Value of Utility Costs vs. Water Saved in 2020

The following figure illustrates how marginal returns change as more money is spent to achieve water savings is also found. As the figure demonstrates, the costs increase as the water savings increase from Program A to B which corresponds to increasing the budget, staffing and participation in the conservation programs. Present value costs and savings are over a 6 year time-span (2014-2020).

Figure B-7 Present Value of Utility Costs vs. Water Saved in 2020 – NCWD*



*Present value costs and savings are over a 6 year time-span (2014-2020).

B.10 Program Cost and Savings Comparison

The following table shows the estimated benefits, costs and savings for all three Retailer programs.

Table B-4 Comparison of Program Estimated Costs and Water Savings - NCWD

Conservation Program	Water Savings (AFY)						Water Utility Benefit to Cost Ratio*	Community Benefit to Cost Ratio*	Present Value of Water Savings*	Present Value of Utility Costs*
	2015	2016	2017	2018	2019	2020				
Program A with Plumbing Code	243	359	478	579	684	796	4.0	1.9	\$45,588,889	\$11,441,526
Program B with Plumbing Code	396	632	900	1,155	1,345	1,527	4.7	2.5	\$74,111,664	\$15,917,224
Program C with Plumbing Code	401	642	915	1,176	1,372	1,556	4.1	2.1	\$77,000,041	\$18,892,789

* Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value costs, benefits, benefit cost ratios, and costs of savings over the 37-year evaluation period.

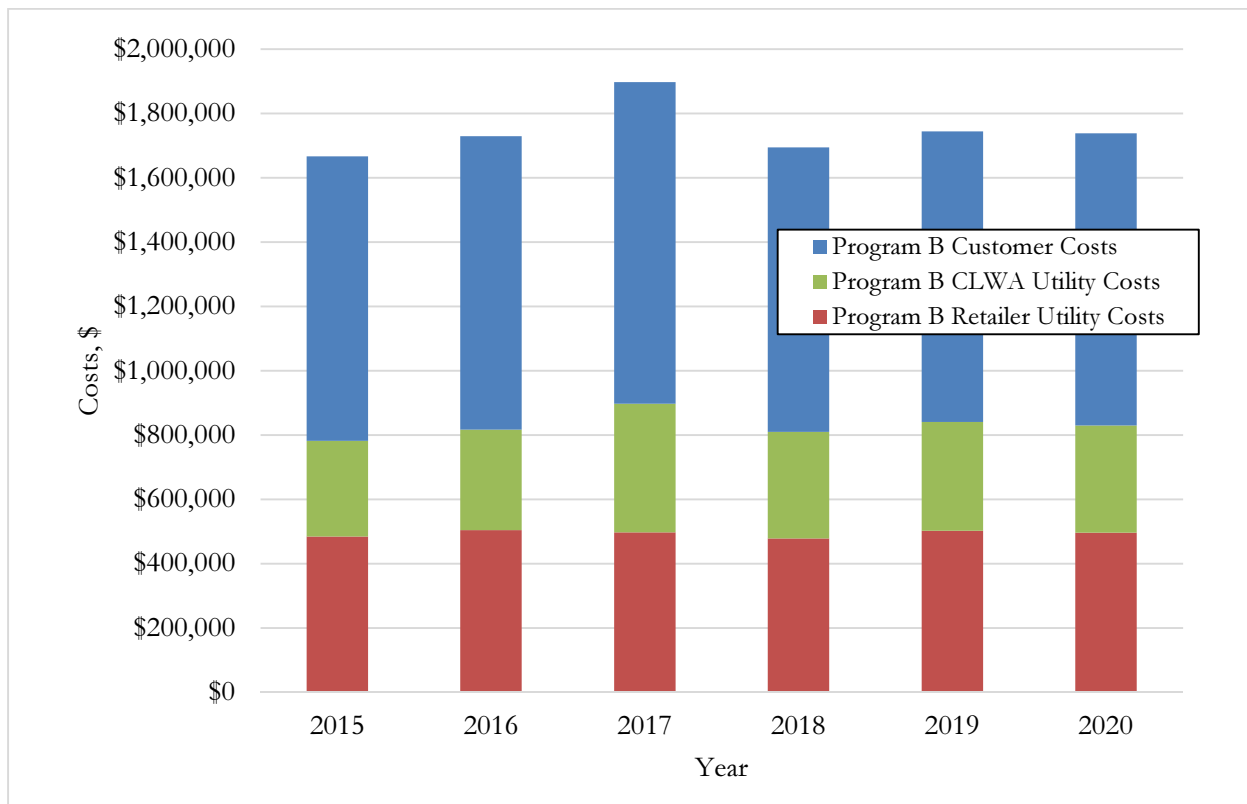
B.11 Program Implementation Budget

The following table and figure present the proposed implementation costs for the Retailer’s CLWA-led and Retailer-led Program B measures. This budget includes CLWA utility costs, Retailer utility costs and customer costs. Utility costs include unit costs (site audit costs, incentives, rebates, etc.) as well as administrative costs.

Table B-5 Program B CLWA, Retailer, and Customer Costs - NCWD

	2015	2016	2017	2018	2019	2020
Program B Retailer Utility Costs	\$ 483,824	\$ 504,088	\$ 497,302	\$ 478,703	\$ 502,298	\$ 496,093
Program B CLWA Utility Costs	\$ 298,011	\$ 313,092	\$ 399,601	\$ 331,252	\$ 338,549	\$ 333,718
Program B Total Utility Costs	\$ 781,835	\$ 817,180	\$ 896,903	\$ 809,955	\$ 840,847	\$ 829,810
Program B Customer Costs	\$ 885,376	\$ 912,083	\$1,001,013	\$ 884,633	\$ 903,800	\$ 908,230
Program B Total Costs	\$1,667,211	\$1,729,263	\$1,897,915	\$ 1,694,589	\$1,744,647	\$1,738,040

Figure B-8 Program B CLWA, Retailer, and Customer Costs – NCWD

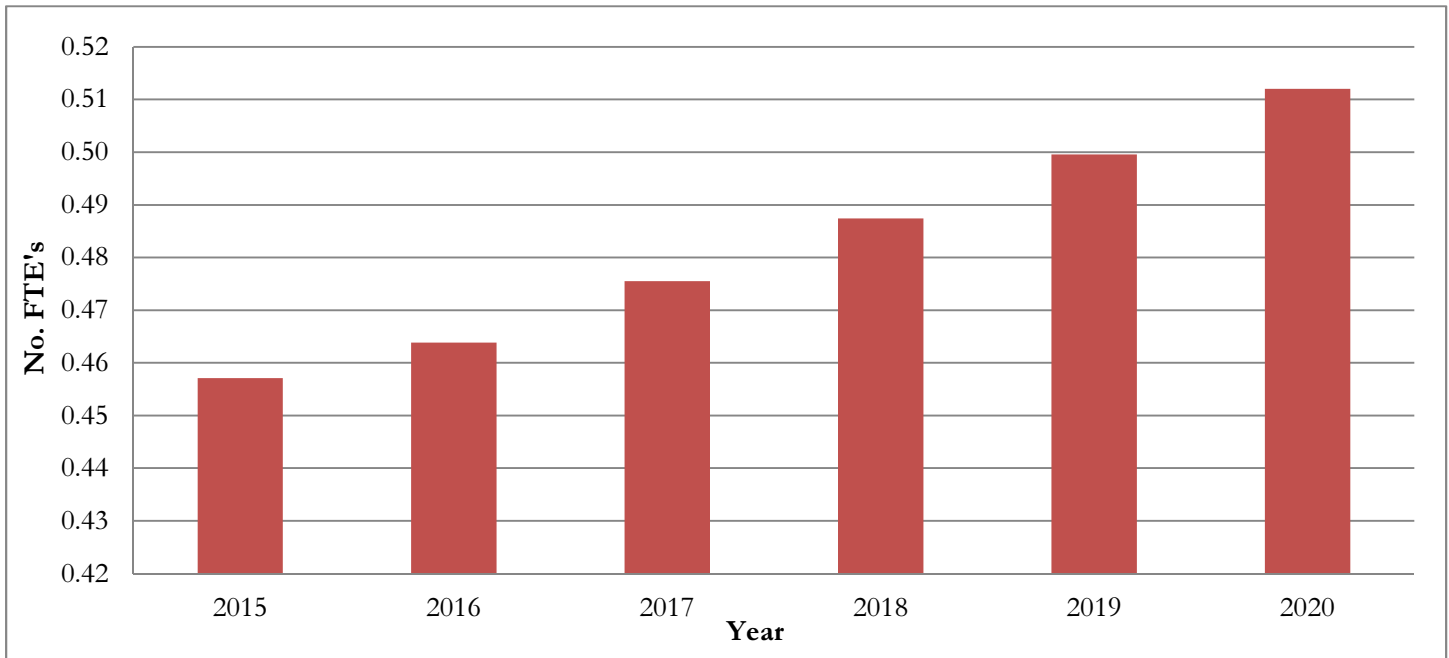


B.12 Program Staffing Needs

As part of this planning effort, consideration has been given to program staffing levels. Current and proposed future needs for staff and/or outsourcing support of the conservation program is presented in this section. The following figure presents the proposed implementation staffing needs for NCWD for implementing the Retailer-led measures in NCWD’s Program B. This estimate includes staffing needs to address only Retailer measures that NCWD plans to implement as part of Program B. These measures are all run in-house. Staffing needs were calculated by dividing annual administrative costs by an average annual CLWA salary of \$85,000 per staff person; or

\$120,000 burdened. New development landscape plan review following the City and County’s Landscape Ordinance is completed by Retailer staff.

Figure B-9 Proposed Staffing for Program B Retailer-Led Measures* - NCWD



*Estimated department staffing based on \$120,000 average annual burdened salary.

B.13 DSS Model Conservation Measure Results

The DSS Model presents the input parameters for each individual measure modeled for the Retailer. Summary cost, savings and benefit cost ratio results are also shown. Annual costs, targets, and savings are available by measure in the Retailer’s DSS Model.

This section presents a results summary of the Retailer-led measures in the Retailer’s Program B. Annual individual measure utility costs, administrative costs, water savings, and targeted accounts for each of the Retailer-led measures in Program B through 2020 are totaled and presented in the following tables.

Each measure’s utility costs are those costs that the Retailer as a water utility would incur to operate the measure, including administrative costs, rebates, etc. Table B-6 presents the administrative portion of these costs. Table B-7 shows the annual water savings for each Retailer-led Program B measure. Table B-8 presents the number of accounts targeted annually for each Program B Retailer-led measure. It is important to note that one targeted account may represent more than one measure incentive (i.e., 2 clothes washers per HECW targeted multi-family account).

Table B-6 Retailer-Led Program B Measure Utility Costs - NCWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss	\$150,000	\$150,000	\$150,000	\$123,000	\$123,000	\$123,000
Conservation Pricing	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Home Water Use Reports	\$6,732	\$6,922	\$7,117	\$7,318	\$7,524	\$7,737
SF Drip Irrigation Incentives	\$24,254	\$24,938	\$25,641	\$26,364	\$27,107	\$27,872
MF CII Drip Irrigation Incentives	\$23,703	\$24,181	\$24,664	\$25,150	\$25,639	\$26,133
Top User Indoor Surveys and Incentives	\$2,498	\$2,555	\$2,613	\$2,672	\$2,732	\$2,793
CII Replace Equip and Performance Program	\$22,610	\$23,054	\$23,500	\$23,949	\$24,401	\$24,855
SF MF Outdoor Surveys	\$26,801	\$27,557	\$28,333	\$29,132	\$29,954	\$30,798
SF MF Survey Leak & Pressure	\$25,014	\$25,719	\$26,445	\$27,190	\$27,957	\$28,745
HE Faucet & HE Showerhead Giveaway	\$15,060	\$15,485	\$15,922	\$16,370	\$16,832	\$17,306
Sprinkler Nozzle Rebate	\$90,303	\$92,737	\$95,235	\$97,797	\$100,425	\$103,122
Irrigation Surveys and Landscape Budgets	\$45,649	\$46,616	\$47,594	\$48,583	\$49,583	\$50,594
Landscape Ordinance	\$5,546	\$2,814	\$2,850	\$2,886	\$2,924	\$2,963
Education and Water Waste Enforcement	\$30,654	\$31,510	\$32,389	\$33,292	\$34,221	\$35,175
Conservation Pricing - IRR	\$5,000	\$20,000	\$5,000	\$5,000	\$20,000	\$5,000
Total	\$483,824	\$504,088	\$497,302	\$478,703	\$502,298	\$496,093

Table B-7 Retailer-Led Program B Measure Administration Costs - NCWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	-	-	-	-	-	-
Conservation Pricing ^a	-	-	-	-	-	-
Home Water Use Reports	\$612	\$629	\$647	\$665	\$684	\$703
SF Drip Irrigation Incentives	\$4,851	\$4,988	\$5,128	\$5,273	\$5,421	\$5,574
MF CII Drip Irrigation Incentives	\$4,741	\$4,836	\$4,933	\$5,030	\$5,128	\$5,227
Top User Indoor Surveys and Incentives	\$576	\$590	\$603	\$617	\$630	\$645
CII Replace Equip and Performance Program	\$4,522	\$4,611	\$4,700	\$4,790	\$4,880	\$4,971
SF MF Outdoor Surveys	\$6,185	\$6,359	\$6,538	\$6,723	\$6,912	\$7,107
SF MF Survey Leak & Pressure	\$5,773	\$5,935	\$6,103	\$6,275	\$6,452	\$6,633
HE Faucet & HE Showerhead Giveaway	\$3,012	\$3,097	\$3,184	\$3,274	\$3,366	\$3,461
Sprinkler Nozzle Rebate	\$8,209	\$8,431	\$8,658	\$8,891	\$9,130	\$9,375
Irrigation Surveys and Landscape Budgets	\$9,130	\$9,323	\$9,519	\$9,717	\$9,917	\$10,119
Landscape Ordinance	\$1,109	\$563	\$570	\$577	\$585	\$593
Education and Water Waste Enforcement	\$6,131	\$6,302	\$6,478	\$6,658	\$6,844	\$7,035
Conservation Pricing – IRR ^a	-	-	-	-	-	-
Total	\$54,850	\$55,664	\$57,061	\$58,489	\$59,949	\$61,443

a. The Water Loss and Conservation Pricing measures' design do not include administrative costs.

Table B-8 Retailer-Led Program B Measure Savings (AFY) - NCWD*

Measure	2015	2016	2017	2018	2019	2020
Water Loss	49	67	86	88	90	93
Conservation Pricing	38	53	72	92	112	133
Home Water Use Reports	69	142	217	297	308	320
SF Drip Irrigation Incentives	1	1	2	2	3	3
MF CII Drip Irrigation Incentives	1	2	3	4	5	6
Top User Indoor Surveys and Incentives	1	1	2	2	3	4
CII Replace Equip and Performance Program	1	1	2	3	3	4
SF MF Outdoor Surveys	6	13	19	26	33	35
SF MF Survey Leak & Pressure	3	6	9	12	15	16
HE Faucet & HE Showerhead Giveaway	10	15	21	27	33	40
Sprinkler Nozzle Rebate	63	98	134	172	211	254
Irrigation Surveys and Landscape Budgets	9	19	29	40	52	54
Landscape Ordinance	41	52	63	75	87	100
Education and Water Waste Enforcement	10	15	21	27	28	29
Conservation Pricing – IRR	18	26	47	68	90	113

* Annual total values for savings are not directly additive since savings from measures which address the same end use(s) are not additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. Reference Program B savings above in Table B-3 for total Program B savings.

Table B-9 Retailer-Led Program B Measure Targeted Accounts

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	0	0	0	0	0	0
Conservation Pricing ^a	0	0	0	0	0	0
Home Water Use Reports	2,040	2,098	2,157	2,218	2,280	2,344
SF Drip Irrigation Incentives	31	32	33	34	35	36
MF CII Drip Irrigation Incentives	8	8	8	8	8	9
Top User Indoor Surveys and Incentives	1	1	1	1	1	1
CII Replace Equip and Performance Program	6	6	6	6	6	7
SF MF Outdoor Surveys	137	141	145	149	154	158
SF MF Survey Leak & Pressure	92	94	97	100	102	105
HE Faucet & HE Showerhead Giveaway	458	471	484	498	512	526
Sprinkler Nozzle Rebate	248	255	262	269	276	284
Irrigation Surveys and Landscape Budgets	21	21	22	22	23	23
Landscape Ordinance	44	23	23	23	23	24
Education and Water Waste Enforcement	189	194	199	205	211	216
Conservation Pricing – IRR ^a	0	0	0	0	0	0
Total	3,275	3,344	3,437	3,533	3,651	3,733

a. The Water Loss and Conservation Pricing measures target overall production and consumption, respectively, to lower GPCD.

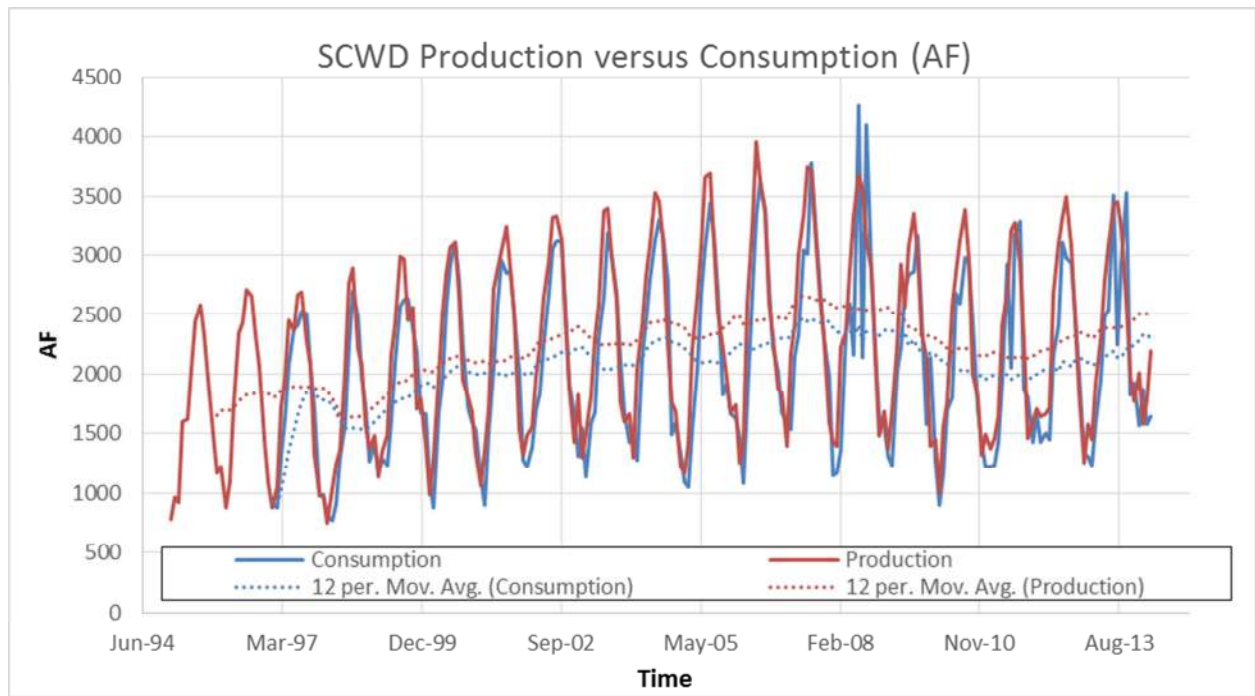
APPENDIX C SCWD-SPECIFIC INFORMATION FOR THE WUE STRATEGIC PLAN

This appendix presents Retailer-specific information for the Water Use Efficiency Strategic Plan. The following sections are presented in the main body of the WUE SP at the CLWA level with a reference to more Retailer-specific information being found in this appendix.

C.1 Production versus Consumption

Total water production and consumption (billed water) data was compared over the period 1995-2014. The following figure illustrates the total production versus total consumption. Water production data was measured at the source (purchased and transported or well-pumped). Water consumption data was measured at the customer meters.

