Meeting Date: **10/29/2013**

Report Type: Staff/Discussion

Report ID: 2013-00696

23

City of SACRAMENTO

City Council Report
915 I Street, 1st Floor
www.CityofSacramento.org

Title: Adoption of the Updated Water Conservation Plan

Location: Citywide

Issue: In order to ensure a sustained water use reduction that meets or exceeds State law, the Department of Utilities has developed a Water Conservation Plan (WCP). The WCP is an update to the Interim Water Conservation Plan that was presented to City Council in late 2011 as part of its 2010 Urban Water Management Plan.

Recommendation: Pass a Motion adopting the updated Water Conservation Plan.

Contact: Bill Busath, Engineering Services Manager, (916) 808-1434; William Granger, Water Conservation Program Specialist, (916) 808-1417, Department of Utilities

Presenter: William Granger, Water Conservation Program Specialist, (916) 808-1417, Department of Utilities

Department: Department Of Utilities

Division: Water Conservation

Dept ID: 14001381

Attachments:

1-Description/Analysis

2-Background

3-Water Conservation Plan

City Attorney Review

Approved as to Form
Joe Robinson
9/23/2013 3:34:18 PM

City Treasurer Review

Reviewed for Impact on Cash and Debt
Janelle Gray
9/10/2013 12:54:04 PM

Approvals/Acknowledgements

Department Director or Designee: Dave Brent - 9/20/2013 9:44:30 AM

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Description/Analysis

Issue Detail: The City of Sacramento submitted an Interim Water Conservation Plan as part of its 2010 Urban Water Management Plan (UWMP) that was taken to City Council and approved on October, 18, 2011, and submitted to the California Department of Water Resources. This report recommends adoption of the revised Water Conservation Plan (WCP) to replace the Interim Water Conservation Plan. The WCP outlines how the City of Sacramento will maintain or exceed the state-mandated 20% reduction of its per capita water consumption.

Policy Considerations: Adoption of the revised Water Conservation Plan is related to the City's General Plan requirements of:

- U 2.1.5: Comprehensive Water Supply Plans. The City shall prepare, implement, and maintain long-term, comprehensive water supply plans.
- U 2.1.10: Water Conservation Programs. The City shall implement conservation programs that increase water use efficiency, including providing incentives for adoption of water efficiency measures.
- U 2.1.11: Water Conservation Enforcement. The City shall continue to enforce City ordinances that prohibit the waste or runoff of water, establish limits on outdoor water use, and specify applicable penalties.
- U 2.1.13: Landscaping. The City shall continue to require the use of water-efficient landscaping in all new development.
- ER 1.1.3: Stormwater Quality. The City shall control sources of pollutants and improve and maintain urban runoff water quality through storm water protection measures consistent with the City's National Pollution Discharge Elimination System (NPDES) Permit.

Economic Impacts: Not applicable

Environmental Considerations: California Environmental Quality Act (CEQA) review is not required prior to adoption of the WCP, under the general rule that CEQA does not apply when it can be seen with certainty that the activity in question does not present the potential for causing any significant effects on the environment (CEQA Guidelines section 15061(b)(3)). Adoption of the revised WCP will provide a framework that identifies a variety of tools that can be used by the City and City residents to reduce water use and increase water use efficiency, and meet the future water conservation goals mandated by State law. Rather than causing any significant environmental effects, these measures will reduce potential environmental effects associated with water use, by reducing surface water diversions and groundwater pumping, by offsetting the need to construct additional water production capacity, and by reducing energy consumption and other impacts associated with water production and distribution and the collection and treatment of this water after it has been used. Adoption of the proposed WCP does not approve or commit the City to any particular capital

improvement or construction project or projects, and any future projects to help meet the City's water conservation and water use efficiency goals, such as water meter installation and replacement or repair of aged leak-prone water distribution lines, will be required to comply with CEQA and any other applicable environmental and regulatory requirements prior to City approval. Adoption of the proposed WCP also constitutes general policy making, which is not considered to be a "project" for which CEQA review is required (CEQA Guidelines section 15378(b)(2)).

Sustainability: Adoption of the Water Conservation Plan will support the City's sustainability goals of reducing greenhouse gasses and conserving resources.

Commission/Committee Action: A presentation of the Water Conservation Plan was provided to the Council Water Ad Hoc Committee on August 28, 2012.

Rationale for Recommendation: Adoption of the revised Water Conservation Plan will help support the City's efforts to comply with the Water Conservation Act of 2009 which mandated a 20% per capita water use reduction by 2020. The Water Conservation Plan outlines a path for the City to follow that will result in sustained per capita water use reduction that meets or exceeds the State requirement. Approval of the WCP will also demonstrate the City's commitment to water conservation.

Financial Considerations: The Water Conservation Plan identifies funding that will be proposed to support expanded conservation efforts beginning in Fiscal Year 2016. Future operating budgets will be updated to include this proposed funding.

Emerging Small Business Development (ESBD): Not applicable

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Background

On October 18, 2011, City Council adopted the 2010 Urban Water Management Plan (UWMP), which included an Interim Water Conservation Plan (IWCP). The IWCP outlined how the City would achieve a 20% reduction from its baseline water usage by 2020, as mandated by SB X7-7. At the time that the 2010 UWMP was adopted, additional information was needed to complete the IWCP.

Over the last year and a half, Department of Utilities (DOU) staff has been working diligently to complete the revised Water Conservation Plan (WCP). In mid-2012, Maddaus Water Management (MWM) was hired to finalize the development the City's Water Conservation Plan. MWM has developed over 300 plans and a short list of similar work includes that done for East Bay Municipal Water District, Marin Municipal Water District, City of Petaluma, City of Oceanside and the Honolulu Board of Water Supply.