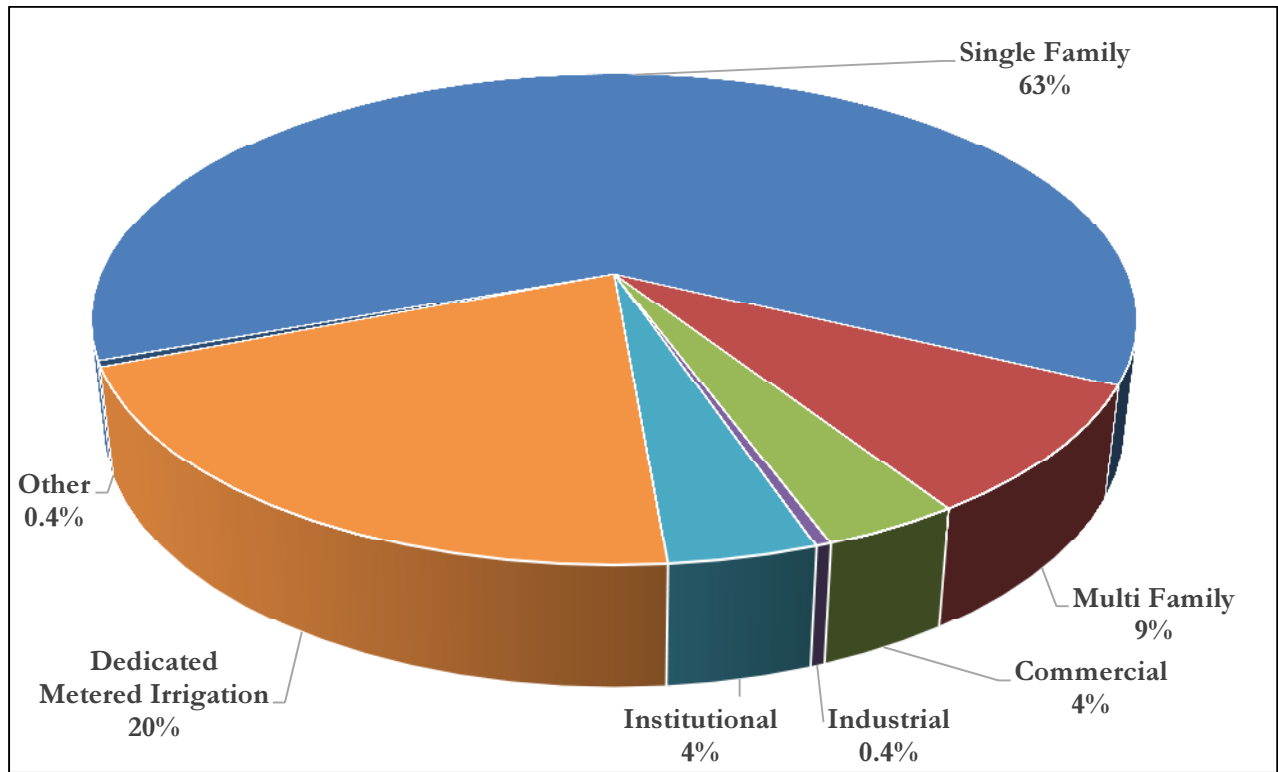
Figure C-1 Total Production vs. Total Consumption – SCWD



C.2 Consumption by User Category

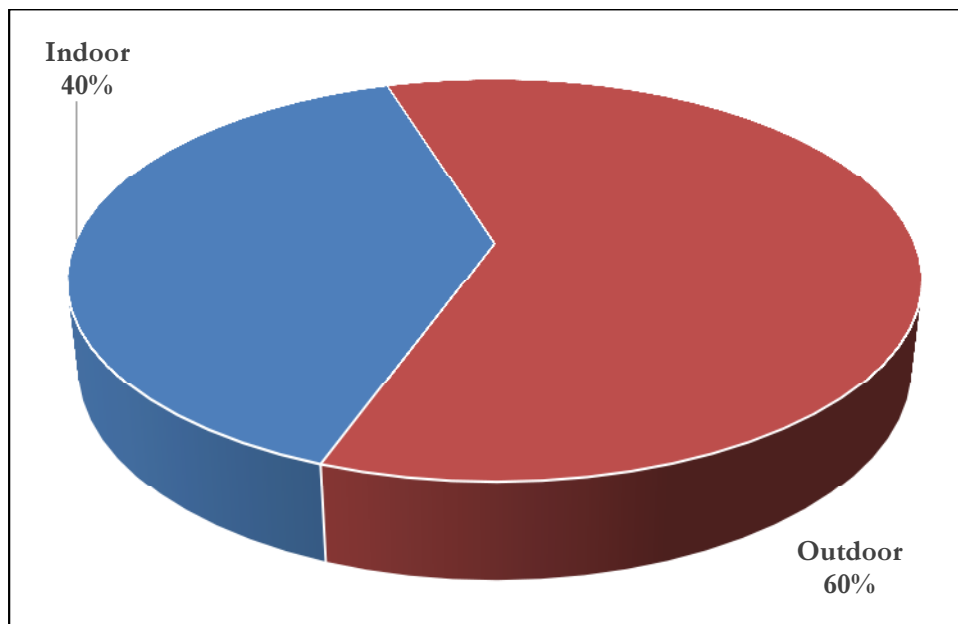
The following figure presents this Retailer's water usage breakdown based on 2013 water use data. Single family water use is the largest category of water users, using over 50 percent of the total water consumed.

Figure C-2 Consumption by Customer Category Based on 2013 Water Use Data – SCWD



The following figure shows the breakdown of total water use into indoor and outdoor components. Year 2013 water use was selected for this profile. A more detailed explanation of the methodology used for determining the percentage of indoor water use can be found in the main body of the WUE SP.

Figure C-3 Overall Use: Indoor vs. Outdoor - SCWD



C.3 Water Demand Projections with and without Plumbing Code

As more thoroughly explained in Section 3 of the main body of this WUE SP, the Econometric Model and DSS Model were used to generate water demand projections for each Retailer. The Econometric Model generated water demand projections for the year 2014 to 2020 and the DSS Model generated water demand projections for the year 2021 to 2050. The following table and figure present the Retailer demand projections with and without plumbing code savings through 2020.

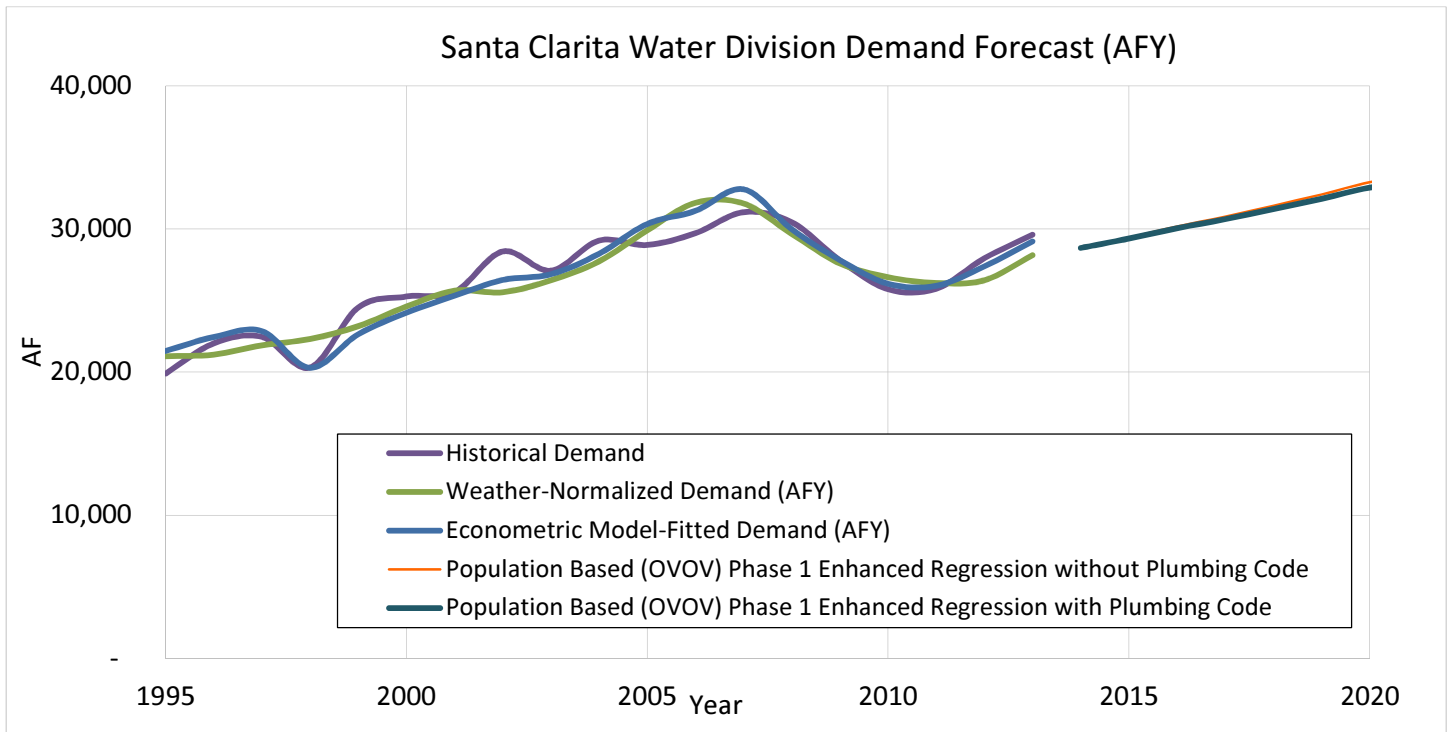
Table C-1 Demand Projections With and Without Plumbing Codes – SCWD

Draft Demand Forecast	2015	2016	2017	2018	2019	2020
Total Demand with No Plumbing Code Savings (AFY)	29,388	30,166	30,864	31,628	32,410	33,263
Total Demand With Plumbing Code Savings (AFY)	29,333	30,054	30,693	31,396	32,115	32,900

The demand projection graphs in the following figure include the following curves:

- Actual Demand – This is historical demand as submitted in spring 2014 to MWM from each Retailer.
- Model-Fitted Demand – The Retailer Econometric Model preliminary results that try to match actual demand using the regression equation described in Appendix F.
- Phase I Enhanced Demand - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and 4) no plumbing code.
 - Savings from plumbing codes (also known as “passive conservation”) is based on federal and state legislated efficiency standards pertaining to plumbing fixtures and appliances. The impact of codes quantified here include the Energy Policy Act of 1992, CALGreen Building Code, AB 715, and SB 407 which governs the types of fixtures available on the market for toilets, showers, washers, etc. The curve with “no plumbing code” would be the demand if these laws were not in place.
- Phase I Enhanced Demand with Plumbing Code - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and (4) plumbing code.

Figure C-4 Projected Demands – SCWD



C.4 Historical and Current Conservation Program

In addition to the conservation opportunities available for each Retailer’s customers through SCV’s programs and ongoing water loss maintenance programs, each Retailer aims to reduce water demands by conducting their own “in-house” conservation program.

Historical activity and water savings from conservation programs was reported to the CUWCC and is available on their website. CUWCC water savings from various BMPs is available annually from year 2002.

SCWD offers free low-flow showerheads, hose nozzles, and faucet and kitchen aerators. Customers are eligible for up to 25 free high efficiency sprinkler nozzles through partner freesprinklernozzles.com; they are also eligible for several drip irrigation kits per account. More information about current conservation opportunities offered by SCWD can be found here: <http://santaclaritawater.com/conservation-2>.

Table 4-1 in the main body of the WUE SP presents the conservation measures and incentives in the Retailer’s service area – some of these are measures led by CLWA, some are Retailer-led. A description of each measure is presented in Table 6-1. These measures are presented as Program A in the Retailer’s DSS Model. Though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer’s DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented. The design of each measure was explained in the previous sections.

C.5 Water Billing Structure

All of SCWD’s customers are metered and billed monthly. On January 1, 2010, SCWD migrated its residential customers to a tiered rate structure and its CII and landscape customers to a fixed rate set at the highest tier rate. Since 2007 the proportion of revenue from fixed charge has met the BMP requirement of not to exceed 30 percent.

C.6 Estimated Conservation Measure Costs and Savings

This section presents a benefit cost analysis for all the measures modeled in each Retailer's DSS Model.

Since the region's buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents long-term benefits and costs. The benefit cost analysis presents how much water each measure would save through 2050, how much they would cost, and what cost of saved water per unit volume if the measures were implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use(s)). Cost categories are defined below:

- Utility Costs - those costs that each Retailer as a water utility would incur to operate the measure, including administrative costs.
- Utility Benefits - the avoided cost of producing water at the identified rate of \$1,900 per AF.
- Customer Costs - those costs customers would incur to implement a measure and maintain its effectiveness over the life of the measure.
- Customer Benefits - the savings other than from reduced water/sewer utility bills, such as energy savings resulting from reduced use of hot water. Conservation program participants would see lower water and sewer bills but overall there would be no net customer benefit.
- Community Costs and Benefits - Community Costs and Benefits include Utility Costs plus Customer Costs, and Utility Benefits plus Customer Benefits, respectively.

The column headings in the following benefit cost analysis table are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits (\$) = the present value of the 37-year time stream of annual costs or benefits, discounted to the base year.
- Utility Benefit-Cost ratio = PV of Utility Costs divided by PV of Utility Benefits over 37 years.
- Community Benefit-Cost ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (sum of PV of Utility Costs plus PV of Customer Costs), over 37 years.
- Five Years Total Cost to Utility (\$) = the sum of the annual Utility Costs for the years from 2015 to 2020. Note not all measures start in the year 2015. The measures start in the years as specified for each measure can be found in each Retailer's DSS Model measure input parameter worksheet.
- Utility Cost of Water Saved per Unit Volume (\$/AF) = PV of Utility Costs over 37 years divided by the 37-Year Water Savings. This value is compared to the utility's avoided cost of water as one indicator of the cost effectiveness of conservation efforts. It should be noted that the value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

As explained in Section 6 of the WUE SP, annual total values for measure parameters are only relevant for measure costs. Savings from measures which address the same end use(s) are not additive.

Table C-2 Estimated Conservation Measure Costs and Savings – SCWD

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ¹	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Water Loss (Retailer)	\$17,212,505	\$17,212,505	\$1,847,468	\$1,847,468	9.3	9.3	\$850,000	377	\$118
AMI (Retailer) ^b	\$5,338,475	\$5,338,475	\$6,952,274	\$19,055,346	0.8	0.3	-	-	\$1,271
Conservation Pricing	\$2,497,434	\$2,497,434	\$268,350	\$268,350	9.3	9.3	\$50,000	299	\$8
Public & School Education (CLWA)	\$2,339,594	\$3,125,089	\$2,155,830	\$2,155,830	1.1	1.4	\$401,431	50	\$1,039
Home Water Use Reports (Retailer)	\$47,847,941	\$62,086,205	\$2,766,822	\$2,766,822	17.3	22.4	\$556,560	1,112	\$64
SF Turf Replacement Program (CLWA)	\$3,680,283	\$3,680,283	\$5,189,118	\$9,032,910	0.7	0.4	\$966,251	35	\$1,355
MF CII Turf Replacement Program (CLWA)	\$13,328,260	\$13,328,260	\$12,395,211	\$49,121,761	1.1	0.3	\$2,309,170	123	\$891
SF Drip Irrigation Incentives (Retailer)	\$1,467,896	\$1,467,896	\$165,508	\$165,508	8.9	8.9	\$85,889	24	\$121
MF CII Drip Irrigation Incentives (Retailer)	\$264,538	\$264,538	\$32,951	\$32,951	8.0	8.0	\$17,105	4	\$133
SF WBIC Free Controller Prg (CLWA)	\$2,851,227	\$2,851,227	\$1,314,217	\$1,541,590	2.2	1.8	\$620,548	49	\$499
MF CII WBIC Free Controller Prg (CLWA)	\$984,645	\$984,645	\$523,084	\$1,270,347	1.9	0.8	\$247,131	16	\$573
School Building Retrofit (CLWA)	\$2,188,698	\$2,571,965	\$268,116	\$482,609	8.2	5.3	\$183,724	50	\$133
HECW Rebates (CLWA)	\$2,414,272	\$5,172,295	\$757,027	\$2,637,759	3.2	2.0	\$598,228	61	\$362
UHET Rebates (Retailer)	\$1,131,171	\$1,131,171	\$134,149	\$443,722	8.4	2.5	\$119,892	32	\$131
UHET Targeted Incentive (Retailer)	\$3,990,491	\$3,990,491	\$370,193	\$1,110,579	10.8	3.6	\$253,679	94	\$101
Top User Indoor Surveys and Incentives (Retailer)	\$862,942	\$1,385,671	\$3,266,663	\$5,943,206	0.3	0.2	\$630,790	14	\$3,979
CII Replace Equip and	\$466,807	\$749,543	\$1,327,841	\$2,311,426	0.4	0.3	\$117,618	2	\$2,618

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ¹	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Performance Pgm (Retailer)									
CII UHET Rebates (CLWA)	\$57,089	\$57,089	\$15,904	\$40,372	3.6	1.4	\$17,907	2	\$307
HE Urinal Rebates (CLWA)	\$77,175	\$77,175	\$16,822	\$62,699	4.6	1.2	\$18,940	2	\$240
Pre-Rinse Spray Nozzle (CLWA)	\$93,049	\$356,102	\$24,774	\$24,774	3.8	14.4	\$27,894	3	\$293
SF MF Outdoor Surveys (Retailer)	\$775,664	\$775,664	\$563,083	\$806,842	1.4	1.0	\$90,946	19	\$777
SF MF Survey Leak & Pressure (Retailer)	\$332,215	\$419,647	\$252,948	\$433,625	1.3	1.0	\$48,836	8	\$828
HE Faucet & HE Showerhead Giveaway (Retailer)	\$3,957,411	\$7,345,884	\$445,294	\$1,132,476	8.9	6.5	\$347,605	107	\$127
Low-Income HE Fixture Installation (CLWA)	\$1,218,154	\$2,365,171	\$192,595	\$192,595	6.3	12.3	\$152,189	31	\$182
Sprinkler Nozzle Rebate (Retailer)	\$70,647,295	\$70,647,295	\$4,248,736	\$11,508,409	16.6	6.1	\$1,181,455	787	\$61
Irrigation Surveys and Landscape Budgets (Retailer)	\$619,938	\$619,938	\$400,042	\$671,653	1.5	0.9	\$188,961	25	\$921
Submetering (Retailer)	\$45,839	\$65,625	\$548,314	\$913,857	0.1	0.1	\$506,250	1	\$13,421
Soil Moisture Sensor Rebates (CLWA)	\$967,766	\$967,766	\$811,014	\$1,459,825	1.2	0.7	\$318,192	31	\$1,145
SF Hot Water on Demand (Retailer)	\$66,396	\$123,425	\$15,627	\$34,379	4.2	3.6	\$3,140	1	\$231
Pool Cover Rebates (CLWA)	\$142,683	\$142,683	\$116,213	\$451,938	1.2	0.3	\$103,862	15	\$1,287
Landscape Ordinance (Retailer)	\$7,250,600	\$7,250,600	\$354,715	\$2,719,478	20.4	2.7	\$79,026	76	\$48

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ¹	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Education and Water Waste Enforcement (Retailer)	\$3,429,115	\$3,429,115	\$2,516,758	\$3,291,146	1.4	1.0	\$468,667	76	\$808


a. Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value (PV) costs, benefits, benefit cost (BC) ratios, and costs of savings over the evaluation period.

b. AMI does not start until after year 2020 so there are no costs or savings associated with the measure during the 2015-2020 timeframe.

C.7 Program Scenario Measures

The following figure displays the conservation measures included in each conservation program scenario. These programs are not intended to be rigid frameworks but rather to demonstrate the range in savings that could be generated if selected measures were run together. A description of how the program scenarios are organized can be found in Section 7.

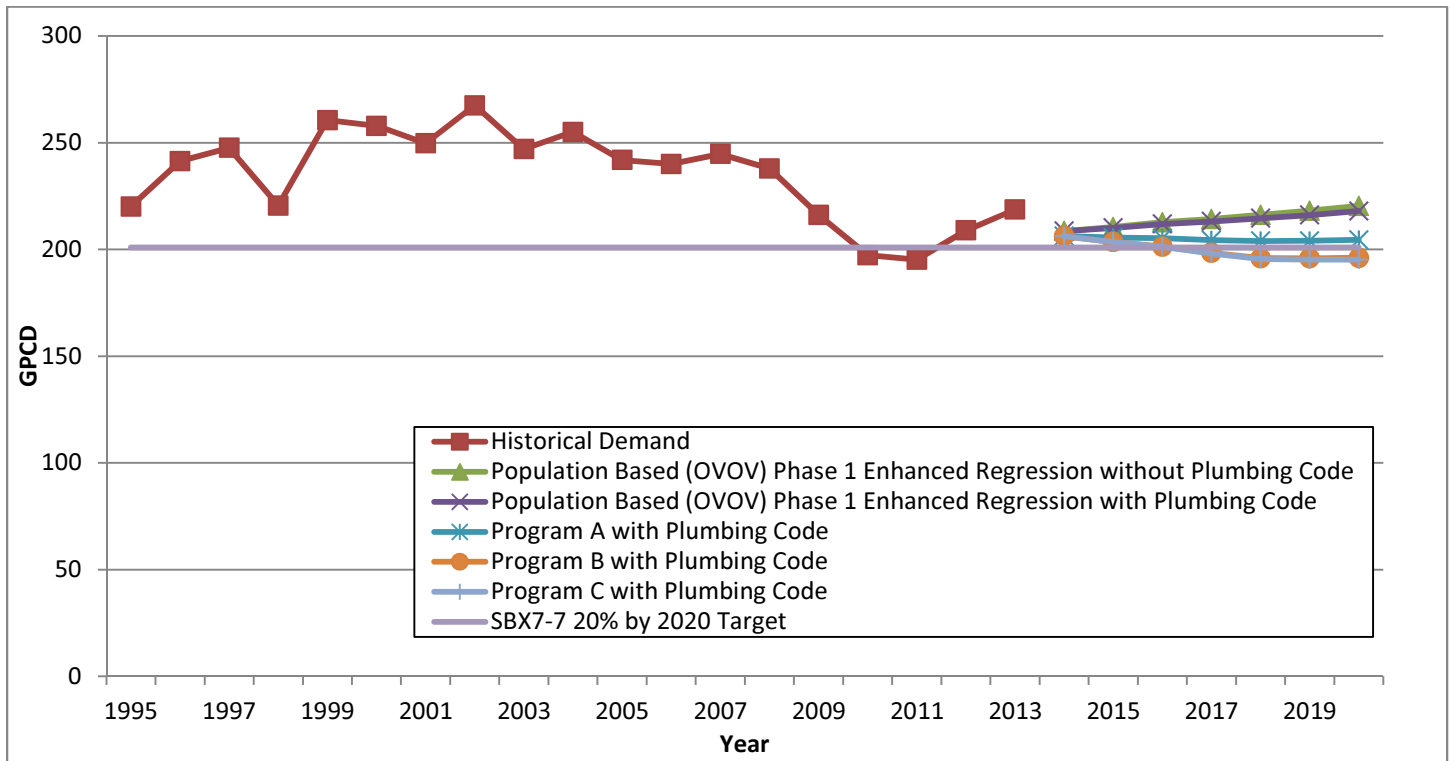
Figure C-5 Program Scenario Measures – SCWD

 Program Scenarios	Measures	Program A	Program B	Program C
	Water Loss (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AMI (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Public & School Education (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Home Water Use Reports (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Drip Irrigation Incentives (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Drip Irrigation Incentives (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
School Building Retrofit (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HECW Rebates (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Rebates (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Targeted Incentive (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Top User Indoor Surveys and Incentives (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
CII Replace Equip and Performance Pgm (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
CII UHET Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Urinal Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Pre-Rinse Spray Nozzle (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Outdoor Surveys (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Survey Leak & Pressure (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Faucet & HE Showerhead Giveaway (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Low-Income HE Fixture Installation (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Sprinkler Nozzle Rebate (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Irrigation Surveys and Landscape Budgets (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Submetering (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Soil Moisture Sensor Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Hot Water on Demand (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Pool Cover Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Landscape Ordinance (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Education and Water Waste Enforcement (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

C.8 Per Capita Water Use with Different Program Options

The following figure presents an average annual Retailer per capita per day use without conservation, with the plumbing codes only, and each of the three alternative programs at the Retailer level.

Figure C-6 Per Capita Water Use with Different Program Options – SCWD



The following table presents year 2020 GPCD target and Program A, B, and C GPCD estimates for the Retailer.

Table C-3 GPCD Target – Year 2020

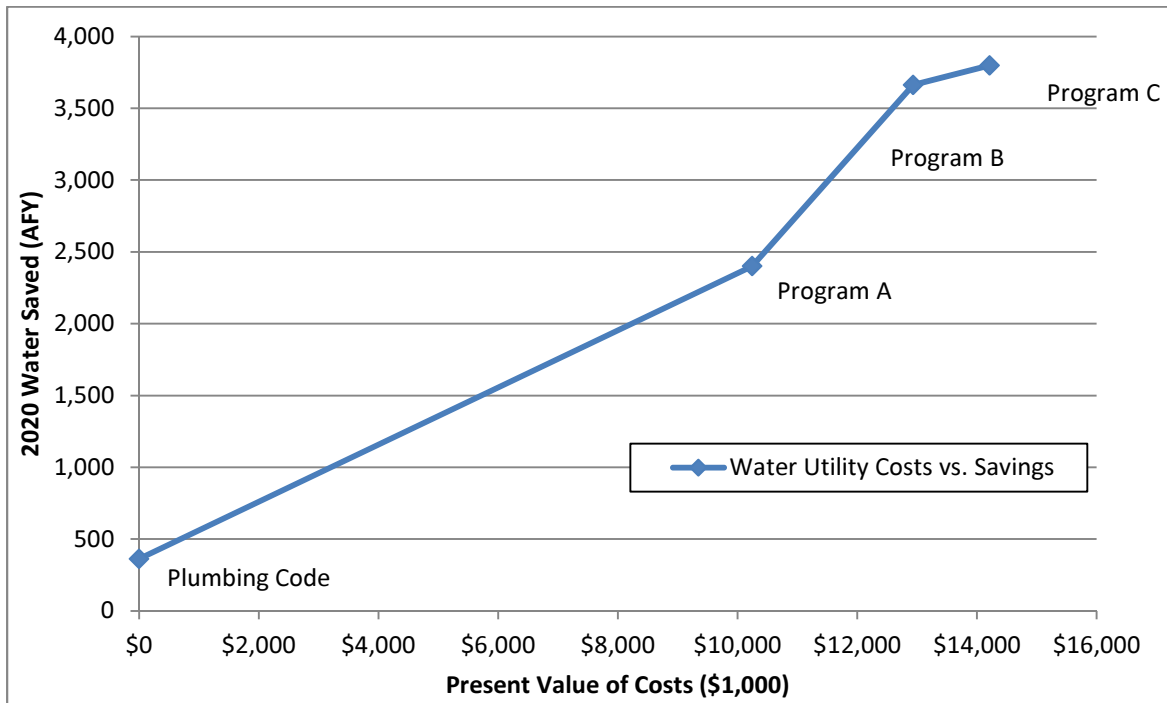
Conservation Measure	SB X7-7 2020 Target	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD ^a	Program C 2020 GPCD
SCWD	201	218	204	196	195

a. Recommended implementation strategy is based on Program B.

C.9 Present Value of Utility Costs vs. Water Saved in 2020

The following figure illustrates how marginal returns change as more money is spent to achieve water savings is also found. As the figure demonstrates, the costs increase as the water savings increase from Program A to B which corresponds to increasing the budget, staffing and participation in the conservation programs. Present value costs and savings are over a 6 year time-span (2014-2020).

Figure C-7 Present Value of Utility Costs vs. Water Saved in 2020 – SCWD*



*Present value costs and savings are over a 6 year time-span (2014-2020).

C.10 Program Cost and Savings Comparison

The following table shows the estimated benefits, costs and savings for all three Retailer programs.

Table C-4 Comparison of Program Estimated Costs and Water Savings - SCWD

Conservation Program	Water Savings (AFY)						Water Utility Benefit to Cost Ratio*	Community Benefit to Cost Ratio*	Present Value of Water Savings*	Present Value of Utility Costs*
	2015	2016	2017	2018	2019	2020				
Program A with Plumbing Code	688	1,054	1,428	1,790	2,088	2,399	5.18	1.95	\$156,661,880	\$30,257,195
Program B with Plumbing Code	968	1,612	2,287	2,956	3,303	3,662	5.47	2.44	\$208,836,777	\$38,190,914
Program C with Plumbing Code	970	1,622	2,327	3,027	3,405	3,798	4.37	1.97	\$219,590,187	\$50,257,660

* Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP shows present value costs, benefits, benefit cost ratios, and costs of savings over the 37-year evaluation period.

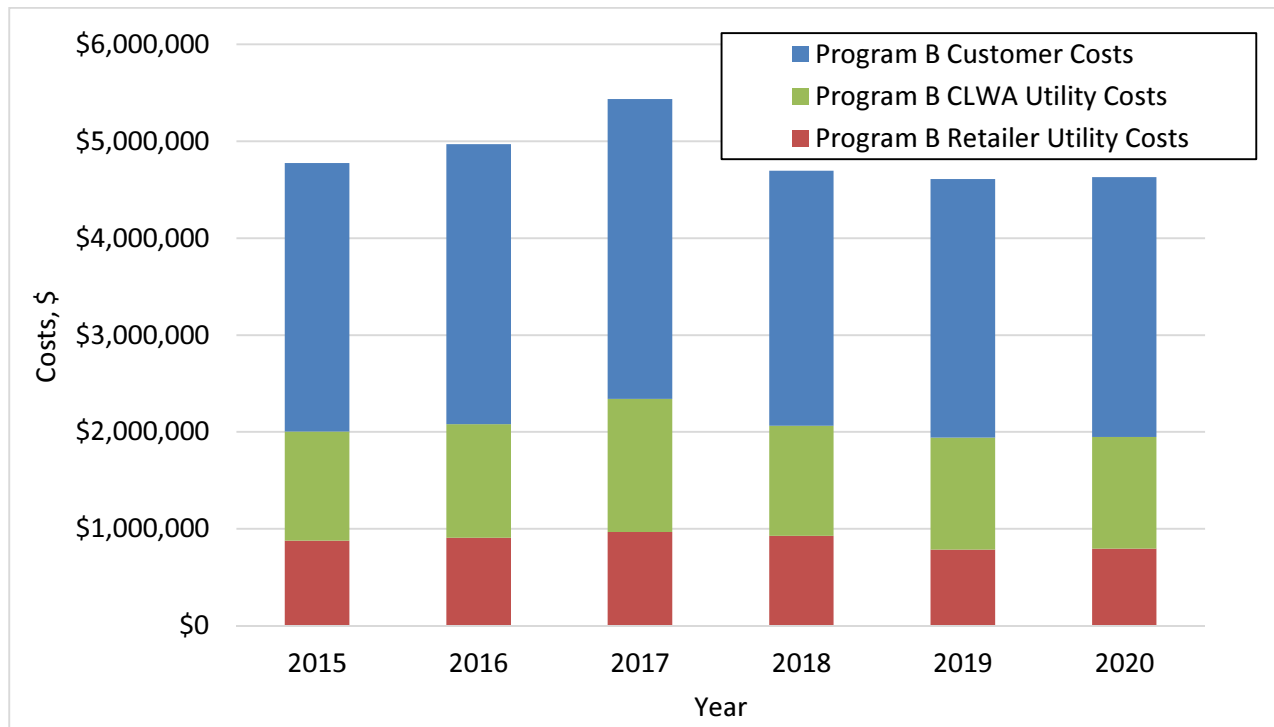
C.11 Program Implementation Budget

The following table and figure present the proposed implementation costs for the Retailer’s CLWA-led and Retailer-led Program B measures. This budget includes CLWA utility costs, Retailer utility costs and customer costs. Utility costs include unit costs (site audit costs, incentives, rebates, etc.) as well as administrative costs.

Table C-5 Program B CLWA, Retailer, and Customer Costs - SCWD

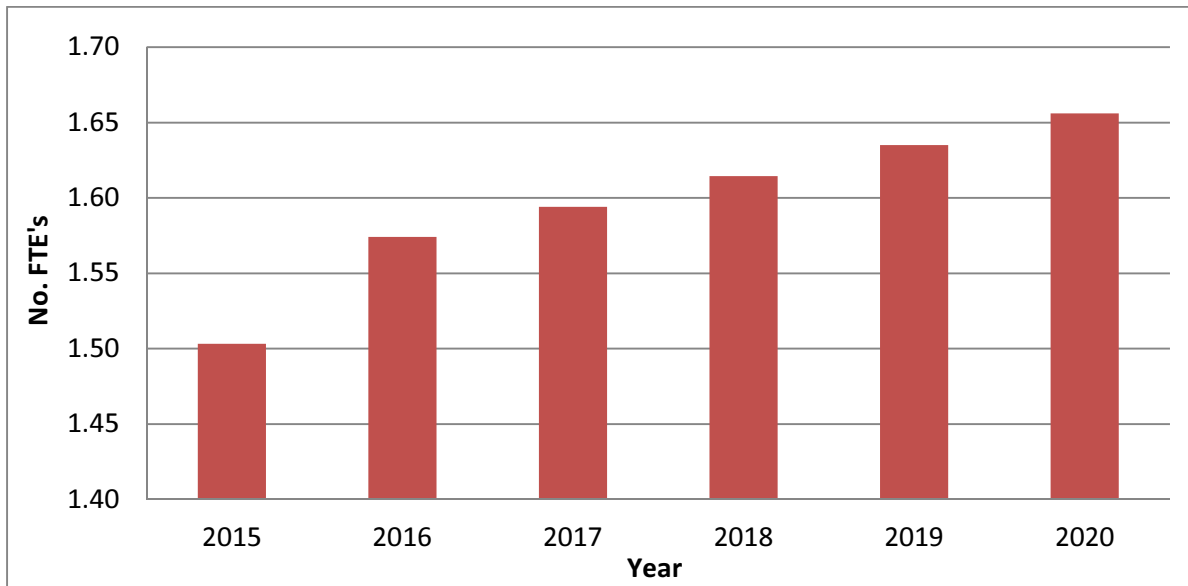
	2015	2016	2017	2018	2019	2020
Program B Retailer Utility Costs	\$878,145	\$908,977	\$968,426	\$928,013	\$787,739	\$797,608
Program B CLWA Utility Costs	\$1,127,228	\$1,170,234	\$1,374,492	\$1,137,913	\$1,155,599	\$1,151,296
Program B Total Utility Costs	\$2,005,373	\$2,079,211	\$2,342,918	\$2,065,926	\$1,943,338	\$1,948,903
Program B Customer Costs	\$2,769,857	\$2,892,222	\$3,093,587	\$2,629,177	\$2,668,320	\$2,680,726
Program B Total Costs	\$4,775,230	\$4,971,432	\$5,436,505	\$4,695,103	\$4,611,658	\$4,629,629

Figure C-8 Program B CLWA, Retailer, and Customer Costs – SCWD



C.12 Program Staffing Needs

As part of this planning effort, consideration has been given to program staffing levels. Current and proposed future needs for staff and/or outsourcing support of the conservation program is presented in this section. The following figure presents the proposed implementation staffing needs for the Retailer for implementing the Retailer-led measures in their Program B. This estimate includes staffing needs to address the Retailer-led measures that the Retailer plans to implement as part of Program B. These measures are all run in-house. Staffing needs were calculated by dividing annual administrative costs by an average annual CLWA salary of \$85,000 per staff person; or \$120,000 burdened. New development landscape plan review following the City and County’s Landscape Ordinance is completed by Retailer staff.

Figure C-9 Proposed Staffing for Program B Retailer-Led Measures* - SCWD

*Estimated department staffing based on \$120,000 average annual burdened salary.

C.13 DSS Model Conservation Measure Results

The DSS Model presents the input parameters for each individual measure modeled for the Retailer. Summary cost, savings and benefit cost ratio results are also shown. Annual costs, targets, and savings are available by measure in the Retailer's DSS Model.

This section presents a results summary of the Retailer-led measures in the Retailer's Program B. Annual individual measure utility costs, administrative costs, water savings, and targeted accounts for each of the Retailer-led measures in Program B through 2020 are totaled and presented in the following tables.

Each measure's utility costs are those costs that the Retailer as a water utility would incur to operate the measure, including administrative costs, rebates, etc. Table C-6 presents the administrative portion of these costs. Table C-7 shows the annual water savings for each Retailer-led Program B measure. Table C-8 presents the number of accounts targeted annually for each Program B Retailer-led measure. It is important to note that one targeted account may represent more than one measure incentive (i.e., 2 clothes washers per HECW targeted multi-family account).

Table C-6 Retailer-Led Program B Measure Utility Costs - SCWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss	\$200,000	\$200,000	\$200,000	\$200,000	\$50,000	\$50,000
Conservation Pricing ^a	-	-	-	-	-	-
Home Water Use Reports	\$107,876	\$109,567	\$111,285	\$113,030	\$114,802	\$116,602
SF Drip Irrigation Incentives	\$16,647	\$16,909	\$17,174	\$17,443	\$17,716	\$17,994
MF CII Drip Irrigation Incentives	\$3,316	\$3,368	\$3,420	\$3,473	\$3,527	\$3,581
SF MF Outdoor Surveys ^b	-	\$22,209	\$22,557	\$22,910	\$23,270	\$23,635
SF MF Survey Leak & Pressure	\$9,466	\$9,614	\$9,765	\$9,918	\$10,073	\$10,231
HE Faucet & HE Showerhead Giveaway	\$67,375	\$68,431	\$69,504	\$70,594	\$71,701	\$72,825
Sprinkler Nozzle Rebate	\$229,021	\$232,606	\$236,241	\$239,926	\$243,662	\$247,449
Irrigation Surveys and Landscape Budgets	\$36,635	\$37,208	\$37,786	\$38,371	\$38,962	\$39,559
Submetering	\$101,250	\$101,250	\$101,250	\$101,250	\$101,250	\$101,250
Landscape Ordinance	\$15,717	\$15,550	\$15,733	\$15,919	\$16,108	\$16,300
Education and Water Waste Enforcement	\$90,842	\$92,266	\$93,711	\$95,179	\$96,668	\$98,181
Total	\$878,145	\$908,977	\$968,426	\$928,013	\$787,739	\$797,608

a. The Conservation Pricing measure includes a rate study every five years.

b. The SF MF Outdoor Surveys measure does not start till year 2016.

Table C-7 Retailer-Led Program B Measure Administration Costs - SCWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	-	-	-	-	-	-
Conservation Pricing ^a	-	-	-	-	-	-
Home Water Use Reports	\$27,968	\$28,406	\$28,852	\$29,304	\$29,764	\$30,230
SF Drip Irrigation Incentives	\$5,549	\$5,636	\$5,725	\$5,814	\$5,905	\$5,998
MF CII Drip Irrigation Incentives	\$663	\$674	\$684	\$695	\$705	\$716
SF MF Outdoor Surveys ^b	-	\$6,345	\$6,445	\$6,546	\$6,648	\$6,753
SF MF Survey Leak & Pressure	\$2,704	\$2,747	\$2,790	\$2,834	\$2,878	\$2,923
HE Faucet & HE Showerhead Giveaway	\$17,468	\$17,741	\$18,020	\$18,302	\$18,589	\$18,881
Sprinkler Nozzle Rebate	\$59,376	\$60,305	\$61,248	\$62,203	\$63,172	\$64,154
Irrigation Surveys and Landscape Budgets	\$9,498	\$9,646	\$9,796	\$9,948	\$10,101	\$10,256
Submetering	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750
Landscape Ordinance	\$5,239	\$5,183	\$5,244	\$5,306	\$5,369	\$5,433
Education and Water Waste Enforcement	\$18,168	\$18,453	\$18,742	\$19,036	\$19,334	\$19,636
Total	\$180,383	\$188,888	\$191,295	\$193,738	\$196,216	\$198,730

a. The Water Loss and Conservation Pricing measure design does not include administrative costs.

b. SF MF Outdoor Surveys measure does not start till year 2016.

Table C-8 Retailer-Led Program B Measure Savings (AFY) – SCWD^a

Measure	2015	2016	2017	2018	2019	2020
Water Loss	139.6	212.7	288.1	365.8	371.5	377.3
Conservation Pricing	80.5	122.3	164.9	208.5	253.1	298.7
Home Water Use Reports	254.4	517.0	785.4	1,062.4	1,086.1	1,112.0
SF Drip Irrigation Incentives	3.7	7.6	11.5	15.6	19.8	24.1
MF CII Drip Irrigation Incentives	0.7	1.3	2.0	2.7	3.5	4.2
SF MF Outdoor Surveys ^b	-	3.6	7.2	10.9	14.8	18.8
SF MF Survey Leak & Pressure	1.4	2.9	4.4	6.0	7.6	7.8
HE Faucet & HE Showerhead Giveaway	28.5	43.4	58.6	74.3	90.5	107.2
Sprinkler Nozzle Rebate	207.8	317.0	428.6	544.1	663.2	787.0
Irrigation Surveys and Landscape Budgets	6.4	9.8	13.3	16.9	20.7	24.6
Submetering	0.2	0.4	0.6	0.9	1.1	1.3
Landscape Ordinance	21.7	32.1	42.6	53.4	64.4	75.8
Education and Water Waste Enforcement	27.7	42.3	57.2	72.6	74.3	76.2

a. Annual total values for savings are not directly additive since savings from measures which address the same end use(s) are not additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. Reference Program B savings above in Table C-3 for total Program B savings.

b. SF MF Outdoor Surveys measure does not start till year 2016.

Table C-9 Retailer-Led Program B Measure Targeted Accounts - SCWD

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	-	-	-	-	-	-
Conservation Pricing ^a	-	-	-	-	-	-
Home Water Use Reports	6,659	6,763	6,869	6,977	7,087	7,198
SF Drip Irrigation Incentives	222	225	229	233	236	240
MF CII Drip Irrigation Incentives	13	13	14	14	14	14
SF MF Outdoor Surveys ^b	-	96	98	99	101	102
SF MF Survey Leak & Pressure	54	55	56	57	58	58
HE Faucet & HE Showerhead Giveaway	1,352	1,373	1,395	1,417	1,439	1,462
Sprinkler Nozzle Rebate	1,441	1,464	1,487	1,510	1,534	1,558
Irrigation Surveys and Landscape Budgets	17	17	17	17	18	18
Submetering	3	3	3	3	3	3
Landscape Ordinance	105	104	105	106	107	109
Education and Water Waste Enforcement	559	568	577	586	595	604
Total	10,425	10,681	10,850	11,019	11,192	11,366

a. The Water Loss and Conservation Pricing measures target overall production and consumption, respectively, to lower GPCD.

b. SF MF Outdoor Surveys measure does not start till year 2016.

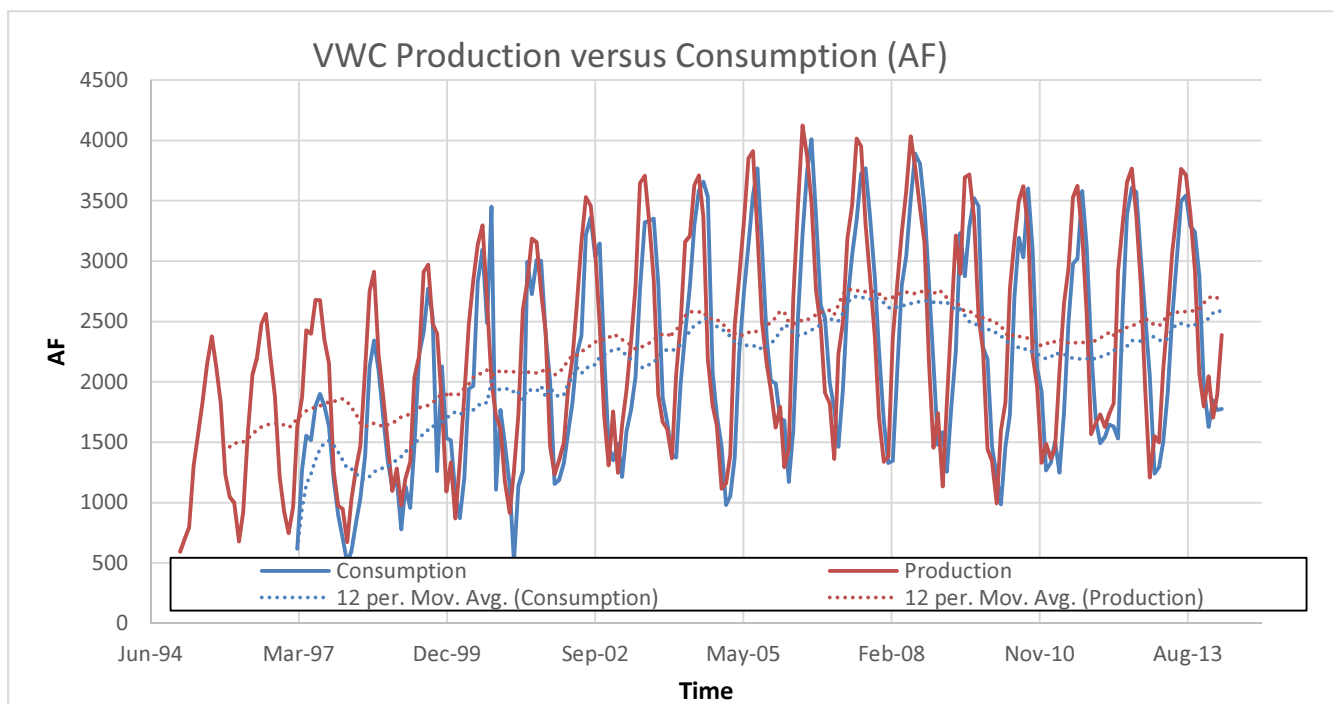
APPENDIX D VWC-SPECIFIC INFORMATION FOR THE WUE STRATEGIC PLAN

This appendix presents Retailer-specific information for the Water Use Efficiency Strategic Plan. The following sections are presented in the main body of the WUE SP at the CLWA level with a reference to more Retailer-specific information being found in this appendix.