The revised WCP was developed with input from the Sacramento Water Conservation Advisory Group (SWCAG). The SWCAG included Councilmember Darrell Fong, local citizens, representatives from other City departments as well as organizations such as the Sacramento Regional Sanitation District, Rental Housing Association, the State Department of Water Resources, and the Water Forum. The SWCAG met a number of times beginning in the spring of 2012 to help develop and review the various program options. On August 28, 2012, a presentation on the WCP was made to the City Council Water Ad Hoc Committee.

The revised WCP outlines the City's reduction target as well as the evaluation of 80 measures that could be implemented to achieve the savings target. Four options were considered as outlined below:

- Program A: a continuation of existing programs (Program A);
- Program B: intensive expansion of the water conservation program to approximately twenty water conservation measures which includes programs administered by the Water Conservation Office and an expansion of the City's system wide leak detection and repair program;
- Program C: all of Program B plus water conservation pricing and;

- Program D: all of Program C plus the aggressive implementation of additional programs.

Program C involves an increase of the Water Conservation Office budget in fiscal year 2016, from $1.5 million to $4 million, whereas Program D would require an even further increase of the Water Conservation Office Budget to approximately $8.5 million. Both Program C and Program D are projected to meet and exceed the City's target of 223 GPCD by 2020.

After considerable discussion by the SWCAG, it was recommended that the City implement Program C to better ensure that the water reduction target of 223 gallons per capita per day (GPCD) is achieved or exceeded. The funding required to support expanded conservation efforts will be proposed beginning in Fiscal Year 2016. Future operating budgets will be updated to include this proposed funding. DOU staff will closely monitor the City's GPCD target and regularly report progress to the City's Water Ad Hoc Committee and the SWCAG as part of its Business Plan.

The revised Water Conservation Plan does not show a significant increase in program activity until fiscal year 2016. The Plan anticipates increasing the City's water conservation, outreach and system-wide leak detection budgets at that time, to achieve the needed water savings reduction.

Once approved, the WCP will provide the City with a template on how to achieve its 2015 and 2020 per capita water use reduction targets. Adopting the WCP and achieving these targets will better allow the City to pursue grant funding from the California Department of Water Resources (DWR) and also demonstrate the City's commitment to water conservation.

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FINAL PLAN
October 29, 2013

City of Sacramento

Water Conservation Plan

Prepared by: City of Sacramento Department of Utilities and Maddaus Water Management
Developed with: The Sacramento Water Conservation Advisory Group (SWCAG)

Spare the Water SACRAMENTO

MADDAUS WATER MANAGEMENT

City of SACRAMENTO Department of Utilities

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EXECUTIVE SUMMARY

Water conservation is a priority and long-standing element of the City of Sacramento water resource portfolio. Beginning in 1995, the City formally signed the Memorandum of Understanding regarding Urban Water Conservation as overseen by the California Urban Water Conservation Council. In 2000, the City signed the Water Forum Agreement, committing to leverage the benefits of water conservation as part of the solution to preserve the Lower American River. With the passage of Senate Bill 7 of Special Extended Session 7 (SB X7-7) in November 2009, water utilities throughout the state, including the City of Sacramento Department of Utilities, are required to meet specific water conservation savings targets by December 31, 2020 or face potential state judicial or administrative action.

An essential theme of the City of Sacramento Water Conservation Plan (the WCP) 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 the City continues to work to address evolving local economic conditions, water demands, climate variability, potential drought conditions and changing state regulations.

The WCP provides a comprehensive approach supported by a thorough economic analysis that will guide the City's water conservation efforts in the coming years. The WCP also delivers easy-to-understand results and quantifies the benefits of meeting a significant portion of the City's future water demands through water conservation measures in lieu of adding additional infrastructure. The WCP is designed to help optimize the City Department of Utilities (Department) operational programs and decision-making process as staff continue to monitor progress in meeting the SB X7-7 mandate of a 20 percent reduction in per capita water use by 2020.

Many experts and stakeholders collaborated in producing the WCP, particularly, the Sacramento Water Conservation Advisory Group (SWCAG), a multi-stakeholder group of approximately 20 entities. The SWCAG was convened in 2010 to serve in an ongoing advisory capacity to the City regarding its water conservation programs and policies, and for strategic planning. The California

State University, Sacramento (CSUS) Center for Collaborative Policy (CCP) served as an independent facilitator and helped encourage the development of the City's effective water conservation policy and water use efficiency by advancing public education and awareness, and building collaborative partnerships throughout this planning effort.

The WCP is directly connected to the City's Water Master Plan and is consistent with the Department's Strategic Plan goals of building public trust and maintaining financial viability. It is also consistent with the City's goals and policies as established in the 2030 General Plan. It works in conjunction with the City's Climate Action Plan, Sustainability Master Plan, Greenwise Joint Venture and Clean Energy Sacramento by YGrene.