D.1 Production versus Consumption

VWC provided production data from January 1995 and consumption data from March 1997. The following figure illustrates the total production versus total consumption. Water production data was measured at the source (purchased and transported or well-pumped). Water consumption data was measured at the customer meters.

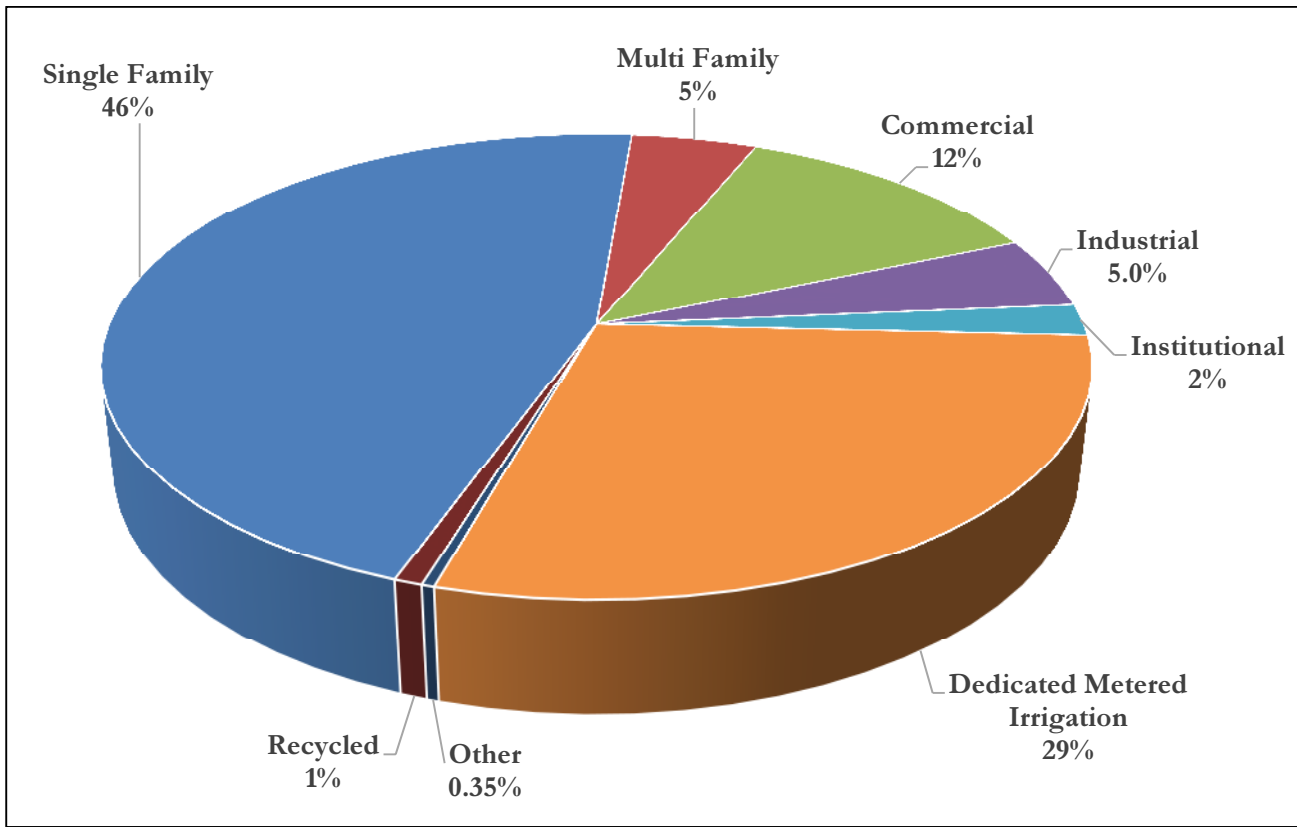
Figure D-1 Total Production vs. Total Consumption – VWC



D.2 Consumption by User Category

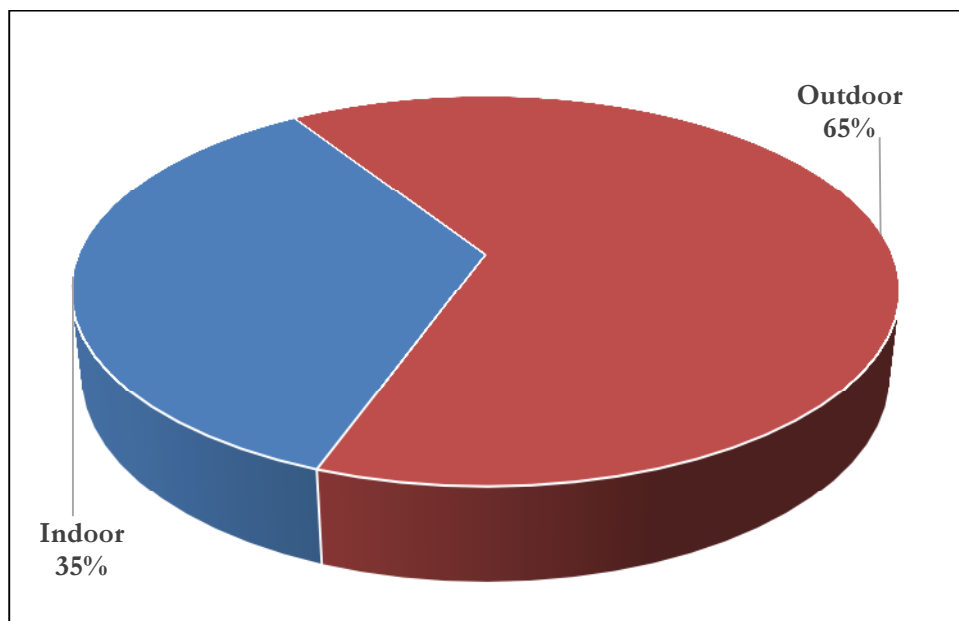
The following figure presents this Retailer’s water usage breakdown based on 2013 water use data. Single family water use is the largest category of water users, using over 45 percent of the total water consumed.

Figure D-2 Consumption by Customer Category Based on 2013 Water Use Data – VWC



The following figure shows the breakdown of total water use into indoor and outdoor components. Year 2013 water use was selected for this profile. A more detailed explanation of the methodology used for determining the percentage of indoor and outdoor water use can be found in the main body of the WUE SP.

Figure D-3 Overall Use: Indoor vs. Outdoor - VWC



D.3 Water Demand Projections with and without Plumbing Code

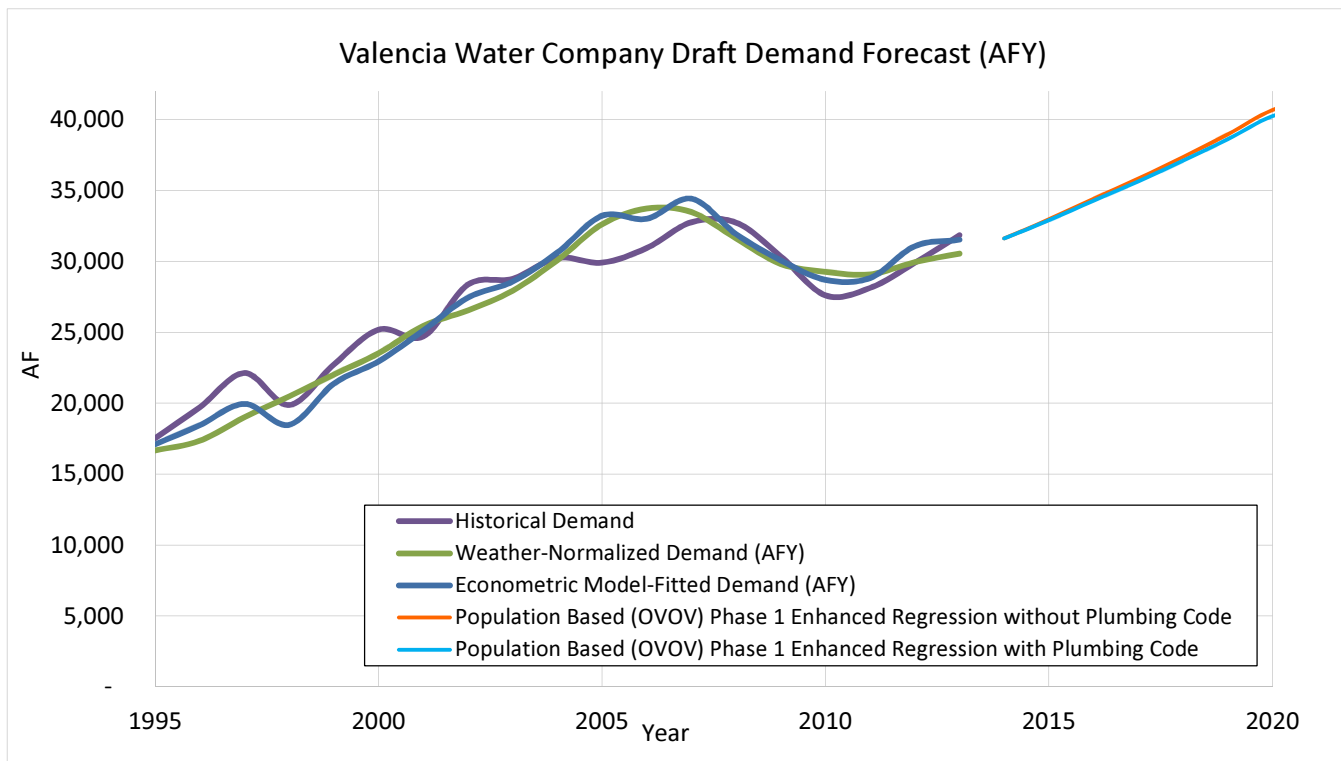
As more thoroughly explained in Section 3 of the main body of this WUE SP, the Econometric Model and DSS Model were used to generate water demand projections for each Retailer. The Econometric Model generated water demand projections for the year 2014 to 2020 and the DSS Model generated water demand projections for the year 2021 to 2050. The following table and figure present the Retailer demand projections with and without plumbing code savings through 2020.

Table D-1 Demand Projections With and Without Plumbing Codes – VWC

Draft Demand Forecast	2015	2016	2017	2018	2019	2020
Total Demand with No Plumbing Code Savings (AFY)	32,963	34,420	35,834	37,359	38,948	40,662
Total Demand With Plumbing Code Savings (AFY)	32,895	34,290	35,638	37,093	38,608	40,242

The demand projection graphs in the following figure include the following curves:

- Actual Demand – This is historical demand as submitted in spring 2014 to MWM from each Retailer.
- Model-Fitted Demand – The Retailer Econometric Model preliminary results that try to match actual demand using the regression equation described in Appendix F.
- Phase I Enhanced Demand - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and 4) no plumbing code.
 - Savings from plumbing codes (also known as “passive conservation”) is based on federal and state legislated efficiency standards pertaining to plumbing fixtures and appliances. The impact of codes quantified here include the Energy Policy Act of 1992, CALGreen Building Code, AB 715, and SB 407 which governs the types of fixtures available on the market for toilets, showers, washers, etc. The curve with “no plumbing code” would be the demand if these laws were not in place.
- Phase I Enhanced Demand with Plumbing Code - Assumes (1) normal weather, (2) economic recovery by 2020 as described previously, (3) price escalation projections of roughly 1.5 percent per year, and (4) plumbing code.

Figure D-4 Projected Demands – VWC

D.4 Historical and Current Conservation

In addition to the conservation opportunities available for each Retailer’s customers through SCV’s programs and ongoing water loss maintenance programs, each Retailer aims to reduce water demands by conducting their own “in-house” conservation program.

Historical activity and water savings from conservation programs was reported to the CUWCC and is available on their website. CUWCC water savings from various BMPs is available annually from year 2002.

Through the High Efficiency Landscape Irrigation Upgrade Measures (HELIUM) Program, VWC customers can receive up to 25 free high efficiency sprinkler nozzles through partner freesprinklernozzles.com or receive a rebate to replace old spray sprinklers with high-efficiency equipment. VWC also offer free water surveys to residential customers. Customers to attend VWC’s Drought Smart Irrigation and Garden Care Workshop receive a \$20 credit on their water bill. More information about current conservation opportunities offered by VWC can be found here: <http://www.valenciawater.com/conservation/>.

Table 4-1 in the main body of the WUE SP presents the conservation measures and incentives in the Retailer’s service area – some of these are measures led by CLWA, some are Retailer-led. A description of each measure is presented in Table 6-1. These measures are presented as Program A in the Retailer’s DSS Model. Though Program A represents the conservation measures each Retailer is currently implementing, it is important to note that these measures are designed in each Retailer’s DSS Models to represent how the measure will be implemented and not necessarily how it is currently implemented. The design of each measure was explained in the previous sections.

D.5 Water Billing Structure

On February 1, 2011 VWC changed its single volumetric rate structure to a tiered structure. The tiered system was designed to support the WaterSMART Allocation (WSA) program, which sets customer specific allocations for all individually metered residential customers. Starting in 2009, customer bills included information on their allocation,

allowing time for acclimation to the new approach before it was fully implemented with tiered rates in 2011. The rate structure is designed to provide support and encourage appropriate use. If a customer's water use is within the designated "efficient" range for their allocated volume, the customer is charged standard rates. If the customer uses less than the efficient limit, the customer is charged at a lower rate and, conversely, if the customer uses more, the customer is charged at the higher rates. There are five (5) tiers, ranging from "Super Efficient" at \$1.144/CCF to "Wasteful" at \$2.878/CCF. Customers are encouraged to access their allocation and billing information on the company's website.

Residential class customers were the first to be placed on WSA and the tiered rate structure as this group represents approximately 54 percent of VWC's total consumption. Dedicated landscape irrigation meters, including those at CII customer locations were placed on WSA with a tiered rate structure in 2012. VWC will evaluate the challenges of migrating the remaining customer classifications to WSA and tiered rates in the future. The proportion of revenue from volumetric charges meets the BMP requirement at about 71 to 73 percent.

D.6 Estimated Conservation Measure Costs and Savings

This section presents a benefit cost analysis for all the measures modeled in each Retailer's DSS Model.

Since the region's buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents long-term benefits and costs. The benefit cost analysis presents how much water each measure would save through 2050, how much they would cost, and what cost of saved water per unit volume if the measures were implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use(s)). Cost categories are defined below:

- Utility Costs - those costs that each Retailer as a water utility would incur to operate the measure, including administrative costs.
- Utility Benefits - the avoided cost of producing water at the identified rate of \$1,900 per AF.
- Customer Costs - those costs customers would incur to implement a measure and maintain its effectiveness over the life of the measure.
- Customer Benefits - the savings other than from reduced water/sewer utility bills, such as energy savings resulting from reduced use of hot water. Conservation program participants would see lower water and sewer bills but overall there would be no net customer benefit.
- Community Costs and Benefits - Community Costs and Benefits include Utility Costs plus Customer Costs, and Utility Benefits plus Customer Benefits, respectively.

The column headings in the following benefit cost analysis table are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits (\$) = the present value of the 37-year time stream of annual costs or benefits, discounted to the base year.
- Utility Benefit-Cost ratio = PV of Utility Costs divided by PV of Utility Benefits over 37 years.
- Community Benefit-Cost ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (sum of PV of Utility Costs plus PV of Customer Costs), over 37 years.
- Five Years Total Cost to Utility (\$) = the sum of the annual Utility Costs for the years from 2015 to 2020. Note not all measures start in the year 2015. The measures start in the years as specified for each measure can be found in each Retailer's DSS Model measure input parameter worksheet.
- Utility Cost of Water Saved per Unit Volume (\$/AF) = PV of Utility Costs over 37 years divided by the 37-Year Water Savings. This value is compared to the utility's avoided cost of water as one indicator of the cost effectiveness of conservation efforts. It should be noted that the value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

As explained in Section 6 of the WUE SP, annual total values for measure parameters are only relevant for measure costs. Savings from measures which address the same end use(s) are not additive.

Table D-2 Estimated Conservation Measure Costs and Savings – VWC

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Water Loss (Retailer)	\$10,100,518	\$10,100,518	\$1,127,533	\$1,127,533	9.0	9.0	\$237,500	199	\$124
AMI (Retailer) ^b	\$7,380,680	\$7,380,680	\$8,193,293	\$23,343,808	0.9	0.3	-	-	\$1,082
Conservation Pricing SF	\$394,255	\$394,255	\$133,906	\$133,906	2.9	2.9	\$16,667	191	\$21
Public & School Education (CLWA)	\$2,150,803	\$2,552,484	\$2,430,691	\$2,430,691	0.9	1.1	\$406,277	44	\$1,255
Home Water Use Reports (Retailer)	\$39,735,915	\$46,157,076	\$815,983	\$815,983	48.7	56.6	\$136,387	831	\$22
SF Turf Replacement Program (CLWA)	\$3,545,567	\$3,545,567	\$7,061,390	\$12,292,050	0.5	0.3	\$1,180,273	32	\$1,899
MF CII Turf Replacement Program (CLWA)	\$24,439,525	\$24,439,525	\$6,450,820	\$25,564,361	3.8	1.0	\$1,099,197	215	\$251
SF Drip Irrigation Incentives (Retailer)	\$2,978,517	\$2,978,517	\$1,078,067	\$1,940,520	2.8	1.5	\$524,566	54	\$394
MF CII Drip Irrigation Incentives (Retailer)	\$9,474,800	\$9,474,800	\$1,240,338	\$2,894,121	7.6	3.3	\$610,665	168	\$142
SF WBIC Free Controller Prg (CLWA)	\$2,645,638	\$2,645,638	\$1,693,376	\$1,986,348	1.6	1.3	\$757,998	44	\$691
MF CII WBIC Free Controller Prg (CLWA)	\$1,746,002	\$1,746,002	\$468,249	\$1,137,176	3.7	1.5	\$212,491	29	\$288
School Building Retrofit (CLWA)	\$1,274,390	\$1,447,558	\$137,692	\$247,845	9.3	5.8	\$61,169	29	\$117
HECW Rebates (CLWA)	\$2,911,013	\$4,956,215	\$842,758	\$2,930,485	3.5	1.7	\$881,672	73	\$333
UHET Rebates (Retailer)	\$1,755,910	\$1,755,910	\$272,081	\$586,021	6.5	3.0	\$284,642	44	\$178
UHET Targeted Incentive (Retailer)	\$882,622	\$882,622	\$417,141	\$417,141	2.1	2.1	\$185,312	21	\$514
Top User Indoor Surveys and Incentives (Retailer)	\$6,375,086	\$8,836,555	\$2,603,078	\$5,940,357	2.4	1.5	\$442,518	104	\$429
CII Replace Equip and Performance Pgm (Retailer)	\$3,546,590	\$4,915,810	\$2,278,929	\$4,102,073	1.6	1.2	\$388,148	32	\$612

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
CII UHET Rebates (CLWA)	\$118,021	\$118,021	\$26,569	\$67,444	4.4	1.7	\$19,737	3	\$248
HE Urinal Rebates (CLWA)	\$166,696	\$166,696	\$28,102	\$104,742	5.9	1.6	\$20,876	5	\$185
Pre-Rinse Spray Nozzle (CLWA)	\$495,172	\$1,322,922	\$41,386	\$41,386	12.0	32.0	\$30,744	14	\$92
SF MF Outdoor Surveys (Retailer)	\$5,308,126	\$5,308,126	\$4,182,343	\$6,132,153	1.3	0.9	\$699,056	112	\$857
SF MF Survey Leak & Pressure (Retailer)	\$790,107	\$901,491	\$688,792	\$1,218,631	1.1	0.7	\$115,128	17	\$948
HE Faucet & HE Showerhead Giveaway (Retailer)	\$315,110	\$475,157	\$42,955	\$114,546	7.3	4.1	\$32,561	9	\$153
Low-Income HE Fixture Installation (CLWA)	\$624,687	\$974,309	\$159,961	\$159,961	3.9	6.1	\$167,333	16	\$295
Sprinkler Nozzle Rebate (Retailer)	\$48,006,431	\$48,006,431	\$1,911,076	\$6,577,905	25.1	7.3	\$491,655	513	\$40
Irrigation Surveys and Landscape Budgets (Retailer)	\$10,967,513	\$10,967,513	\$2,179,663	\$3,526,713	5.0	3.1	\$988,554	430	\$282
Submetering (Retailer)	\$52,479	\$68,044	\$57,633	\$103,740	0.9	0.7	\$41,370	1	\$1,230
Soil Moisture Sensor Rebates (CLWA)	\$1,306,215	\$1,306,215	\$961,476	\$1,730,658	1.4	0.8	\$241,949	41	\$1,004
SF Hot Water on Demand (Retailer)	\$651,941	\$973,573	\$214,370	\$471,614	3.0	2.1	\$69,243	8	\$342
Pool Cover Rebates (CLWA)	\$240,751	\$240,751	\$123,672	\$552,401	1.9	0.4	\$81,067	26	\$811
Landscape Ordinance Education and Water Waste Enforcement (Retailer)	\$36,111,877	\$36,111,877	\$248,100	\$2,232,898	145.6	16.2	\$90,278	496	\$7
	\$4,496,879	\$4,496,879	\$2,892,223	\$3,782,138	1.6	1.2	\$483,934	95	\$697

Measure	PV of Water Utility Benefits ^a	PV of Community Benefits ^a	PV of Water Utility Costs ^a	PV of Community Costs ^a	Water Utility BC Ratio ^a	Community BC Ratio ^a	Water Utility Costs 2015-2020	Water Savings in 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)
Conservation Pricing MF	\$33,832	\$33,832	\$127,336	\$127,336	0.3	0.3	\$10,000	15	\$256
Conservation Pricing IRR	\$712,900	\$712,900	\$133,906	\$133,906	5.3	5.3	\$16,667	408	\$10
Recycled Water for New Development (Retailer)	\$26,553,295	\$26,553,295	\$35,011	\$42,014	758.4	632.0	\$13,515	769	\$1


a. Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value (PV) costs, benefits, benefit cost (BC) ratios, and costs of savings over the evaluation period.

b. AMI does not start until after year 2020 so there are no costs or savings associated with the measure during the 2015-2020 timeframe.

D.7 Program Scenario Measures

The following figure displays the conservation measures included in each conservation program scenario. These programs are not intended to be rigid frameworks but rather to demonstrate the range in savings that could be generated if selected measures were run together. A description of how the program scenarios are organized can be found in Section 7.

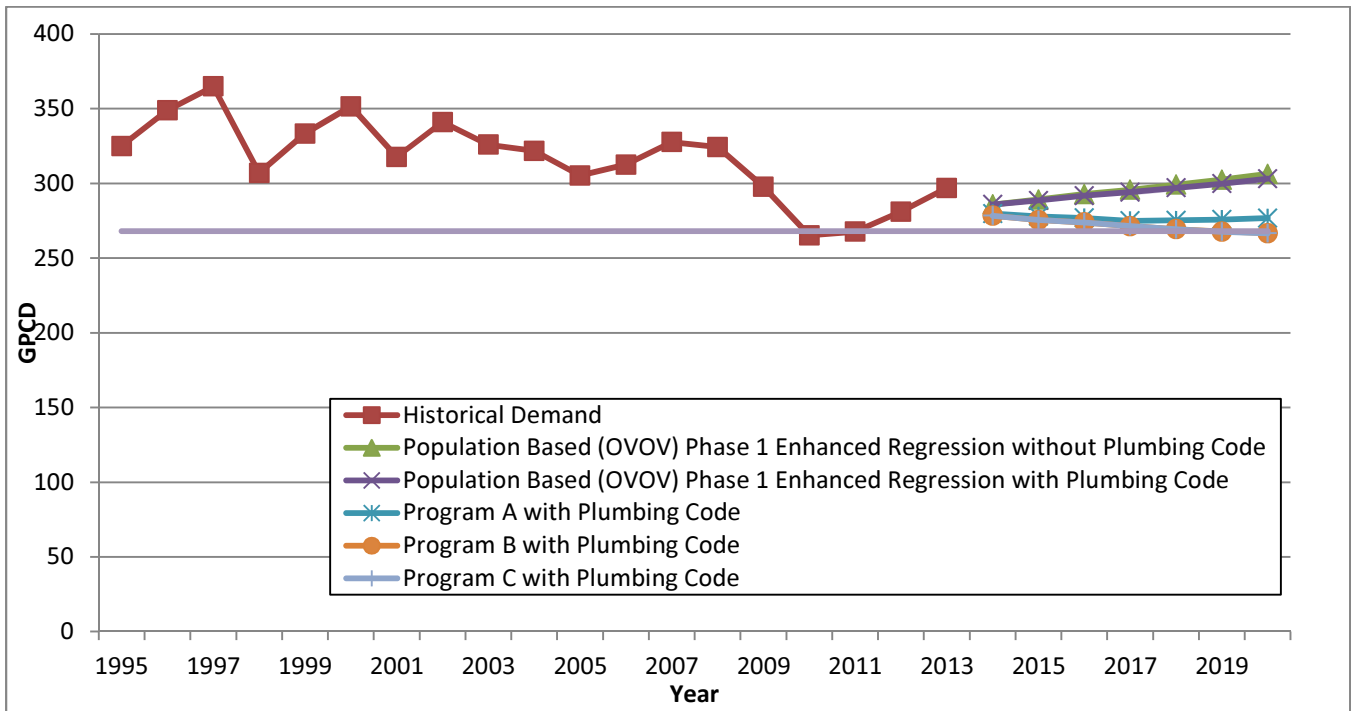
Figure D-5 Program Scenario Measures – VWC

 Program Scenarios	Measures	Program A	Program B	Program C
	Water Loss (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AMI (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing SF (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Public & School Education (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Home Water Use Reports (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Turf Replacement Program (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Drip Irrigation Incentives (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII Drip Irrigation Incentives (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MF CII WBIC Free Controller Prg (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
School Building Retrofit (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HECW Rebates (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Rebates (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
UHET Targeted Incentive (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Top User Indoor Surveys and Incentives (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CII Replace Equip and Performance Pgm (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CII UHET Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Urinal Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Pre-Rinse Spray Nozzle (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Outdoor Surveys (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF MF Survey Leak & Pressure (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HE Faucet & HE Showerhead Giveaway (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Low-Income HE Fixture Installation (CLWA)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Sprinkler Nozzle Rebate (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Irrigation Surveys and Landscape Budgets (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Submetering (Retailer)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Soil Moisture Sensor Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SF Hot Water on Demand (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Pool Cover Rebates (CLWA)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Landscape Ordinance (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Education and Water Waste Enforcement (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing MF (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Conservation Pricing IRR (Retailer)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Recycled Water for New Development (Retailer)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

D.8 Per Capita Water Use with Different Program Options

The following figure presents an average annual Retailer per capita per day use without conservation, with the plumbing codes only, and each of the three alternative programs at the Retailer level.

Figure D-6 Per Capita Water Use with Different Program Options – VWC



The following table presents year 2020 GPCD target and Program A, B, and C GPCD estimates for the Retailer.

Table D-3 GPCD Target – Year 2020

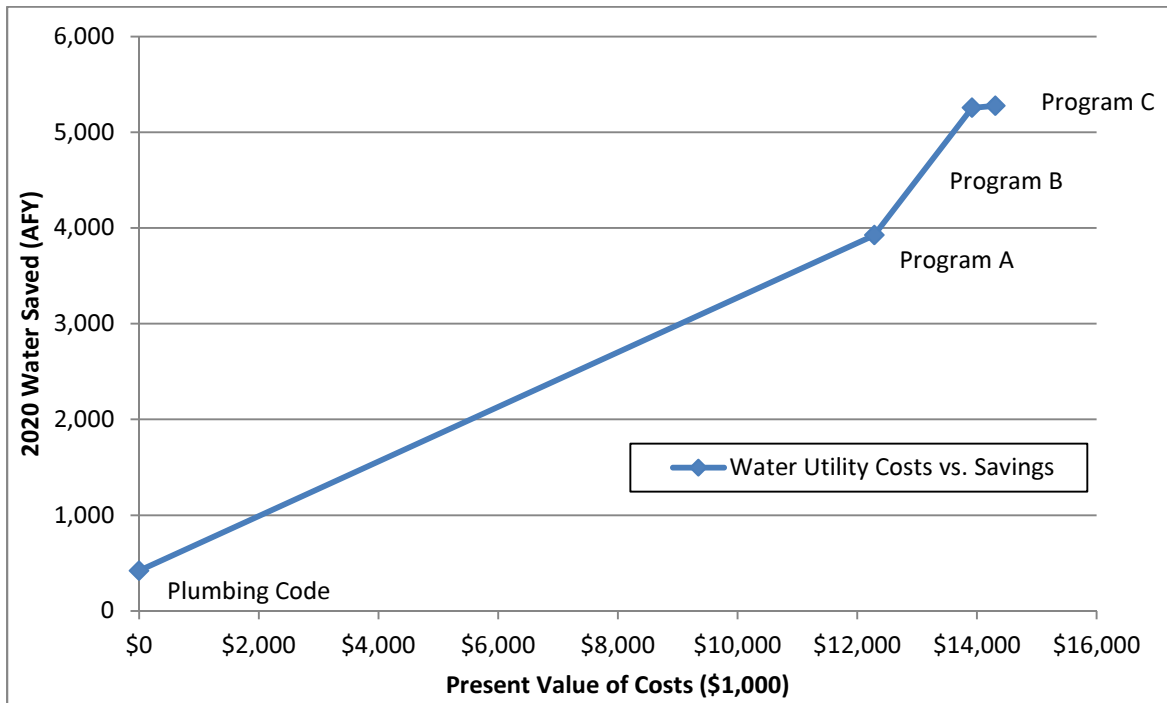
Conservation Measure	SB X7-7 2020 Target	2020 GPCD With plumbing codes	Program A 2020 GPCD	Program B 2020 GPCD ^a	Program C 2020 GPCD
VWC	268	303	277	267	267

a. Recommended implementation strategy is based on Program B.

D.9 Present Value of Utility Costs vs. Water Saved in 2020

The following figure illustrates how marginal returns change as more money is spent to achieve water savings is also found. As the figure demonstrates, the costs increase as the water savings increase from Program A to B, which corresponds to increasing the budget, staffing, and participation in the conservation programs. Present value costs and savings are over a 6-year time-span (2014-2020).

Figure D-7 Present Value of Utility Costs vs. Water Saved in 2020 – VWC*



*Present value costs and savings are over a 6-year time-span (2014-2020).

D.10 Program Cost and Savings Comparison

The following table shows the estimated benefits, costs and savings for all three Retailer programs.

Table D-4 Comparison of Program Estimated Costs and Water Savings - VWC

Conservation Program	Water Savings (AFY)						Water Utility Benefit to Cost Ratio*	Community Benefit to Cost Ratio*	Present Value of Water Savings*	Present Value of Utility Costs*
	2015	2016	2017	2018	2019	2020				
Program A with Plumbing Code	1,272	1,882	2,516	2,975	3,435	3,923	5.13	2.54	\$194,533,303	\$37,923,230
Program B with Plumbing Code	1,560	2,230	2,945	3,711	4,468	5,255	6.01	2.97	\$256,077,710	\$42,631,831
Program C with Plumbing Code	1,560	2,230	2,951	3,721	4,484	5,275	5.13	2.41	\$262,978,925	\$51,299,898

* Since the region’s buildout year is anticipated to be year 2050, the DSS Model runs through year 2050 and the benefit cost analysis conducted for the WUE SP presents present value costs, benefits, benefit cost ratios, and costs of savings over the 37-year evaluation period.

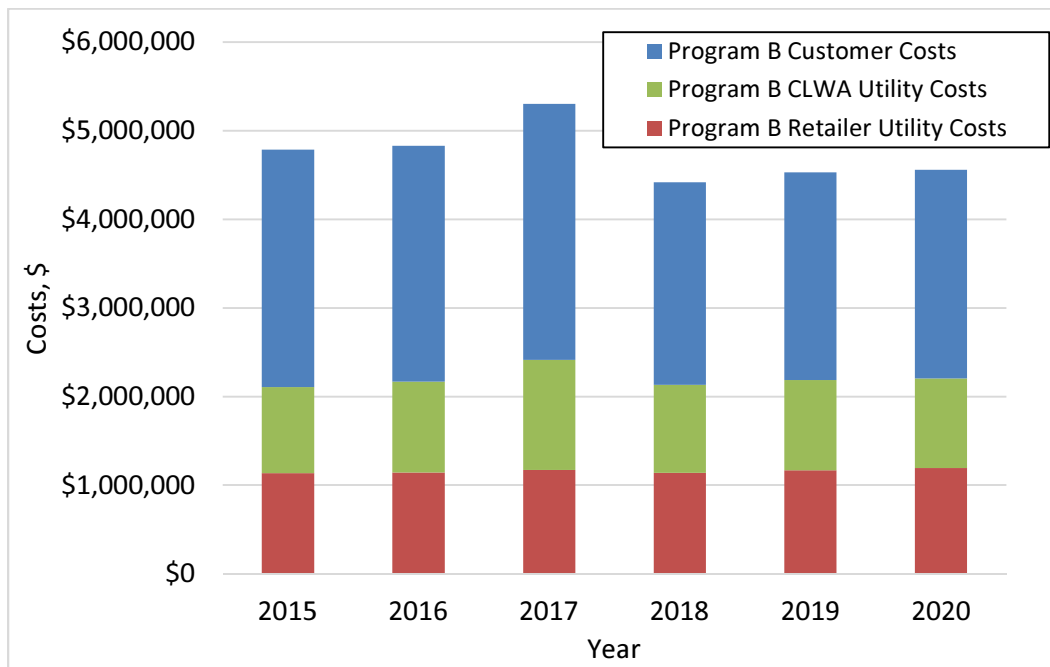
D.11 Program Implementation Budget

The following table and figure present the proposed implementation costs for the Retailer’s CLWA-led and Retailer-led Program B measures. This budget includes CLWA utility costs, Retailer utility costs and customer costs. Utility costs include unit costs (site audit costs, incentives, rebates, etc.) as well as administrative costs.

Table D-5 Program B CLWA, Retailer, and Customer Costs - VWC

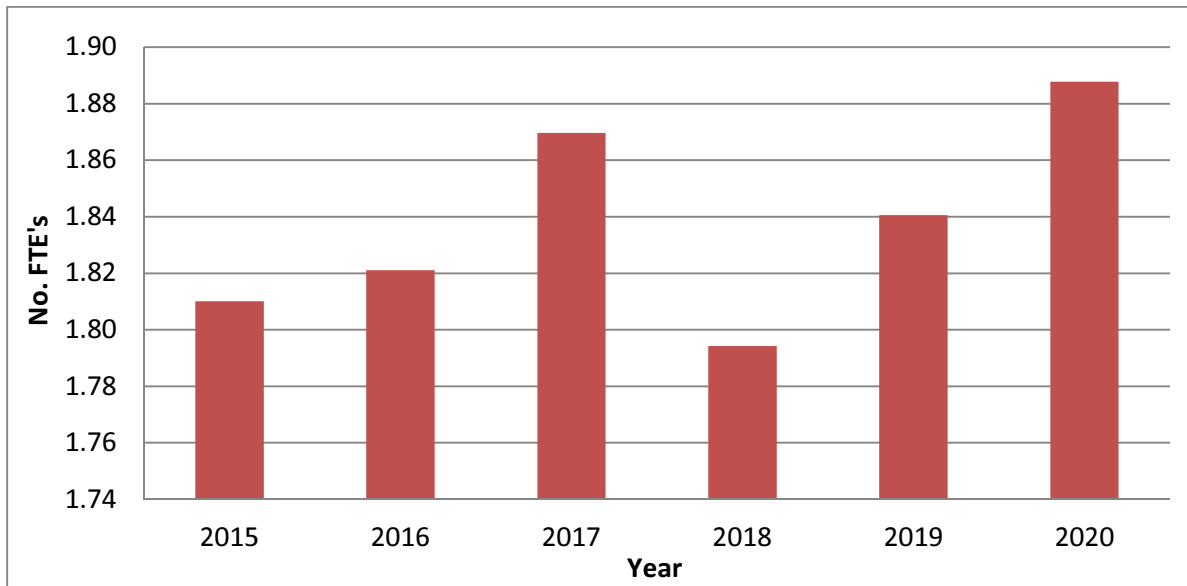
	2015	2016	2017	2018	2019	2020
Program B Retailer Utility Costs	\$1,133,398	\$1,143,089	\$1,171,912	\$1,138,201	\$1,166,014	\$1,194,392
Program B CLWA Utility Costs	\$972,757	\$1,026,516	\$1,240,238	\$ 992,623	\$1,020,103	\$1,010,674
Program B Total Utility Costs	\$2,106,155	\$2,169,606	\$2,412,149	\$2,130,824	\$2,186,116	\$2,205,066
Program B Customer Costs	\$2,681,102	\$2,660,052	\$2,889,865	\$2,288,844	\$2,343,332	\$2,352,686
Program B Total Costs	\$4,787,257	\$4,829,658	\$5,302,015	\$4,419,668	\$4,529,448	\$4,557,753

Figure D-8 Program B CLWA, Retailer, and Customer Costs – VWC



D.12 Program Staffing Needs

As part of this planning effort, consideration has been given to program staffing levels. Current and proposed future needs for staff and/or outsourcing support of the conservation program is presented in this section. The following figure presents the proposed implementation staffing needs for the Retailer for implementing the Retailer-led measures in their Program B. This estimate includes staffing needs to address the Retailer-led measures that the Retailer plans to implement as part of Program B. These measures are all run in-house. Staffing needs were calculated by dividing annual administrative costs by an average annual CLWA salary of \$85,000 per staff person; or \$120,000 burdened. New development landscape plan review following the City and County’s Landscape Ordinance is completed by Retailer staff.

Figure D-9 Proposed Staffing for Program B Retailer-Led Measures* - VWC

*Estimated department staffing based on \$120,000 average annual burdened salary.

D.13 DSS Model Conservation Measure Results

The DSS Model presents the input parameters for each individual measure modeled for the Retailer. Summary cost, savings and benefit cost ratio results are also shown. Annual costs, targets, and savings are available by measure in the Retailer's DSS Model.

This section presents a results summary of the Retailer-led measures in the Retailer's Program B. Annual individual measure utility costs, administrative costs, water savings, and targeted accounts for each of the Retailer-led measures in Program B through 2020 are totaled and presented in the following tables.

Each measure's utility costs are those costs that the Retailer as a water utility would incur to operate the measure, including administrative costs, rebates, etc. Table D-6 presents the administrative portion of these costs. Table D-7 shows the annual water savings for each Retailer-led Program B measure. Table D-8 presents the number of accounts targeted annually for each Program B Retailer-led measure. It is important to note that one targeted account may represent more than one measure incentive (i.e., 2 clothes washers per HECW targeted multi-family account).

Table D-6 Retailer-Led Program B Measure Utility Costs – VWC

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Conservation Pricing SF ^a	\$3,333	\$3,333	\$3,333	\$3,333	\$3,333	\$3,333
Home Water Use Reports	\$26,435	\$27,252	\$28,095	\$28,963	\$29,859	\$30,782
SF Drip Irrigation Incentives	\$101,673	\$104,816	\$108,056	\$111,397	\$114,841	\$118,391
MF CII Drip Irrigation Incentives	\$120,663	\$123,432	\$126,215	\$129,014	\$131,829	\$134,661
UHET Rebates ^b	\$70,317	\$72,369	\$74,474	-	-	-
Top User Indoor Surveys and Incentives	\$87,237	\$89,321	\$91,425	\$93,548	\$95,692	\$97,858
CII Replace Equip and Performance Pgm	\$76,662	\$78,434	\$80,218	\$82,013	\$83,820	\$85,638
SF MF Outdoor Surveys	\$135,493	\$139,682	\$144,000	\$148,452	\$153,041	\$157,773
SF MF Survey Leak & Pressure	\$22,314	\$23,004	\$23,715	\$24,449	\$25,204	\$25,984
HE Faucet & HE Showerhead Giveaway	\$6,311	\$6,506	\$6,707	\$6,915	\$7,128	\$7,349
Sprinkler Nozzle Rebate	\$95,716	\$98,499	\$101,355	\$104,286	\$107,295	\$110,384
Irrigation Surveys and Landscape Budgets	\$195,460	\$199,892	\$204,343	\$208,813	\$213,303	\$217,813
SF Hot Water on Demand	\$13,421	\$13,836	\$14,263	\$14,704	\$15,159	\$15,628
Landscape Ordinance	\$31,130	\$9,287	\$9,338	\$9,392	\$9,446	\$9,503
Education and Water Waste Enforcement	\$93,899	\$96,760	\$99,705	\$102,739	\$105,863	\$109,081
Conservation Pricing MF ^a	-	\$3,333	\$3,333	\$3,333	\$3,333	\$3,333
Conservation Pricing IRR ^a	\$3,333	\$3,333	\$3,333	\$3,333	\$3,333	\$3,333
Recycled Water New Development ^c	-	-	-	\$13,515	\$13,532	\$13,549
Total	\$1,133,398	\$1,143,089	\$1,171,912	\$1,138,201	\$1,166,014	\$1,194,392

a. The Water Loss and Conservation Pricing measure costs reflect annual maintenance costs. Multifamily conservation pricing measure comes online in year 2016.

b. The UHET Rebates measures goes offline in year 2017.

c. Recycled Water for New Development comes online in 2018.

Table D-7 Retailer-Led Program B Measure Administration Costs - VWC

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	-	-	-	-	-	-
Conservation Pricing SF ^a	-	-	-	-	-	-
Home Water Use Reports	\$6,100	\$6,289	\$6,483	\$6,684	\$6,890	\$7,103
SF Drip Irrigation Incentives	\$20,335	\$20,963	\$21,611	\$22,279	\$22,968	\$23,678
MF CII Drip Irrigation Incentives	\$24,133	\$24,686	\$25,243	\$25,803	\$26,366	\$26,932
UHET Rebates ^b	\$16,227	\$16,700	\$17,186	-	-	-
Top User Indoor Surveys and Incentives	\$20,132	\$20,613	\$21,098	\$21,588	\$22,083	\$22,583
CII Replace Equip and Performance Pgm	\$15,332	\$15,687	\$16,044	\$16,403	\$16,764	\$17,128
SF MF Outdoor Surveys	\$31,268	\$32,234	\$33,231	\$34,258	\$35,317	\$36,409
SF MF Survey Leak & Pressure	\$5,149	\$5,309	\$5,473	\$5,642	\$5,816	\$5,996
HE Faucet & HE Showerhead Giveaway	\$1,262	\$1,301	\$1,341	\$1,383	\$1,426	\$1,470
Sprinkler Nozzle Rebate	\$8,701	\$8,954	\$9,214	\$9,481	\$9,754	\$10,035
Irrigation Surveys and Landscape Budgets	\$39,092	\$39,978	\$40,869	\$41,763	\$42,661	\$43,563
SF Hot Water on Demand	\$4,474	\$4,612	\$4,754	\$4,901	\$5,053	\$5,209
Landscape Ordinance	\$6,226	\$1,857	\$1,868	\$1,878	\$1,889	\$1,901
Education and Water Waste Enforcement	\$18,780	\$19,352	\$19,941	\$20,548	\$21,173	\$21,816
Conservation Pricing MF ^a	-	-	-	-	-	-
Conservation Pricing IRR ^a	-	-	-	-	-	-
Recycled Water New Development ^c	-	-	-	\$2,703	\$2,706	\$2,710
Total	\$217,211	\$218,537	\$224,357	\$215,314	\$220,867	\$226,532

a. Water Loss and Conservation Pricing measures' design does not include administrative costs.

b. UHET Rebates measures goes offline in year 2017.

c. Recycled Water for New Development comes online in 2018.