The Department and SWCAG's primary objectives used to develop the WCP include:

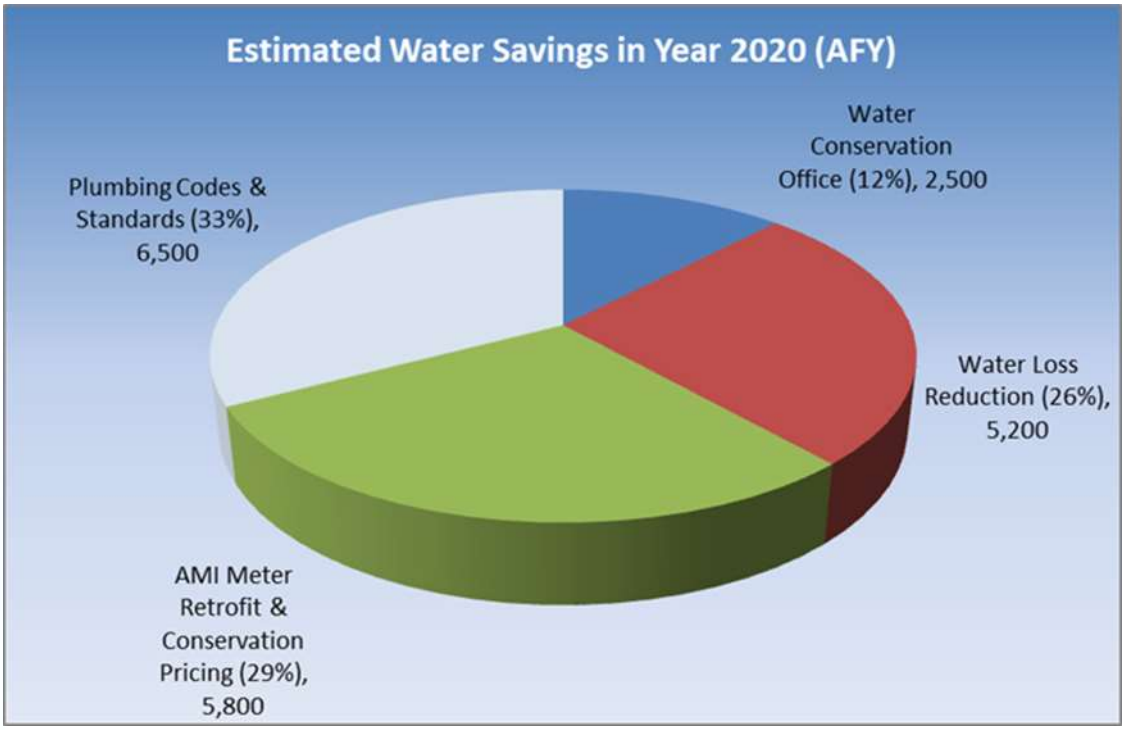
- Deliver cost effective water conservation and water use efficiency measures to maximize opportunities to sustainably meet the future water needs of the City;
- Offset and/or delay the need to construct additional water production capacity in the future;
- Assist with reducing ratepayer costs for the treatment and delivery of water and the treatment of wastewater, and reduce water-related energy consumption;
- Meet state and federal water conservation mandates;
    - Achieve or exceed 20 percent per capita water use reduction statewide by 2020;
    - Maintain commitments to the California Urban Water Management Council and Water Forum, 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 rivers and groundwater integral to the region's quality of life.

The WCP results illustrate that water conservation will continue to lower projected demands during the next 20-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, the Department of Utilities, SWCAG and Water Ad Hoc Committee established the WCP to meet, at a minimum, the required conservation goal of reducing per capita water demands per day (GPCD) 20 percent or more by 2020. Achieving this goal using the WCP's recommended conservation program of measures is estimated to sustainably reduce the City's overall use from its baseline, and save approximately 30 million gallons of water per day by the year 2020. Many of the added measures will take time for results to accrue, therefore, they are planned to be put into place as soon as feasible. While overall water use through FY 2012 remains relatively low compared to the City's base period, it has begun to rise and could put the City in jeopardy of achieving its 2015 and 2020 targets which are linked to receiving future grant funding.

The water conservation planning approach used to develop the City's WCP 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 the Department's water capital facility planning. The infrastructure needs of the City's water systems are substantial. Strategic use of water conservation will not only help the City 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 City's water conservation program is comprised of multiple water conservation measures such as the system-wide implementation of advanced metering infrastructure (AMI) and further implementation of a water loss reduction program. It includes measures to educate, incentivize or mandate conservation equitably among various types of City customers including residential, commercial, institutional, and irrigation accounts. Water savings will come from the components of the WCP as noted in Figure E.S1 below: AMI meter installation and water conservation pricing, system water loss reduction, successful implementation of programs and measures by the Water Conservation Office, and benefits from existing and new plumbing codes and standards.

Figure ES-1: City of Sacramento Estimated Water Savings in Year 2020 by Measure Type



At the conclusion of the analysis process, four programs were developed and reviewed by the SWCAG and the Department of Utilities' Management Team (see Table ES-2 below). A consensus was reached on the recommended program. The implementation approach agreed upon is:

- Implement Program C , a more intensive effort of existing measures with new measures added that ensure the City achieves or exceeds its 20 x 2020 reduction target of 223 GPCD;
- 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 Regional Water Authority, state and federal grants and partnerships to the maximum extent possible through 2020 to continue expansion of the programs offered by the Water Conservation Office;

- Pursue a comprehensive water conservation pricing study by 2014. Rebalance the conservation measures, depending on the City's progress towards meeting 2020 target, after considering the factors intrinsic to the volumetric pricing rate.