Table D-8 Retailer-Led Program B Measure Savings (AFY) – VWC^a

Measure	2015	2016	2017	2018	2019	2020
Water Loss	171	176	182	187	193	199
Conservation Pricing SF	49	75	102	131	160	191
Home Water Use Reports	352	542	738	768	798	831
SF Drip Irrigation Incentives	14	21	29	37	45	54
MF CII Drip Irrigation Incentives	40	63	87	112	139	168
UHET Rebates	20	31	43	43	44	44
Top User Indoor Surveys and Incentives	25	39	54	70	86	104
CII Replace Equip and Performance Pgm	8	12	16	21	26	32
SF MF Outdoor Surveys	39	59	81	104	108	112
SF MF Survey Leak & Pressure	6	9	12	15	16	17
HE Faucet & HE Showerhead Giveaway	2	3	5	6	7	9
Sprinkler Nozzle Rebate	125	195	267	344	426	513
Irrigation Surveys and Landscape Budgets	103	161	222	287	356	430
SF Hot Water on Demand	2	3	4	6	7	8
Landscape Ordinance	263	306	350	397	445	496
Education and Water Waste Enforcement	31	49	67	87	91	95
Conservation Pricing MF	-	3	6	9	12	15
Conservation Pricing IRR	105	161	219	280	343	408
Recycled Water New Development ^b	-	-	-	245	501	769

a. Annual total values for savings are not directly additive since savings from measures which address the same end use(s) are not additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. Reference Program B savings above in Table D-3 for total Program B savings.

b. Additional recycled water for new development is projected to come online in 2018.

Table D-9 Retailer-Led Program B Measure Targeted Accounts - VWC

Measure	2015	2016	2017	2018	2019	2020
Water Loss ^a	0	0	0	0	0	0
Conservation Pricing SF ^a	0	0	0	0	0	0
Home Water Use Reports	6,778	6,988	7,204	7,426	7,656	7,893
SF Drip Irrigation Incentives	542	559	576	594	612	631
MF CII Drip Irrigation Incentives	64	66	67	69	70	72
UHET Rebates ^b	217	223	230	0	0	0
Top User Indoor Surveys and Incentives	45	46	47	48	49	50
CII Replace Equip and Performance Pgm	14	14	14	15	15	15
SF MF Outdoor Surveys	632	651	671	692	713	736
SF MF Survey Leak & Pressure	137	142	146	150	155	160
HE Faucet & HE Showerhead Giveaway	137	142	146	150	155	160
Sprinkler Nozzle Rebate	758	781	805	829	853	879
Irrigation Surveys & Landscape Budgets	80	82	84	86	88	90
SF Hot Water on Demand	89	92	95	98	101	104
Landscape Ordinance	249	74	75	75	76	76
Education and Water Waste Enforcement	578	595	614	632	651	671
Conservation Pricing MF ^a	0	0	0	0	0	0
Conservation Pricing IRR ^a	0	0	0	0	0	0
Recycled Water New Development ^c	0	0	11	67	68	56
Total	10,320	10,455	10,785	10,931	11,262	11,593

a. The Water Loss and Conservation Pricing measures target overall production and consumption, respectively, to lower GPCD.

b. UHET Rebates measure goes offline in year 2017.

c. Recycled Water for New Development comes online in 2018.

APPENDIX E KEY ASSUMPTIONS FOR THE DSS MODEL

The following section presents the key assumptions used in the DSS Model. 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 finally the percent of estimated real water losses. This section presents DSS Model assumptions regarding plumbing code water savings, present value parameters, and active conservation measure costs and savings.

E.1 Plumbing Codes and Legislation

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

1. National Plumbing Code
2. CALGreen
3. AB 715

Each of the three items is described below. In the sections following the descriptions is information on how the DSS Model handles these items and what information is needed for input.

National Plumbing Code

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

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

Replacement of fixtures in existing buildings is also governed by the Federal Energy Policy Act that requires only devices with the specified level of efficiency (shown above) can be sold today (since 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 US Department of Energy regulates appliances such as residential clothes washers. Regulations to make these appliances more energy efficient has driven manufactures to dramatically reduce the amount of water these efficient machines use. Generally front loading washing machines use 30 to 50 percent less water than conventional models (which are still available). In a typical analysis the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 12 gallons or less) so that by the year 2025 this will be the only type of machines purchased. 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 will be of this type. In 2012, the United States Environmental Protection Agency estimated the Energy Star clothes washer market share in the US in 2011 to be over 60 percent. Energy Star washing machines have a water factor (WF) of 6.0 or less. A WF of 6.0 is the equivalent of using 3.1 cubic feet or 23.2 gallons of water per load.

State Building Code – CALGreen

The CALGreen requirements effect all new development in the State of California after January 1, 2011. The new development requirements under CALGreen are listed in the following figure.

Table E-1 CALGreen Building Code Summary Table

CALGreen Building Code						
Building Class	Component	Effective Date*	Indoor Fixtures Included	Indoor Requirement	Landscaping & Irrigation Requirements	Are the Requirements Mandatory?
Residential	Indoor	1/1/2011	Toilets, Showers, Lavatory & Kitchen Faucets, Urinals	Achieve 20 percent savings overall below baseline		Yes
	Outdoor	1/1/2011			Provide weather adjusting controllers	Yes
Non Residential	Indoor	1/1/2011	Submeter leased spaces	Only if building >50,000 sq. ft. & if leased space use >100 gpd		Yes
			Toilets, Showers, Lavatory & Kitchen Faucets, Wash Fountains, Metering Faucets, Urinals	Achieve 20 percent savings overall below baseline		Yes
	Outdoor	1/1/2011			Provide water budget	> 1,000 sq ft. landscaped area
					Separate meter	As per Local or DWR ordinance
					Prescriptive landscaping requirements	> 1,000 sq ft. landscaped area
					Weather adjusting irrigation controller	Yes

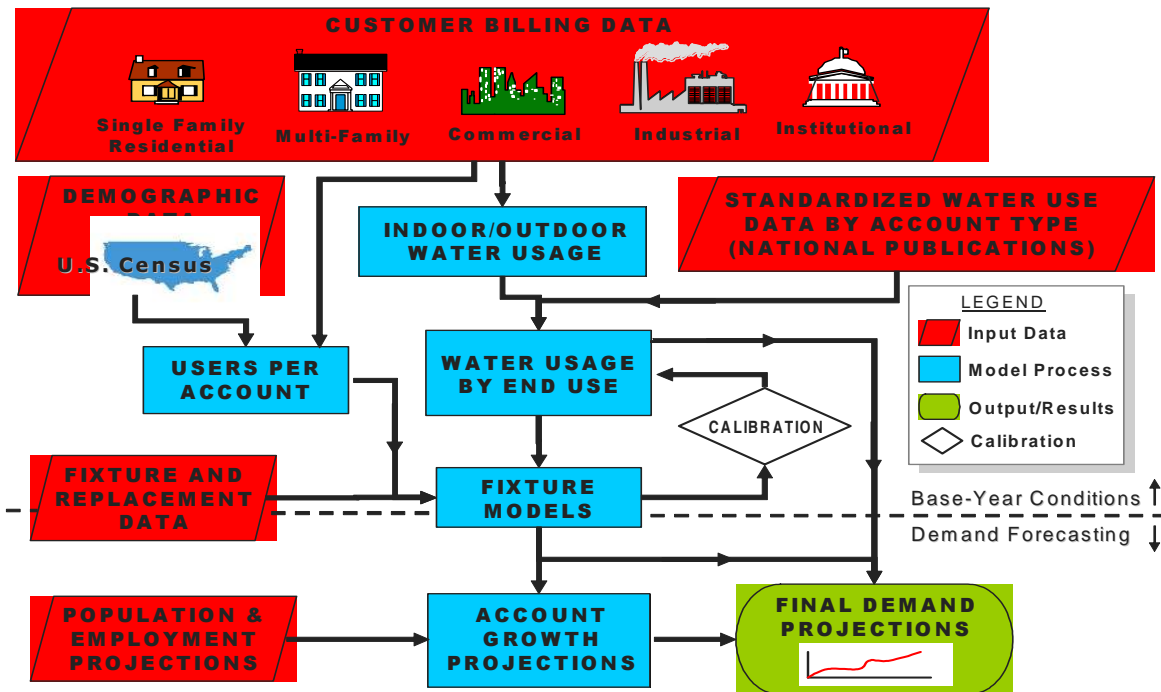
* Effective date is 7/1/2011 for toilets

State Plumbing Code – AB 715

The Plumbing Code includes the new CCR Title 20 California State Law (AB 715) requiring High Efficiency Toilets and High Efficiency Urinals be exclusively sold in the state by 2014.

The following figure conceptually describes how the National plumbing code, CALGreen and AB 715 are incorporated into the flow of information in the DSS Model.

Figure E-1 DSS Model Overview Used to Make Potable Water Demand Projections



California State Law – SB 407

SB 407 (Plumbing Fixture Retrofit on Resale or Remodel): The DSS Model carefully takes into account the overlap with SB 407, the plumbing code (natural replacement), CALGreen, AB 715 and rebate programs (such as toilet rebates). SB 407 begins from the year 2017 in residential and 2019 in commercial properties. SB 407 program length is variable and continues until all the older high flush toilets have been replaced the service area. The number of accounts with high flow fixtures is tracked to make sure that the situation of replacing more high flow fixtures than actually exist does not occur.

DSS Model Fixture Replacement

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

combination. For example, the DSS Model will contain a pair of replacement tables for Residential Single Family toilets, Residential Multi Family toilets, Commercial toilets, Residential clothes washing machines, Commercial washing machines, etc.

Figure E-2 Example Toilet Replacement Percentages by Type of Toilet

Replacement Appliance Market Shares				
Year	1.28 gpf HET	1.6 gpf ULFT	High Use Toilet	Total
2012	75%	25%	0%	100%
2014	100%	0%	0%	100%
2020	100%	0%	0%	100%
2030	100%	0%	0%	100%
2050	100%	0%	0%	100%
New Appliance Market Shares				
Year	1.28 gpf HET	1.6 gpf ULFT	High Use Toilet	Total
2012	100%	0%	0%	100%
2014	100%	0%	0%	100%
2020	100%	0%	0%	100%
2030	100%	0%	0%	100%
2050	100%	0%	0%	100%

In the previous example, the DSS Model combines the effects of the following for the toilet fixture type:

- Federal Policy Act
 - Determines the “saturation” of 1.6 gpf toilets as it was in effect from 1992-2014 for toilet replacements.
- CALGreen
 - Determines that all “new appliance market share” toilets in “new” development will be 1.28 gpf
 - The year 2012 was selected as the beginning of the toilet portion of the code did not go into effect until July 1, 2011 and it also takes a while to get a permit, build the facility or residence, and have the toilets functioning with the building occupied, such that the savings would not actually occur until the year 2012 rather than the year 2011.
- AB 715
 - Determines that the “replacement appliance market” and “new appliance market” toilets will all be 1.28 gpf toilets or lower.

DSS Model Initial Fixture Proportions

The DSS Model also needs a place to start when it comes to fixture replacement. It needs to know what the initial proportions (or percentages) of each type of fixture that are currently installed (also known as fixture saturation rate) in the modeled service area for each customer class.

Figure E-3 presents an example of the initial proportions determined for residential toilets in the year 2010. In the following **example** the model started in 2010, therefore it is assumed the initial proportions of the 1.28 gallon per flush type toilets is 0 percent as they were not readily available at that time. Then using the 2010 DP-04 census data, which shows the age of houses in the service area, it is calculated that 39.3 percent of the total current homes were built since 1992 when 1.6 gallon per flush toilets were required to be installed in new homes. Then an average natural replacement rate (rate of broken or remodeled toilet) of 2.5 percent per year for higher flush volume toilets is assumed. Then, in this example, a 3.96 percent replacement rate is calculated due to a rebate program that was raising the replacement rate of toilets. This gives the initial proportion of 1.6 gallon per flush (gpf) toilets to be 90.0 percent, and 1.28 gpf toilets 3.3 percent. In this case the initial proportion of high flush toilets is assumed to

be the remainder of 6.7 percent. This figure shows an example of a toilet fixture model and how it incorporates the changes from each of these legislative items. There are similar fixture models for showers, clothes washers, and urinals. There is one fixture model for each of the following categories:


- Single family toilets
- Multi-family toilets
- Commercial toilets
- Commercial urinals
- Single family showers
- Multi-family showers
- Single Family clothes washers
- Multi-family clothes washers

Figure E-3 Example Residential Toilet Initial Proportions from Fixture Analysis used for DSS Fixture Model

Fixture Model:		Residential Toilets				Replacement Data		
Appliance Data						Comments		
Fixture Type	Volume per Use (Gallons) ¹	Proportion of Homes by Age ²	Net Change due to Natural Replacement	Net Change due to Rebate Program ³	Initial Proportions ⁴		Fixture Type	Percent Annual Replacement ⁵
1.28 gal/flush High Efficiency Toilets (HET)	1.3	0.0%	0.0%	3.30%	3.3%	3.4% as these toilets were not very prevalent in the start year.	1.28 gal/flush High Efficiency Toilets (HET)	2.0%
1.6 gal/flush Ultra Low Flow Toilets (ULFT)	1.8	39.3%	50.0%	0.66%	90.0%	39.3% new homes since 1990 + 50% natural replacement +15% retrofit program	1.6 gal/flush Ultra Low Flow Toilets (ULFT)	2.0%
High Flush and 3.5 gal/flush	4.0	60.7%	-50.00%	-3.96%	6.7%	Remainder	High Flush and 3.5 gal/flush	2.5%
NOTES:								
1a. Volumes-per-use are based on average flush volumes for age of toilet. New toilets when out of adjustment flush at an average of 1.8 gpf instead of 1.6 gpf.								
1b. Initial proportions of fixtures installed in homes are based on the age of homes as provided in the 2010 Census.								
2. Assume homes constructed after 1992 installed ULFTs.								
3. Net change due to rebate program is based on historical active conservation activity.								
4. The initial proportions are fundamentally calculated by taking the initial proportions of homes by age (corresponding to efficiency levels) and adding the net change due to natural replacement and adding change due to rebate program minus the "free rider effect." No fixture % can exceed 90%.								
5a. Assume a 2.5% replacement rate for older toilets to the ULFTs over the 17 years since they where required.								
5b. Assume a future annual replacement rate of 2.0% for high efficiency fixtures, 2.0% for medium efficiency fixtures and 2.5% for low efficiency fixtures. 2.0% corresponds to a 50 year fixture life. 2.5% corresponds with a 40 year fixture life.								

These initial proportions determine in the fixture model and found in each agency’s Water Use Data workbook, are then entered into the DSS Model for each fixture’s “Codes and Standards” worksheet. A screenshot of the single family toilets codes and standards worksheet is shown in the following figure. Most DSS Models include fixture models for SF and MF toilets, showers, and clothes washers; and commercial toilets and urinals.

Figure E-4 Example Residential Toilet Fixture Screenshot from DSS Model

Single Family Toilets																															
 <p>Single Family Toilets</p> <p>Categories</p>	<table border="1"> <tr> <td>Measure Category</td> <td>Default Plumbing Code</td> </tr> <tr> <td>Start Year</td> <td>2012</td> </tr> <tr> <td>Description</td> <td> <p>The DSS Model is capable of modeling multiple types of fixtures, including fixtures with slightly different design standards. For example currently toilets can be purchased that can flush at 1.28 gallons per flush or 1.6 gallons per flush. The higher flush toilets (3.5gpf) still exist but no longer can be purchased in California and cannot therefore be used for a replacement or new installation. The DSS Model utilizes a fixture replacement table to decide what type of toilet is installed when a fixture is replaced or a new fixture is installed. The replacement of the fixtures is listed as a percentage. For example, a value of 100% would represent that all the toilets sold would be of one particular flush volume. A value of 75% means that three out of every four toilets installed would be of that particular flush volume type.</p> <p>The DSS Model combines the effects of the following for the toilet fixture type:</p> <ul style="list-style-type: none"> • Federal Policy Act: Determines the "saturation" of 1.6 gpf toilets as it was in effect from 1992-2014 for toilet replacements. • Cal Green: Determines that all "new appliance market share" toilets in "new" development will be 1.28 gpf. The year 2012 was selected for the model input as the toilet portion of the code did not go into effect until July 1, 2011 and it also takes a while to get a permit, build the facility or residence, and have the toilets functioning with the building occupied, such that the savings would not actually occur until the year 2012 rather than the year 2011. • AB 715: Determines that the "replacement appliance market" and "new appliance market" toilets will all be 1.28 gpf toilets. <p>An additional input to the DSS Model is the natural replacement rate of fixtures due to breakage, remodeling or other reason for replacement over time. To do this the DSS Model uses a percentage value for each fixture type that becomes the assumed natural replacement rate for that fixture. For example, a natural replacement rate of 2.5% is used for older toilets. This value can be modified by the user as shown on the previous worksheet. Each year the number of remaining accounts with old toilets is calculated as 0.975 times the prior year's value.</p> </td> </tr> <tr> <td>Comments</td> <td> <ol style="list-style-type: none"> 1. Volumes-per-use are based on average flush volumes for age of toilet. New toilets when out of adjustment flush at an average of 1.8 gpf instead of 1.6 gpf. 2. Initial proportions of fixtures installed in homes are based on the age of homes as provided in the 2010 Census. 3. Assume homes constructed after 1992 installed ULFTs. 4. Net change due to rebate program is based on historical active conservation activity. 5. The initial proportions are fundamentally calculated by taking the initial proportions of homes by age (corresponding to efficiency levels) and adding the net change due to natural replacement and adding change due to rebate program minus the "free rider effect." No fixture % can exceed 90%. 6. Assume a 2.5% replacement rate for older toilets to the ULFTs over the 17 years since they were required. 7. 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For example currently toilets can be purchased that can flush at 1.28 gallons per flush or 1.6 gallons per flush. The higher flush toilets (3.5gpf) still exist but no longer can be purchased in California and cannot therefore be used for a replacement or new installation. The DSS Model utilizes a fixture replacement table to decide what type of toilet is installed when a fixture is replaced or a new fixture is installed. The replacement of the fixtures is listed as a percentage. For example, a value of 100% would represent that all the toilets sold would be of one particular flush volume. A value of 75% means that three out of every four toilets installed would be of that particular flush volume type.</p> <p>The DSS Model combines the effects of the following for the toilet fixture type:</p> <ul style="list-style-type: none"> • Federal Policy Act: Determines the "saturation" of 1.6 gpf toilets as it was in effect from 1992-2014 for toilet replacements. • Cal Green: Determines that all "new appliance market share" toilets in "new" development will be 1.28 gpf. 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DSS Model Fixture Replacement Rates

An additional input to the DSS Model is the natural replacement rate of fixtures due to breakage, remodeling or other reason for replacement over time. To do this the DSS Model uses an percentage value for each fixture type that becomes the assumed natural replacement rate for that fixture. For example, high flush toilets have a replacement rate value of 2.5 percent. Each year the number of remaining accounts with old toilets is calculated as 0.975 times the prior year's value. This value can be modified by the user for any fixture as shown in Figure E-6 below.

Also included in the following figure are example fixture efficiencies, which can be adjusted to any desired level based on service area characteristics. MWM can update data on efficiency levels found in the field and the 2011

California Single Family Water Use Efficiency Study (Bill DeOreo) or other recent information related to fixture saturation rates.


Figure E-5 Example Future Replacement Rates of Fixtures from DSS Model

		Fixtures			
Fixture Name	End Use	Average Water Use	Units	Fixture Life (yrs)	Replacement Rate
1.28 gpf HET	Toilets	1.30	gpf	50	2.0%
1.6 gpf ULFT	Toilets	1.80	gpf	50	2.0%
High Use Toilet	Toilets	3.50	gpf	40	2.5%
1 gpf Urinal	Urinals	1.00	gpf	50	2.0%
0.5 gpf Urinal	Urinals	0.50	gpf	50	2.0%
Waterless Urinal	Urinals	0.00	gpf	50	2.0%
High Use Urinals	Urinals	3.00	gpf	40	2.5%
Quart Urinals	Urinals	0.25	gpf	50	2.0%
High Efficiency 2 gpm	Showers	13.92	gal per use	25	4.0%
Low Flow 2.5 gpm	Showers	18.27	gal per use	25	4.0%
High Flow > 3 gpm	Showers	23.49	gal per use	25	4.0%
Efficient	Clothes Washers	12.00	gal per use	10	10.0%
Medium Efficiency	Clothes Washers	19.20	gal per use	10	10.0%
Top Loader	Clothes Washers	34.20	gal per use	10	10.0%

DSS Model End Uses


Indoor and outdoor residential and non-residential end use breakdowns can be found in the “End Uses” section of each Retailer’s DSS Model on the “Breakdown” worksheet. As screenshot example of this worksheet is shown in Figure E-7. The source of these values is the California DWR Report "California Single Family Water Use Efficiency Study", 2011, AWWARF’s Report “Residential End Uses of Water” 2014 (pending), and Retailer supplied data on costs and savings. AWWARF’s 1999 "Commercial End Uses of Water” is also used.