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

Comparison of Program Savings and Water Conservation Office Estimated Costs City of Sacramento					
Program	2020 Per Capita	2040 Per Capita	Meet SB x7-7 Targets?	Annual Conservation Program Only Estimated Cost in 2020*	Estimated Annual Costs in 2020 ($/person)**
A (Existing)	233	222	No	$ 1,520,000	2.73
B (2020)	227	211	No	$ 3,920,000	7.07
C (2020+Pricing)	223	205	Yes	$ 3,940,000	7.11
D (All modeled)	221	200	Yes	$ 8,480,000	15.31

The recommended next steps for the successful implementation of the WCP include:

- Strengthen existing partnerships, forge new ones and apply for grants where available;
- Reassess program focus and activity levels annually to help decide upon priorities for the next plan year, using the recommendations from the WCP;
- Prioritize measures for implementation with those that contribute the most to meeting the per capita water use targets ; and
- Conduct a market penetration study within the next few years to determine the saturation of high efficiency fixtures primarily in the single family sector.
- Continue engaging the Sacramento Water Conservation Advisory Group to review and provide input on the plan progress and schedule to meet the City's GPCD target.

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ACKNOWLEDGEMENTS

The revised Water Conservation Plan was developed and prepared by the City of Sacramento Department of Utilities and Maddaus Water Management (Technical Consultant for the Plan), under direction by Julie Friedman (in 2012) and later William Granger. This effort included input and guidance from City Staff and the Department of Utilities Management Team, the Sacramento Water Conservation Advisory Group, the City of Sacramento Water Ad Hoc Committee, California State University (CSUS) Center for Collaborative Policy (Facilitator for Stakeholders) and the Water Forum (Technical Advisory Support). We thank the many experts consulted during this process for their assistance in producing this research and Plan.

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ACRYONYM LIST

AB	Assembly Bill
AF	acre-foot/acre-feet
AMI	Advanced Meeting Infrastructure
AMS	Advanced Metering System
AWWARF	American Water Works Association Research Foundation
BMP	Best management practice
C&S	Study Cost & Savings Study
CII	Commercial, industrial, institutional
CIMIS	California Irrigation Management Information System
City	City of Sacramento
CMMS	Computerized Maintenance Management System
COM	Commercial
County	County of Sacramento
CCP	Center for Collaborative Policy
CUWCC	California Urban Water Conservation Council
CSUS	California State University, Sacramento
DMM	Demand Management Measure
DOU	Department of Utilities
DSS Model	Demand Side Management Least Cost Planning Decision Support System
DWR	California Department of Water Resources
EPA	Environmental Protection Agency
ET	Evapotranspiration
ETo	Reference evapotranspiration
FTE	Full-time equivalent
FWTP	E. A. Fairburn Water Treatment Plant
FY	Fiscal Year
GIS	Geographic local information system
GOV	Government
GPD	Gallons per day
GPD/A	Gallons per day per account
GPCD	Gallons per capita per day
GPF	Gallon per flush
GPM	Gallon per minute
HET	High-efficiency toilet
HEU	High-efficiency urinal
HEW	High-efficiency washer
HOA	Home Owners Association
INST	Institutional
IRR	Irrigation
IWCP	Interim Water Conservation Plan
LEED	U.S. Green Building Council Leadership and Excellence in Environmental Design
MF	Residential multi-family
MG	Million gallons
MGD	Million gallons per day
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
MWM	Maddaus Water Management
ND	New development
NRW	Non revenue water
NGO	Non-profit governmental organization
O&M	Operations and maintenance
PG&E	Pacific Gas and Electric
PSA	Public Service Announcement
RWA	Regional Water Authority
RWEP	Regional Water Efficiency Program
SACOG	Sacramento Area Council of Governments
SAWWA	Sacramento Area Water Works Association
SB	Senate Bill
SF	Residential single family
SMUD	Sacramento Municipal Utility District
SRWTP	Sacramento River Water Treatment Plant
SWCAG	Sacramento Water Conservation Advisory Group
Tech Memo	Technical Memorandum
ULF	Ultra low flow
UNAR	Uniform North American Requirements
USBR	US Bureau of Reclamation
UWMP	Urban Water Management Plan
WF	Sacramento Water Forum
WCP	Sacramento's Water Conservation Plan
YR	Year

1. INTRODUCTION

This section provides the defined authority to create this plan, the objective, purpose and scope of the Water Conservation Plan (WCP), an overview of the City of Sacramento's water system and provides a project history of the development of the Plan.

1.1 Defining Authorities

This WCP was prepared by the City of Sacramento Department of Utilities (DOU) in support of the Sacramento Water Conservation Program. The WCP is an update to the "Interim Water Conservation Plan" (IWCP) that was included as an Appendix to the 2010 Urban Water Management Plan (UWMP). At the time of UWMP adoption in October 2011, additional information was needed to complete the IWCP.

The WCP was prepared according to United State Environmental Protection Agency and American Water Works Association (AWWA) guidelines for the development of Water Conservation Plans and authored by the City's Environmental Services Manager, the Water Conservation Administrator (Project Manager) and the Technical Consultant, Maddaus Water Management (MWM). The WCP was developed by the City DOU with the Sacramento Water Conservation Advisory group (SWCAG) and Water Ad Hoc Committee and supported by using the Demand Side Management Least Cost Planning Decision Support System (DSS) Model developed and technical chapters prepared by MWM under Contract Numbers C2012-0427 and C2012-0427-1. The completion of the WCP and cost effectiveness modeling effort also updates past planning efforts performed or supported by MWM, Water Forum and City Staff: In 1999, MWM developed the City's 2000 Urban Water Management Plan (UWMP); in 2005 MWM reviewed information during the development of the Regional Water Conservation Master Plan; in 2009 and 2010, City DOU and Water Forum developed the IWCP.

1.2 Objective of Plan

The City's stated objective is to develop a Water Conservation Plan to attain the water efficiency goals in the most cost-effective manner for implementation by City staff. Key components of the WCP include:

- Updating and further examining the water savings already committed to by the City of Sacramento to identify the best path towards achieving those savings and the means for monitoring those commitments to the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding Regarding Urban Water Conservation (MOU); and

- Developing a long-term plan for complying with SB X7-7 and meeting the gallons per capita per day (GPCD) target by 2020.

The DOU and SWCAG's primary objectives used to develop the WCP include:

i. Maximize opportunities to sustainably meet the future water needs of the City of Sacramento through cost-effective water conservation and water use efficiency;
ii. Identify strategies to reduce ratepayer costs for the treatment and delivery of water and the treatment of wastewater, reduce water-related energy consumption, and offset the need to construct water production capacity in the future;
iii. Maintain commitments to achieving 20 percent GPCD water use reduction statewide by 2020 and meet state and federal mandates;
iv. Demonstrate environmental stewardship and foster wise, innovative, responsible and efficient practices;
v. Expand the current Water Conservation Program that further helps support the health of rivers and groundwater integral to the region's quality of life.

1.3 SB X7-7 Targets and Plan Savings Goals

The City is committed to maintaining a water demand reduction through water conservation and water use efficiency. Water conservation is defined as not using water to perform a task that could otherwise use water (e.g., sweeping instead of using a hose to wash down a sidewalk), and water use efficiency is defined as achieving the same task that requires water to be done with less water (e.g., watering the lawn less each day). The City is creating a path that will strive to reach its water savings goals by being more efficient with its own operations and maintenance practices and using various conservation "measures" to encourage customers to be both more conserving and efficient with their water use.

As required by the Urban Water Management Planning Act and published in the City's Urban Water Management Plan (UWMP), the City is expected to reduce per capita water consumption by 56 GPCD (or about 30 million gallons per day) by 2020 according to the requirements of SB X7-7. The 56 GPCD reduction is the computed target from the 10-year historical baseline of 279 GPCD reduced by 20% down to 223 GPCD.

Currently, water demand is repressed due to a potential variety of factors, including the economic downturn. The City relayed in the 2010 UWMP that estimated demands are assumed to rebound prior to 2020 to approximately pre-recession levels based on water production levels in 2008 equating to 256 GPCD. Most recently, water production has trended back up from 207 GPCD in 2010 to 217 GPCD in 2012.Given the City has estimated water demand may return to

approximately 256 GPCD under normal economic conditions (without conservation) the amount of water savings estimated to reach the 223 GPCD target specified in SB X7-7 by 2020 is 33 GPCD and serves as the goal for the WCP. The City will continue to track and monitor GPCD annually along with its progress implementing its water conservation program in order to comply with the CUWCC MOU in the near term and to meet SB x7-7 requirements by 2020.

1.4 Purpose and Scope of Plan

The City's 2010 Urban Water Management Plan (UWMP) dictated the scope of the WCP to be designed to clearly uphold commitments to the CUWCC MOU and Sacramento Water Forum Agreement, achieve Senate Bill 7 of Special Extended Session 7 (SB X7-7), and be consistent with the 2010 UWMP and complete the Interim WCP.

The City has engaged in an ongoing process to evaluate its water conservation programs, which has involved the following participating groups:

- City Council
- Water Ad Hoc Committee
- City staff
- Sacramento Water Conservation Advisory Group
- Community-at-Large

The City's water conservation programs will be revised periodically as the water savings potential diminishes as conservation is achieved and as new opportunities or technologies arise. The WCP is an update to the "Interim Water Conservation Plan" published in the 2010.

Any changes in Sacramento's water conservation programs will reflect the benefits (and costs) of water conservation in this region, including benefits associated with protecting the environmental health of the rivers that are integral to the region's quality of life. Moreover, water efficiency measures often have ancillary benefits including reductions in energy use and improvements in water quality. As discussed in the Climate Change chapter of the UWMP (Chapter 7), 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 Mountains.

The City of Sacramento will continue to aggressively pursue more efficient water use, and is committed to fully participating in meeting California's statewide goal of a 20 percent reduction in per capita water use in a manner that is most cost effective and provides the greatest benefits to the City's ratepayers.

1.5 Overview of Sacramento Water System[1]

The City is located in the Central Valley of California, in Sacramento County (County). The City is also located at the confluence of the Sacramento and American Rivers. The Sacramento River flows south from Lake Shasta, while the American River flows west from the Sierra Nevada Mountains.

As described in the City's Urban Water Management Plan, the City's DOU is responsible for providing and maintaining water production and distribution, sewer collection, storm drainage, and flood control services for residents and businesses within the City limits. The Department strives to provide its customers with dependable, high quality water, storm drainage and wastewater services in a fiscally and environmentally sustainable manner. The City is both a water retailer and wholesaler and has extensive surface water entitlements, consisting of five appropriative water right permits issued by the State Water Resources Control Board (SWRCB), pre-1914 rights and a water rights settlement contract with the United States Bureau of Reclamation (USBR). These water entitlements allow the City to divert water from both the Sacramento and American Rivers.