Figure E-6 End Use Breakdown Example Screenshot

Breakdown								
 Breakdown	Indoor							
	End Use Name	SF	MF	COM	IND	INST	IRR	OTH
	Toilets	16.0%	18.0%	16.5%	12.0%	18.0%		
	Urinals			4.0%	3.0%	5.0%		
	Faucets	21.0%	12.0%	13.0%	14.0%	14.0%		
	Showers	24.0%	28.0%	8.0%	8.0%	8.0%		
	Dishwashers	2.0%	5.0%	6.0%	6.0%	6.0%		
	Clothes Washers	13.0%	16.5%	15.0%	15.0%	15.0%		
	Process			23.0%	27.0%			
	Kitchen Spray Rinse			5.0%	5.0%	5.0%		
	Internal Leakage	7.0%	5.0%	9.5%	10.0%	10.0%		
	Baths	2.5%	1.5%					
	Other	14.5%	14.0%	0.0%	0.0%	19.0%		
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%
	Outdoor							
End Use Name	SF	MF	COM	IND	INST	IRR	OTH	
Irrigation	80.0%	83.0%	95.0%	95.0%	95.0%	95.0%		
Pools	1.0%	2.0%						
Wash Down	7.0%	4.0%						
Car Washing	7.0%	4.0%						
External Leakage	5.0%	7.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Outdoor							95.0%	
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

End use breakdown values will differ slightly between Retailers due to differing demographics of their service area population. Residential frequency of use information for toilets, showers, and washers, and non-residential frequency of use of toilets and urinals is included in the “Codes and Standards” green section on the “Fixtures” worksheet of each Retailer’s DSS Model, and then confirmed in each “Service Area Calibration End Use.” Calculated frequencies of use in uses/user/day for these customer end uses are presented in each customer category “Service Area Calibration End Use” worksheet and compared to an industry-accepted use range based on AWWARF’s residential, commercial and institutional end use reports mentioned previously. An example of this calibration sheet is shown in the screenshot in Figure E-8.

Figure E-7 Single Family End Use Breakdown and Fixture Use Frequency Example Screenshot

Single Family							
 Single Family	End Use	Use Percentage	Uses/User/Day	Lower	Upper	State	Fixture Model
	Toilets	16.0%	4.76	4.5	5.6	Calibrated	Edit
	Faucets	21.0%					
	Showers	24.0%	0.73	0.6	0.9	Calibrated	Edit
	Dishwashers	2.0%					
	Clothes Washers	13.0%	0.32	0.3	0.42	Calibrated	Edit
	Internal Leakage	7.0%					
	Baths	2.5%					
	Other	14.5%					
Total	100.0%						

E.2 Present Value Parameters

Present value analysis using constant FY 2014 dollars and a real discount rate of 3 percent 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 programs, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a program may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

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

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

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

The time value of money is explicitly considered. Typically, the costs to save water occur early in the planning period whereas the benefits usually extend to the end of the planning period. A long planning period of 30-40 years is typically used because costs and benefits that occur beyond 2050 years have very little influence on the total present value of the costs and benefits. The value of all future costs and benefits is discounted to the first year in the DSS Model (the base year, which in this case is 2013), at the real interest rate of 3.0 percent. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 6.1 percent) by the assumed rate of inflation (3.0 percent). Cash flows discounted in this manner are herein referred to as “Present Value” sums.

E.3 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by CLWA and the individual Retailers. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. The model was run for 36 years (each year between FY 2014 and FY 2050). Costs were spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

Lost revenue due to reduced water sales is not included as a cost because the water use efficiency measures evaluated herein generally take effect over a long span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations and savings on variable costs such as energy and chemicals.

E.4 Assumptions about Measure Savings

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur three to seven years after the start of implementation, depending upon the implementation schedule. For every 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, like toilets for example, would be “permanent” and not revert to an old inefficient level of water use if the device needed to be replaced. However, some measures that are primarily behavioral 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 new homeowners may have less efficient water using practices around the home). Surveys typically have a measure life on the order of five years.

APPENDIX F ECONOMETRIC MODEL DESCRIPTION

F.1 Introduction

In the past, CLWA has relied on projections of population and jobs to predict future baseline water demand. These estimates of baseline demand were then converted into estimates of net demand by subtracting likely savings from various plumbing codes and active conservation programs. While the simplicity of this methodology makes it appealing and easy to understand, econometric analysis of historical data (assuming historical relationships remain valid) can provide helpful information for answering questions such as:

- How much and at what rate will demand rebound as the economy expands?
- How much will future price increases continue to depress demand?
- How does demand respond to weather?

To address these questions, we have developed econometric demand models for each Retailer that aim to estimate the relationship between water demand and its key drivers such as price, economic conditions and weather. We have evaluated the following independent variables (Table F-1) for inclusion in the models and will evaluate a few more in Phase II:

Table F-1 Independent Variables Evaluated for the Econometric Analysis

Variable Type	Variables	Units	Data Source	Comment
Weather	Precipitation	Inches per month	NOAA Weather Data	Phase I
Weather	Avg Daily Max Air Temp	Fahrenheit	NOAA Weather Data	Phase I
Weather	Reference ETo	Inches	Not available for all areas	Phase II
Economy	# of Jobs	Jobs per capita	SCAG, LA County, City of Santa Clarita	Phase II
Economy	Unemployment	Unemployment rate	CA EDD / BLS	Phase I
Service Area Housing Mix	SF and MF Units	Dwelling units	DOF	Phase II
Service Area Data	Rates	\$/AF	Provided by Retailers	Phase I
Service Area Data	Population	People	Census	Phase I
Conservation	Conservation savings per year	Million gallons per day	CUWCC	Phase II

Based on the Phase I analysis, the following best fit equation was developed:

$$Ln(monthly\ GPCD) = \alpha + \beta Trend + \theta Ln(unemployment\ rate) + \delta Ln(marginal\ price) + \vartheta Temperature\ Deviation + \vartheta Rainfall\ Deviation + \pi monthly\ indicators + \varepsilon \dots \dots \dots Eq. 1$$

Where,

- Monthly production is measured in gallons per capita per day (GPCD).
- α is a scaling constant. Trend is a variable that takes on a value of 0 in the first year, 1 in the second year, and so on.
- Unemployment rate is captured as an annual percent (for example, 7 percent).

- Marginal price for single-family customers, measured in dollars per hundred cubic feet
- Temperature deviation is measured in degrees Fahrenheit (average maximum daily temperature in a given month minus average for the same month between 1995 and 2012).
- Rainfall deviation is measured in total inches (total rainfall in a given month minus average total rainfall for same month between 1995 and 2012).
- Monthly indicators are binary 0-1 variables, taking on a value of 1 for a given month in question, 0 otherwise.
- ε denotes random statistical error.

Each variable on the right hand side of the equation (independent variable) is preceded by a coefficient (i.e. β , etc.) that measures the strength of the impact of an independent variable on monthly demand (the variable on the left hand side of the equation is also known as the dependent variable). A positive coefficient implies that increases in an independent variable will cause an increase in the dependent variable; a negative coefficient implies the opposite. The purpose of model development is both to select the elements of the equation as well as to estimate each independent variable's coefficient. Continuous variables such as the marginal price and the unemployment rate are logarithmically transformed so that their respective coefficients can be given a proportional interpretation. So, for example, the coefficient on logarithmically transformed marginal price becomes the price elasticity, and so on. The trend variable captures changes in GPCD over time not accounted for by price, unemployment rate, or weather.

Our basic model specification (Eq. 1) includes several features. First, Retailer-specific production data are modeled at a monthly, not annual, level. The reason for estimating monthly level models is to allow for the impact of weather to vary by time of year. Prior research strongly indicates that abnormal reference ETo and abnormal rainfall do not have the same effect in January as, say, in May.¹ Working with monthly production data allows one to incorporate time-varying weather effects.

Second, rainfall corrected reference ETo enter the model as deviations from their respective monthly averages, capturing directly how demand reacts to weather as it deviates from average. Normal seasonality in monthly demand (that is, July demand being much higher than January demand) is captured by the monthly indicator variables.

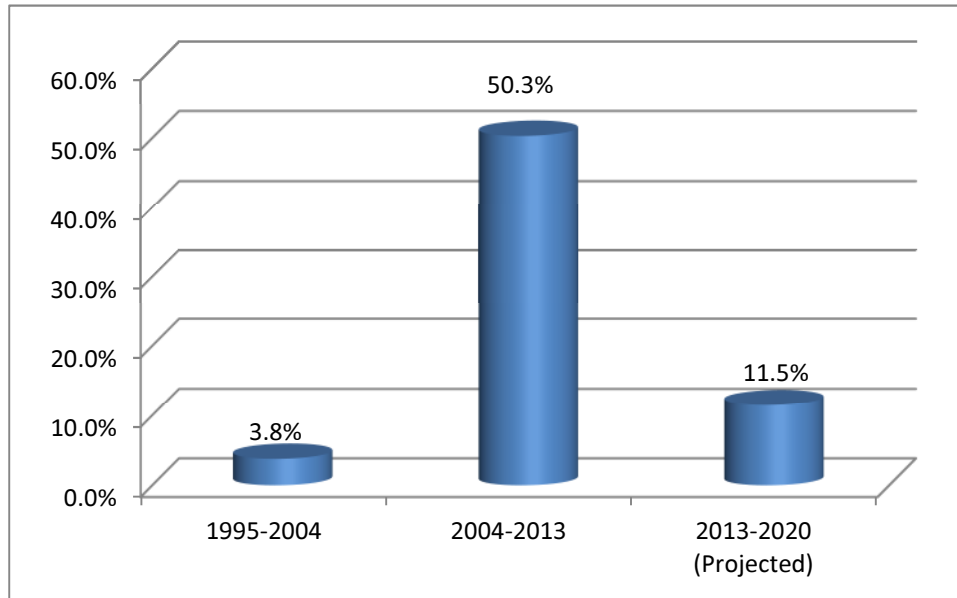
In Phase I, we used temperature and rainfall from the NOAA weather station located in Newhall, California to control for weather. In Phase II, we used reference ETo and precipitation, from the Department of Water Resources PRISM weather tool, that are likely to be recommended by both DWR and CUWCC for the purpose of weather normalization of compliance year GPCD. Thus, there is every reason to favor PRISM over NOAA data.

Third, economic conditions are captured by the unemployment rate obtained from the Bureau of Labor Statistics for Los Angeles County. We tested whether the city of Santa Clarita's unemployment rate predicts water use patterns better than a metric that reflects broader economic conditions, but it did not. In Phase II, we also evaluated whether changing proportion of single- and multi-family housing could be used to improve the models, but this metric did not show sufficient independent variation to merit inclusion in the final models.

¹ Bamezai, A., *GPCD Weather Normalization Methodology*, final report submitted to the California Urban Water Conservation Council, 2011.

Finally, our models also include a measure of the marginal price of water in real terms (that is, price deflated by the consumer price index published by the Bureau of Labor Statistics). We have used marginal price of water faced by the average single-family customer in a Retailer to depict price variation over time. By and large, Commercial, Institutional, and Industrial (CII) and SFR price trends appear similar. Figure F-1 shows price escalation faced by single-family customers in the CLWA service area overall, calculated as a weighted average of each Retailer's price data.

Figure F-1 Valley-Wide Trends in the Single-Family Real Price of Water



F.2 Econometric Model Results

We developed models as shown in Equation 1 for each Retailer using their own unique data. To illustrate the method in general we also developed a monthly GPCD model for all CLWA Retailers combined. Results for this rolled-up valley-wide model are shown in Table F-2. This type of model is known as a time-series, cross-sectional model. This valley-wide model incorporates Retailer-level fixed effects, a correction for autocorrelation in the error term, and population weighting to account for different Retailer sizes. Autocorrelation refers to model error in successive months exhibiting a positive or negative correlation. Model estimation techniques that account for this correlation produce more accurate hypothesis tests. Retailer-specific fixed effects capture the impact of Retailer characteristics that do not vary much over time, such as average household income and lot size, leading to a much more robust model specification than one without these fixed effects. In other words, this model captures the impact on GPCD of income, lot size and other unobservable time-invariant differences across Retailers implicitly through these fixed effects.

In addition to the fixed effects, each Retailer is allowed to have its own time trend, if necessary, to capture the impact of service area dynamics that influence water use but are not fully captured by price, unemployment rate, or weather. Only in the case of WW36 did a positive time trend appear necessary, which matches anecdotal evidence suggesting that newer development in the area is more affluent than what has existed historically. The normal seasonality in water use is also allowed to vary across retailers, as is the impact of weather deviations from normal.

The differences across retailers are small, but in the interest of accuracy, each is allowed to have their own unique seasonal pattern.

The estimated valley-wide model (Table F-2) has three columns, including one for the estimated coefficient, one for the likely band of error surrounding this coefficient (referred to as standard error), and one for the t-statistic. An independent variable's t-statistic is the ratio of the coefficient over its standard error. A t-statistic of two or greater indicates a statistically significant relationship between the dependent and independent variable; less than two indicates that the data are not able to conclusively demonstrate a relationship. The latter finding may reflect the lack of any relationship, or it may occur because of data errors or other problems, such as two or more independent variables being highly correlated with one another. The model's R-square is shown at the bottom, which is indicative of the explanatory power of a statistical model. It can vary between zero and a maximum of one, with higher numbers indicating greater explanatory power.

Table F-2's coefficients have the following interpretations:

- A price elasticity of -0.154 indicates that a 10 percent real increase in the marginal price of water can be expected to reduce demand by 1.5 percent. Our valley-wide estimate of price elasticity compares well with the published literature on this topic.
- A 10 percent increase in the annual unemployment rate is likely to depress water demand by 1.7 percent, a statistically significant effect, and comparable to the effect of price. The weather coefficients are all significant and behave in expected ways.
- An extra inch of reference ETo per month (adjusted for rainfall) during the spring season increases monthly demand by roughly 15.8 percent, during the summer months by 8.7 percent, and during the winter months by roughly 15.0 percent. Lower than average reference ETo would have the opposite effect.

The monthly indicator variables also exhibit the expected pattern with July and August exhibiting the largest coefficients, indicating that July and August demand is greatest during the year, reaching a minimum during February.

Figure F-2 shows how the model prediction compares with CLWA's valley-wide GPCD trend. The resulting R^2 value of 0.93 shows that there is a good fit between actual and predicted values. The models capture the downturn in demand experienced during the 2008-2011 period. The models suggest that a good chunk of the uptick in demand during 2012 and 2013 was weather related. Once this weather effect is removed, it causes a downshift in projected normal-weather demand going forward. This normal weather baseline demand is expected to rise as the economy expands, but tempered by projected price increases (shown in Figure C-1) which have been factored into the forecast.

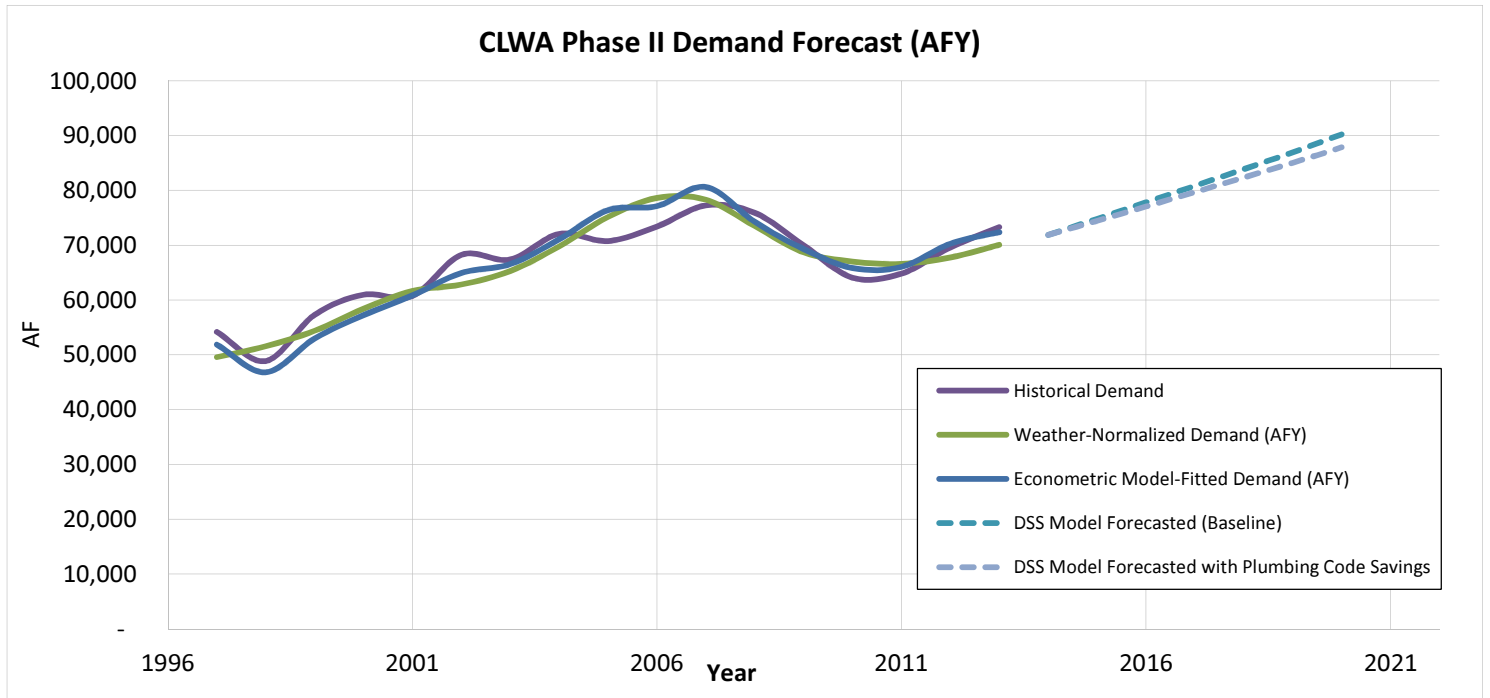
Table F-2 CLWA Valley-Wide Model Results

Dependent Variable: Ln (Monthly Baseline GPCD)

Independent Variable	Coefficient	Std. Error	t-statistic
Ln(Marginal Price)	-0.154	0.023	-6.7
Ln(Unemployment Rate)	-0.169	0.014	-12.4
Rainfall adj. Ref. ETo (Apr-Jun)	0.158	0.009	17.5
Rainfall adj. Ref. ETo (Jul-Oct)	0.087	0.010	8.4
Rainfall adj. Ref. ETo (Nov-Mar)	0.150	0.009	15.7
Jan Indicator	-0.082	0.020	-4.1
Feb	-0.145	0.023	-6.4
Mar	0.028	0.021	1.3
Apr	0.287	0.018	15.6
May	0.527	0.017	31.2
Jun	0.682	0.016	43.8
Jul	0.804	0.016	51.1
Aug	0.815	0.015	52.9
Sep	0.708	0.016	44.6
Oct	0.480	0.017	27.5
Nov	0.227	0.017	12.9
Constant	5.283	0.034	155.0
Retailer specific fixed effects*	Included		
Retailer specific trend terms*	Included		
Retailer interactions with monthly dummies*	Included		
R-Square	0.93		

*The large number of coefficients associated with the Retailer fixed effects, Retailer trend terms, and Retailer interactions with monthly dummies are not shown for the sake of brevity.

Figure F-2 CLWA Valley-Wide Econometric Model Fit and Forecast



APPENDIX G MEASURE SCREENING PROCESS AND RESULTS

In order to start the cost effectiveness analysis and build a water use efficiency model for each Retailer and the CLWA, the SCV Family decided on the list of conservation measures to be analyzed that, once modeled, would serve as the menu to build conservation program scenarios. To this end, CLWA hosted a workshop on November 18, 2013 to review and select conservation measures together with staff representatives from each Retailer. The library of conservation measure opportunities had more than 50 measures and various implementation strategies (with different unit costs, participation levels and/or unit water savings, which must be modeled individually). In order to maximize efficiency and productivity at the workshop, each Retailer developed two “top 10” lists of active conservation measures that they would like to evaluate in order to eventually decide if your agency wants the measure included in the WUE SP:

1. *Regional “Top 10” list* – a suite of measures that would be analyzed to update the WUE Strategic Plan for the SCV Family of Water Suppliers in the coming 5 years.
2. *Retailer “Top 10” list* – a suite of measures that your agency may like to implement individually without CLWA support.

Furthermore, to help facilitate your input and combine results most easily, each Retailer completed an online survey to help identify their ideal “top 10” potential conservation measures for both the regional and Retailer programs. Retailers collaborated internally with others in their agency as necessary. The results of the survey were treated as the input from each Retailer’s perspective.

Based on this initial Retailer input, the subsequent workshop was structured to focus on a discussion of measures that received mixed interest from the group, rather than those measures that the group already had consensus on. This approach led to a decision on which measures should initially be included in the models. Additionally, each Retailer also had the ability to add unique measures for their Retailer’s model (assumed agreed upon schedule and budget under Task 6).

Once finalized, the selected measures on from both the CLWA-led and Retailer-led lists were inserted into each Retailer’s DSS Models, along with the standard utility operations (e.g., water loss control programs) and education measures in order to have a complete standard menu of 32 measures in each Retailer’s DSS Model. Next, the Project Team worked with each Retailer to analyze measures (participation rates, Retailer unit costs, Retailer unit water savings, etc.), and build conservation program scenarios. The list of 32 measures comes from MWM’s past experience on having enough measures to choose from to (a) build program scenarios that are able to meet SB X7-7 water use targets, and (b) still be feasible to be successfully implemented between CLWA and Retailer combined efforts.