The City treats surface water diverted from the Sacramento and American Rivers through the Sacramento River Water Treatment Plant (SRWTP) and the E.A. Fairbairn Water Treatment Plant (FWTP). The SRWTP, located less than one-fourth mile downstream from the confluence with the American River, began operation in 1924 and, currently, due to the conditions of the existing facilities and hydraulic constraints, the SRWTP's reliable capacity is limited to 135 MGD. Construction is underway for a project to rehabilitate the older facilities at the SRWTP to bring the capacity back to 160 MGD. The FWTP is located on the American River approximately seven miles upstream of the American and Sacramento River confluence. The FWTP began operation in 1964 and has a current design capacity of 200 MGD following the expansion completed in late 2005. Currently, the California Department of Public Health (CDPH) has permitted a capacity of 160 MGD. However, the amount of water diverted is further limited when the river levels are less than the Hodge Flow Criteria. During times of peak demand, generally in July and August, the Hodge Flow Criteria restrict the Fairbairn WTP intake to a diversion rate of 100 MGD. The limitations vary throughout the year and more information can be found in the Water Forum Agreement.

The City currently operates a number of municipal groundwater supply wells. Additionally, irrigation wells are operated separately from the drinking water system and are used to meet irrigation demands of City parks. The City's water supply master plan includes a conjunctive use element and groundwater capacity will be increased to support the conjunctive use program.

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[1] Adapted from City of Sacramento's 2010 Urban Water Management Plan (October 2011).

The City also maintains distribution system infrastructure serving more than 130,000 customer accounts, including a pipeline network of just over 1,760 miles of transmission and distribution mains ranging in size from four to 60 inches in diameter; only 154 miles consist of pipe that are 14 inches in diameter or larger.

1.6 Structure and Basis of Existing Sacramento Conservation Program and Regional Partnerships

The City has been a signatory of the California Urban Water Conservation Council (CUWCC) since 1995 and a signatory to the 2000 Water Forum Agreement that includes a Purveyor Specific Agreement with provisions for Water Conservation. Currently, Sacramento partners with the Regional Water Authority (RWA) for a variety of conservation projects related to state and federal grant assistance programs and also for the regional "Be Water Smart - Blue Thumb" public awareness campaign and school education programs. The City, through RWA, supports and partners with local energy providers, Sacramento Municipal Utility District (SMUD), and the Sacramento County Regional County Sanitation District (SRCSD) to implement conservation rebate programs.

Over the past decade rebate programs have been historically offered to the City's customers through City run programs and the RWA regional partnerships. These programs range from toilet and washing machine rebate incentives for residential and business customers to state-of-the-art weather based "smart" irrigation controller rebates. Given that more than 70 percent of the City's demand is estimated to be residential and the region's warm and dry Mediterranean climate, an emphasis on residential outdoor water use is important because as much as 60 percent of residential water use goes to irrigating residential landscapes.

The success of the WCP will require that the City be proactive in marketing and educating customers as to the benefits of installing water efficient devices and changing water use habits. It is anticipated that many of these programs will increase in participation as more customers become metered and pay a volumetric rate for water used.

1.6.1 Laws, Regulations and Agreements

There are a number of water conservation related agreements, laws, codes and regulations that frame the requirements of the WCP; these are listed below. The WCP responds to these requirements and includes the conservation measures necessary for the City to stay in compliance with the requirements. Approval of the updated Water Conservation Element for the Water Forum Agreement is consistent with the City of Sacramento's Sustainability Master Plan Goals.

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

ii. SB 407 – Requires residential and commercial property owners of pre-1994 buildings or dwelling units to replace existing plumbing fixtures with water conserving fixtures by 2017 and 2019 respectively and to upgrade existing buildings upon any remodel initiated after January 1, 2014; and authorizes the City to enact local ordinances for greater amount of water savings.

iii. 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.

iv. AB 1881 – State Model Water Efficient Landscape Ordinance adopted by the City in 2009; improves efficiency in water use in new and existing urban irrigated landscapes.

- In 2009, Sacramento City Council adopted an ordinance repealing and adding Chapter 15.92 to the Sacramento City Code related to water efficient landscape and irrigation. Additionally, City Council adopted an Ordinance amending Article XI of Chapter 13.04 of the Sacramento City Code relating to Outdoor Water Conservation to prevent waste and ensure reasonable use of water, and that promoted low volume irrigation methods to reduce the per capita amount of water used by City customers.

v. 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 be conditioned on the implementation of the Demand Management Measures (DMMs) (the Best Management Practices (BMPs).

vi. AB 2572 – Requires the City to install water meters by January 1, 2025 and charge upon volume of delivery. To meet California state law, the City is required to install over 60,000 water meters on unmetered single-family connections before 2025. As part of the City of Sacramento's capital improvement program, the City installs between 5,000-7,100 residential water meters per year with a goal to have all connections metered before January 1, 2025.

vii. Prop 84 – Requires priority project lists be included in Integrated Regional Water Management Plan for the American River Basin for the City and other local agencies to gain grant eligibility.

viii. AB797 – Urban Water Management Planning Act requires the City to implement either Demand Management Measures or Best Management Practices.

ix. California Urban Water Conservation Council (CUWCC) 2008 MOU – City has been signatory since 1995 and committed to implementing the Water Conservation Best Management Practices (BMP's).

x. Water Forum Agreement (City Agreement No. 199-222, updated in 2009 with Resolution No. 2009-433) –In 2009, the City adopted the updated Water Conservation Element (WCE)

to the 2000 Water Forum Agreement. The WCE is essential to meeting both of the co-equal objectives of the Water Forum, to meet the region's water supply needs, and preserve and enhance the lower American River. The Water Forum signatories agree to replace current water conservation plans with the California Urban Water Conservation Council Memorandum of Understanding (CUWCC MOU). Adoption is consistent with the City's Sustainability Plan.

xi. National Plumbing Code – passed in 1992 has long required more efficient plumbing fixtures to be for sale through the United States.

xii. 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.