The following figures present the CLWA and Retailer measure rankings resulting from this screening process. Measures with the highest priority for being included in the cost effectiveness analysis were ranked with number 1 representing the most important. Note that selections for the top 1-5 measures likely “passed” the screening; measures showing ranking 5-10 received the most debate at the workshop.

Figure G-1 Retailer-Only Measures Screening Ranking

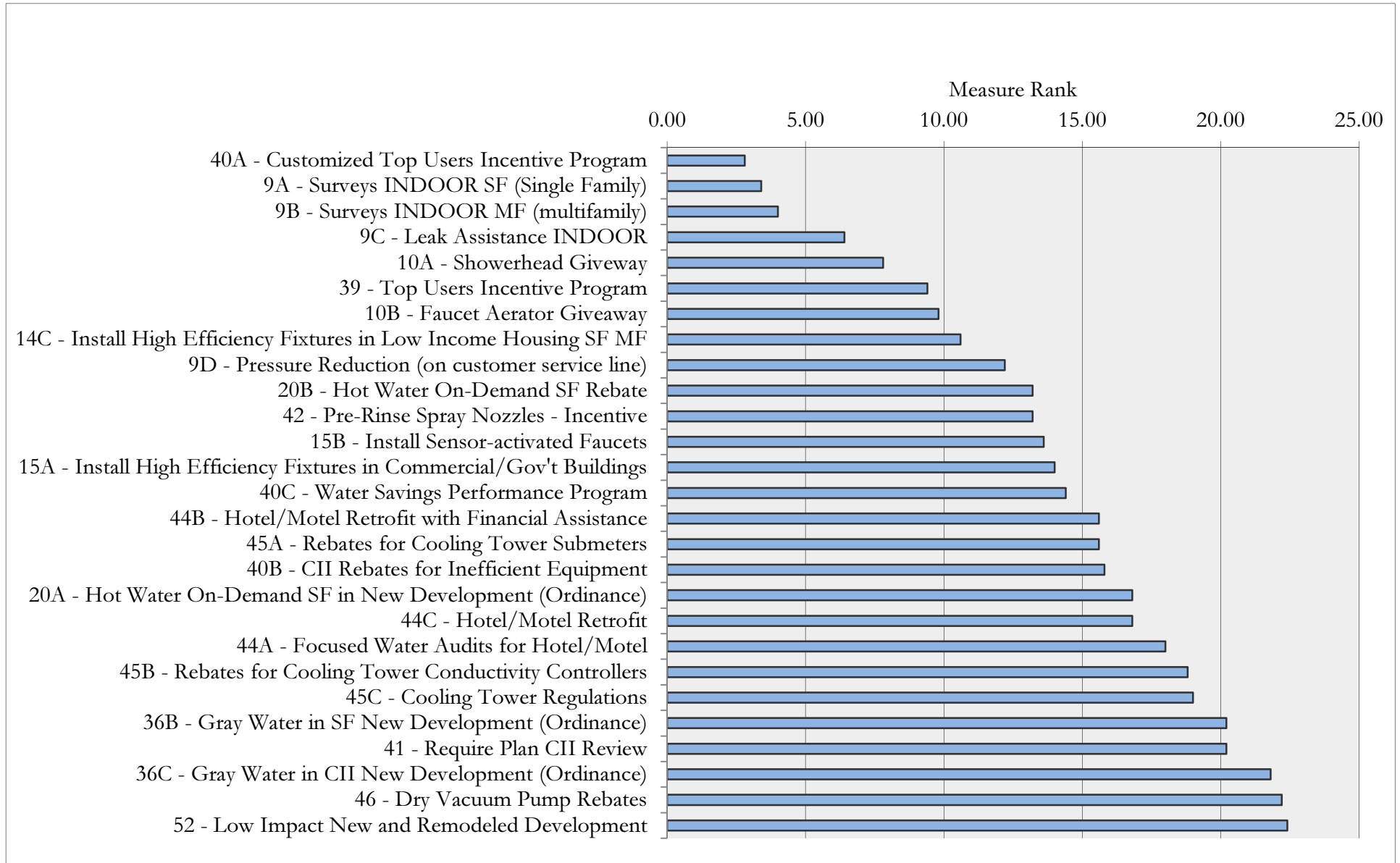
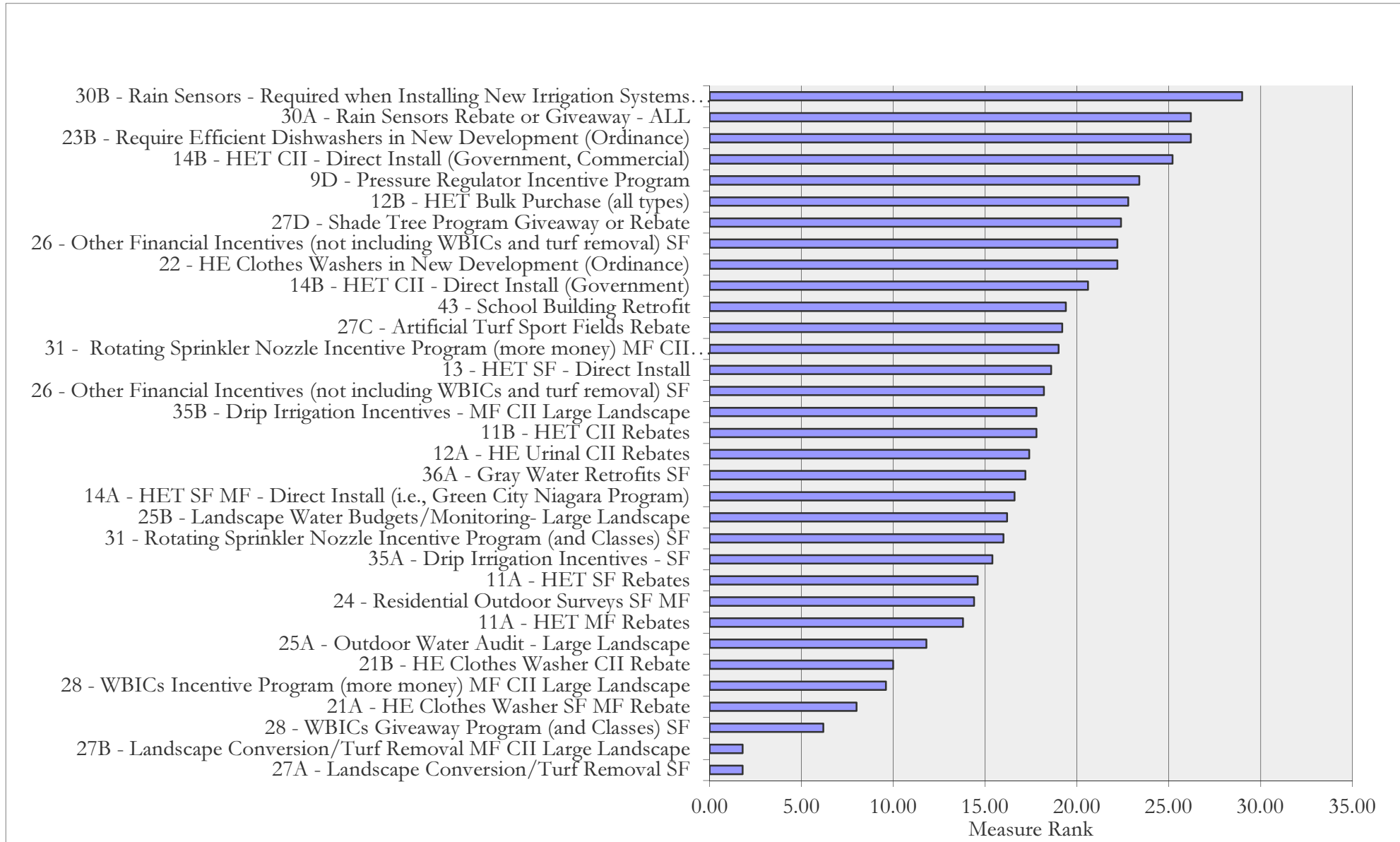


Figure G-2 CLWA Measures Screening Ranking



The general discussion screening criteria included:

- **Technology/Market Maturity** – Refers to whether the technology needed to implement the water use efficiency measure, such as an irrigation control device, is commercially available and supported by the local service industry. A measure was more likely to be included if the technology was widely available in the service area and less likely to be included if the technology was not commercially available or not supported by the local service industry.
- **Service Area Match** – Refers to whether the measure or related technology is appropriate for the area’s climate, building stock, and lifestyle. For example, promoting native and/or water efficient landscaping may not be appropriate where water use analysis indicates little outdoor irrigation. Thus, a measure was not included if it was not well suited for the area’s characteristics and could not save water; and was more highly considered to be included if it was well suited for the area and could save water.
- **Customer Acceptance/Equity** – Refers to whether retail customers within the service area would be willing to implement and accept the water use efficiency measures. For example, would retail customers attend homeowner irrigation classes and implement lessons learned from these classes? If not, then the water savings associated with this measure would not be achieved and a measure with this characteristic would score low for this criterion. This criterion also considers retail customer equity where one category of retail customers receives benefit while another pays the costs without receiving benefits. Retail customer acceptance may be based on convenience, economics, perceived fairness, and/or aesthetics.

Based on the above criteria, as well as input from other interested parties, MWM, CLWA and Retailer staff decided if a measure was a “Yes” or “No”. Measures with a “No” were eliminated from further consideration, while those with a “Yes” passed into the next evaluation phase: cost-effectiveness analysis using the DSS Model.

Below is the schedule of measure screening tasks:

- May 2013 - Survey Monkey survey distributed
- November 2013 – Screening Workshop
- December 2013 – Screening call with Retailer and CLWA representatives
- January 2014 – Screening call with Retailer and CLWA representatives
- February 2014 – Measure list finalized

The following figures present a summary of the level of interest in current and potential individual Retailer and CLWA led water conservation measures by CLWA and Retailer representatives.

Figure G-3 May 2013 Survey Summary of CLWA Current or Potential Conservation Measures

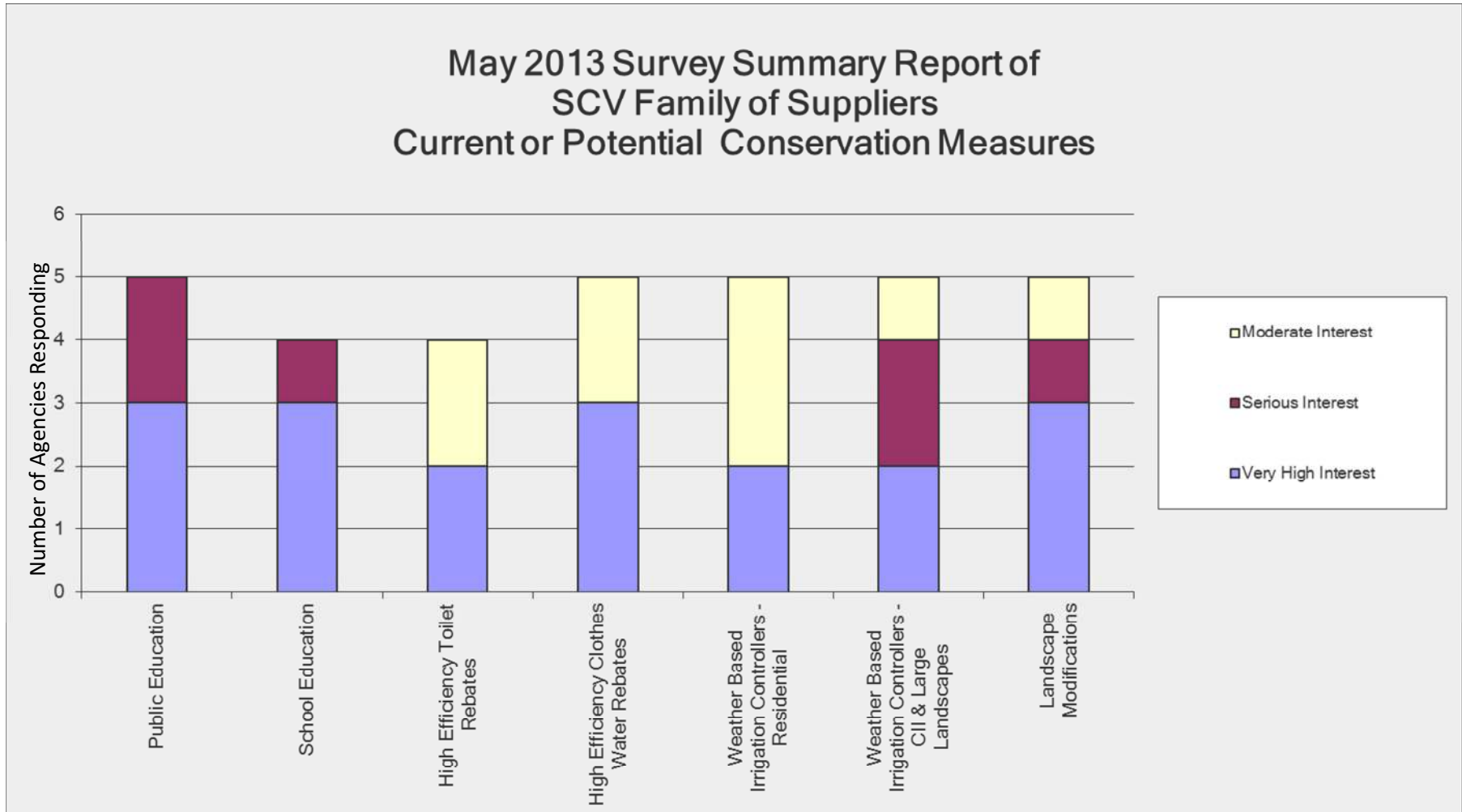
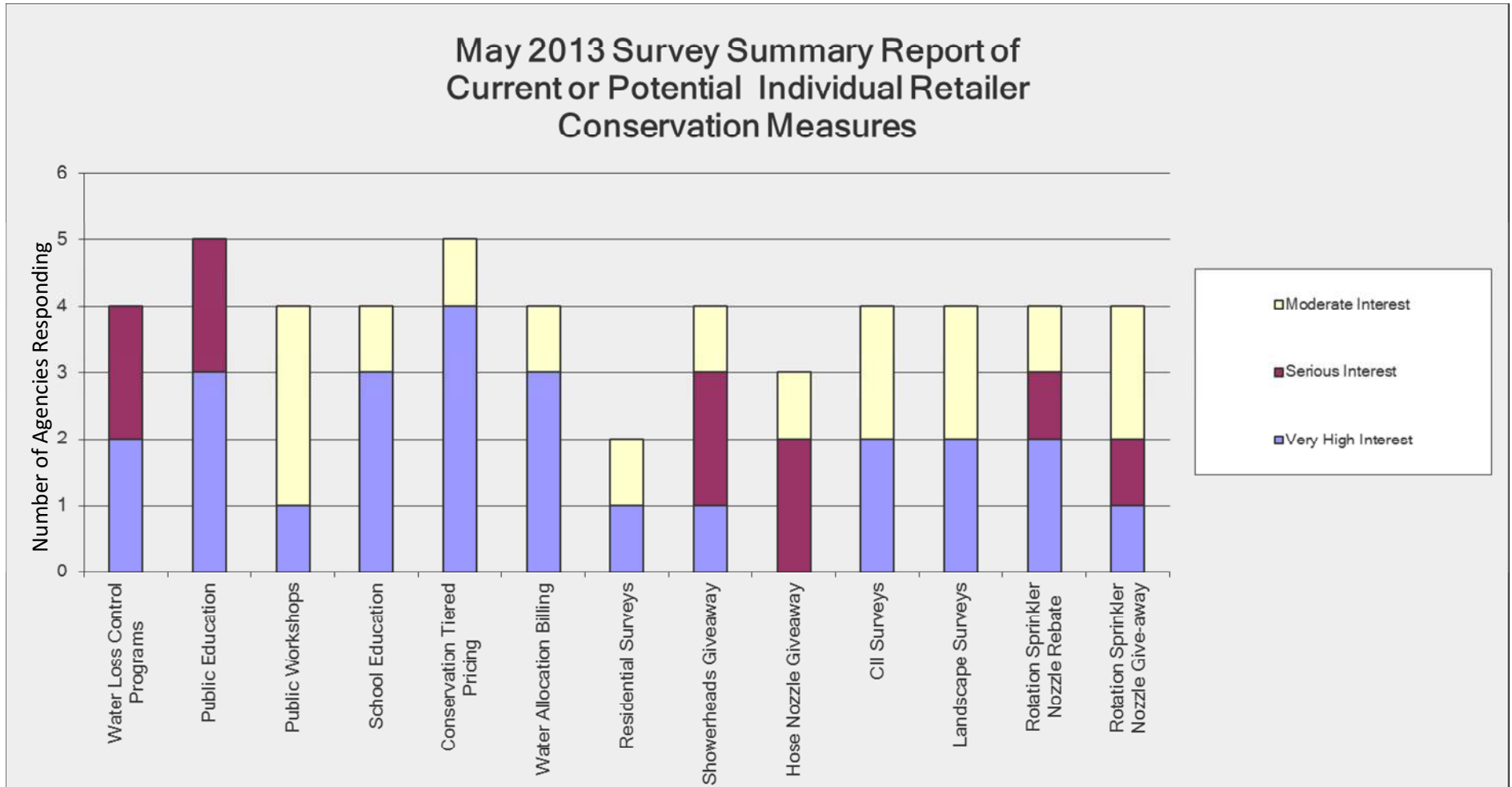


Figure G-4 May 2013 Survey Summary of Current or Potential Individual Retailer Conservation Measures



APPENDIX H LARGE USER ANALYSIS

To assist with future tracking and monitoring of CII water demand, the MWM team prepared a query of businesses in the Santa Clarita Valley based on a download of U.S. Census data for the northern Los Angeles County area. This data was further refined with a query of businesses found in zip codes within the four Retailer service areas. The businesses are coded by the North American Code Identification System (NACIS) as part of their tax identification process. The NACIS is very detailed and as a result MWM grouped similar businesses into categories that would align with similar types of water use. The outcomes of the business query are presented in the following table.

Table H-1 Query Results of Businesses in Santa Clarita Valley

Code	# of businesses	Business Description
54	1,230	Professional, scientific, and technical services
23	1,166	Construction
62	1,018	Health care and social assistance
44	810	Retail trade
42	809	Wholesale trade
81	774	Other services (except public administration)
72	767	Accommodation and food services
52	583	Finance and insurance
56	558	Administrative and support, waste management and remediation services
53	526	Real estate, rental, and leasing
51	301	Information
71	297	Arts, entertainment, and recreation
332	208	Fabricated metal product manufacturing
61	167	Educational services
48	161	Transportation and warehousing
453	144	Miscellaneous store retailers
454	113	Non-store retailers
334	84	Computer and electronic product manufacturing
339	60	Miscellaneous manufacturing
323	59	Printing and related support activities
31	58	Manufacturing
333	58	Machinery manufacturing
451	57	Sporting goods, hobby, book, and music stores
336	54	Transportation equipment manufacturing
55	52	Management of companies and enterprises
326	45	Plastics and rubber products manufacturing
325	38	Chemical manufacturing
452	36	General merchandise stores
335	35	Electrical equipment, appliance, and component manufacturing
337	25	Furniture and related product manufacturing

Code	# of businesses	Business Description
493	22	Warehousing and storage
492	20	Couriers and messengers
321	19	Wood product manufacturing
11	18	Agriculture, forestry, fishing, and hunting
327	15	Nonmetallic mineral product manufacturing
99	13	Industries not classified
22	12	Utilities
21	7	Mining, quarrying, and oil and gas extraction
331	5	Primary metal manufacturing
322	4	Paper manufacturing

Source: U.S. Census Data, 2010.

MWM further reviewed the Retailer's data and provided a more refined list of business types to assist with updates to each Retailer's billing systems. The types of business groups presented in the following table are intended to be support for fields in business systems that may be populated by the water retailers. Once additional business information is loaded into the Retailer billing system, additional water use analysis and the targeting of water use efficiency incentive programs may be completed.

Table H-2 List of Recommended Business Types

Category #	Main Category	Sub Category	NAICS Code
1	Agriculture, forestry, fishing, hunting, mining, quarrying, and oil and gas extraction		11 & 21
2	Utilities		22
3	Construction		23
4	Manufacturing		31
4-1		Wood product manufacturing	321
4-2		Paper manufacturing	322
4-3		Printing and related support activities	323
4-4		Chemical manufacturing	325
4-5		Plastics and rubber products manufacturing	326
4-6		Nonmetallic mineral product manufacturing	327
4-7		Primary metal manufacturing	331
4-8		Fabricated metal product manufacturing	332
4-9		Machinery manufacturing	333
4-10		Computer and electronic product manufacturing	334
4-11		Electrical equipment, appliance, and component manufacturing	335
4-12		Transportation equipment manufacturing	336
4-13		Furniture and related product manufacturing	337
4-14		Miscellaneous manufacturing	339
5	Wholesale trade		42

Category #	Main Category	Sub Category	NAICS Code
6	Retail trade		44
6-1		Sporting goods, hobby, book, and music stores	451
6-2		General merchandise stores	452
6-3		Miscellaneous store retailers	453
6-4		Non-store retailers	454
7	Transportation and warehousing		48
8	Information		51
9	Finance and insurance		52
10	Real estate and rental and leasing		53
11	Professional, scientific, and technical services		54
12	Management of companies and enterprises		55
13	Administrative and support and waste management and remediation services		56
14	Educational services		61
15	Health care and social assistance		62
16	Arts, entertainment, and recreation		71
17	Accommodation and food services		72
18	Other services (except public administration)		81
19	Single Family Residential HOA's		N/A
20	Multi-family Residential HOA's and Apartment Complexes		N/A
21	Mobile Home Parks		N/A
22	Municipal/Government		N/A
23	Dedicated Irrigation		N/A