1.7 Plan Development with Stakeholders

Many experts were consulted during this collaborative process for their assistance in producing the WCP, particularly, the Sacramento Water Conservation Advisory Group (SWCAG), a multi-stakeholder group of approximately 20 entities, the City Water Ad Hoc Committee and City Manager, and the City DOU Management Team.

The SWCAG was established in November 2010 to serve in an on-going advisory capacity regarding the Sacramento water conservation programs and policies, and for strategic planning. The California State University, Sacramento (CSUS) Center for Collaborative Policy (CPP) helped to serve as a neutral facilitator. The DOU convened with the stakeholders to encourage effective water conservation policy and water use efficiency, advance public education and awareness, and build collaborative partnerships. The SWCAG members helped develop the City Water Efficiency Plan. Specifically, they:

- Provided input on water conservation policies and programs to support staff to achieve City's water conservation efficiency goals and targets.
- Worked with staff to collaboratively develop a SWCAG "work plan" including key advisory objectives and timelines.
- Provided specific feedback to the Water Conservation Interim Plan.
- Assisted in expanding public awareness, education and technical assistance including developing and relaying key water conservation messages to the community.
- Expanded partnerships with organizations to leverage results.

The WCP Project was conducted over a two year period. Significant stakeholder involvement was used to develop the most appropriate plan for the City. In 2012, City DOU presented possible Goals and Measures List (a list of 80 Water Conservation Measures that the City was currently providing and new Measures) to the SWCAG for comment at the meetings held between March

and June, 2012. The Facilitator assisted with achieving consensus on the Goals and the Measures that were evaluated. SWCAG Workgroups, DOU Workgroups and a Technical Advisory Workgroup were put in place to assist in reviewing, rating and ranking the Measures prior to evaluation. The final results were provided to the technical consultant, Maddaus Water Management, for the Decision Support System Cost Benefit Analyses.

City staff actively sought and considered input from SWCAG members and other interested stakeholders before finalizing the Measures that were evaluated. City staff was open to any and all input provided by SWCAG participants, and retained the flexibility to revise the scope in consideration of new information, advice, or events which were discussed with the SWCAG. The staff's goal was to direct facilitated discussion toward topics that would significantly benefit the City's water demand management and water conservation efficiency goals within a defined scope and limited resources.

The role of the SWCAG members is to provide informed advice to City Utilities staff about the City's water conservation programs and policies as outlined by the Water Conservation Plan. In order to provide the best possible comment on conservation issues, members learned about existing city policy and practices, water conservation community best practices, and the City's analysis of how best practices might be applied in Sacramento, e.g. the Water Conservation Plan cost-benefit analysis and any constraints in the City of Sacramento context. Members discussed their concerns and suggestions with each other and with City staff, and, where possible, utilized the neutral Facilitator to resolve any differences of opinion within the SWCAG in order to provide consensus-based recommendations to the City.

Each SWCAG member had the following responsibilities:

- Become conversant with the City's Water Conservation Interim Plan, Goals and BMP Targets, Mission and Vision (2010-2015 Strategic Plan), programs, and policies (including ordinances).
- Attend all regularly scheduled SWCAG meetings and be prepared by having reviewed previous meeting summaries and materials distributed in advance of each meeting; or, if attendance is not possible, to check in with City staff or the facilitators to learn what was missed and to notify staff of an alternate that may attend the meetings, keeping in mind that consistent participation is important.
- Provide feedback and guidance to staff on the project work plan, upcoming meeting agendas, and other relevant issues.
- Work toward agreement on joint advice where possible by making good faith efforts to understand differing points of view.
- Provide effective representation by informing his or her organization of SWCAG discussions and consulting them on upcoming issues.

- City Staff had the following responsibilities: The Department of Utilities' Engineering and Field Services Divisions provided staff for the SWCAG and collaboratively created and managed the SWCAG work plan to ensure timely progress toward meeting the City's water conservation goals.
- Accurately convey information about water conservation program and policy issues, as well as resource and time constraints.
- Represent the interest of City ratepayers as well as Department of Utilities during SWCAG discussions.
- Work with the facilitators to coordinate logistics for meetings, including meeting dates, room bookings, and audio-visual equipment.
- Coordinate and prepare informational briefings and materials for SWCAG members.
- Actively solicit SWCAG member feedback throughout the planning process and incorporate input.
- Ensure City policy makers are briefed periodically throughout the planning process and consulted on any pressing issues.

Facilitators

The Center for Collaborative Policy provided facilitation to the SWCAG. The role of the facilitator was to:

I. Provide recommendations to City staff for structuring SWCAG discussions, and facilitate those discussions.
II. Actively seek to help all parties express their concerns and recommendations to the full SWCAG and City staff, and to help SWCAG members resolve differences of opinion where possible.
III. Remain impartial as to the content of the policy and controversial issues under discussion.
IV. Coordinate with the project manager to develop agendas and meeting materials, and track meeting discussions and outcomes.

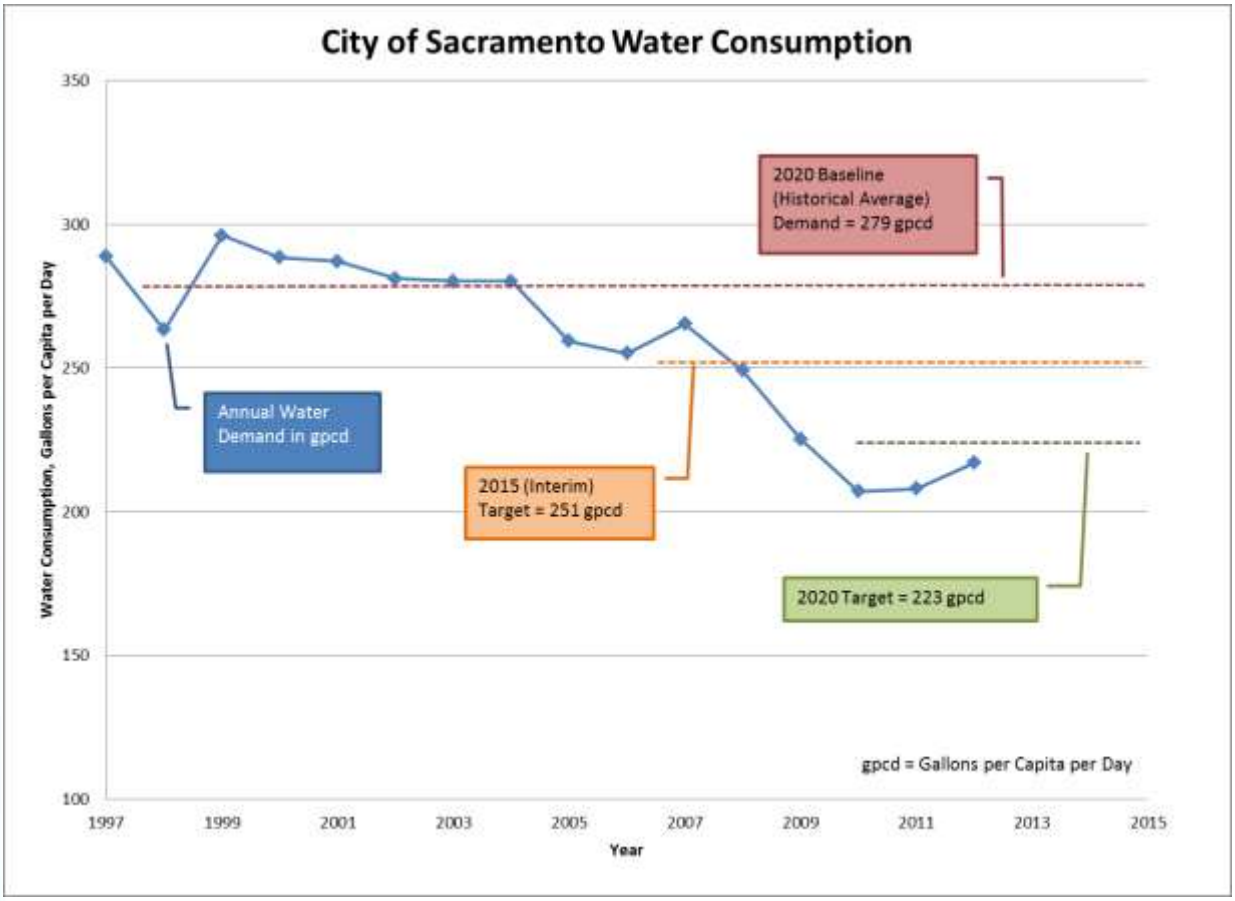
All decisions regarding City of Sacramento water conservation programs and policies remained the responsibility of the staff as directed by City Council. The SWCAG members were briefed and consulted throughout any City decision-making process and provided input at key decision points in an advisory capacity.

SWCAG members did not need to reach consensus on advice to the City; however, the facilitator assisted the SWCAG members in working toward consensus when it seemed achievable and would benefit the planning process.

2. ANALYSIS OF HISTORICAL WATER DEMAND

This section presents the City's water use patterns that were analyzed based on water production and consumption data provided by City staff to Maddaus Water Management in 2012 and 2013. A review of the historical demand trend in gallons per capita per day provided in the City's 2010 Urban Water Management Plan is presented in Figure 2-1. This historical trend is reflective of the current economic conditions that prevail across the United States including in the City's service area. For the UWMP and the analysis in the WCP, the "normal" base year without the influences of the current economic recession was assumed to be 256 GPCD as experienced in 2008. In 2012, demands have been modestly increasing across the Sacramento area as some economic recovery is occurring and is expected to continue, as discussed in Section 3.3. However, data for the past few years has yet to be weather normalized. The CUWCC's weather normalization tool will be available for use sometime in late 2013.

Figure 2-1: Analysis of Historical Water Demand



Source: City of Sacramento, Urban Water Management Plan, 2010

Given the City is not a fully metered system, assumptions were necessary and made based on existing consumption data for metered accounts for those accounts that are not yet metered (for purposes of developing the water balance in the DSS Model described in Section 3).

The available metered billing data was analyzed and considered only partially representative, given the City's system is being incrementally metered and not all neighborhood demand patterns are similar. Eight years of monthly water use data were analyzed (years 2005 to 2012) to derive average per account per day water use and are presented for informational purposes in Section 2.2). Data from each customer category was analyzed separately. Based on the City's water billing system of metered accounts, residential water use was broken down into single-family and multi-family categories. Historical data was segregated into indoor and outdoor water use by customer type using the monthly billing data. The residential per capita water use values were then checked based on available data that is calculated within the DSS Model for water use inside the home and outside the home. It is assumed that the relative difference between indoor use and outdoor for unmetered accounts would be similar. These estimates for per account and per capita consumption values were validated with other sources of municipal water use data applicable to the area. Other non-residential categories of use were analyzed separately. Average daily commercial/industrial and public water use was expressed on a gallons per account or gallons per employee basis. During this analysis, City water loss was also estimated after reasonable estimates were made to account for estimated total consumption compared to total production.

2.1 Comparison of Production versus Metered Consumption

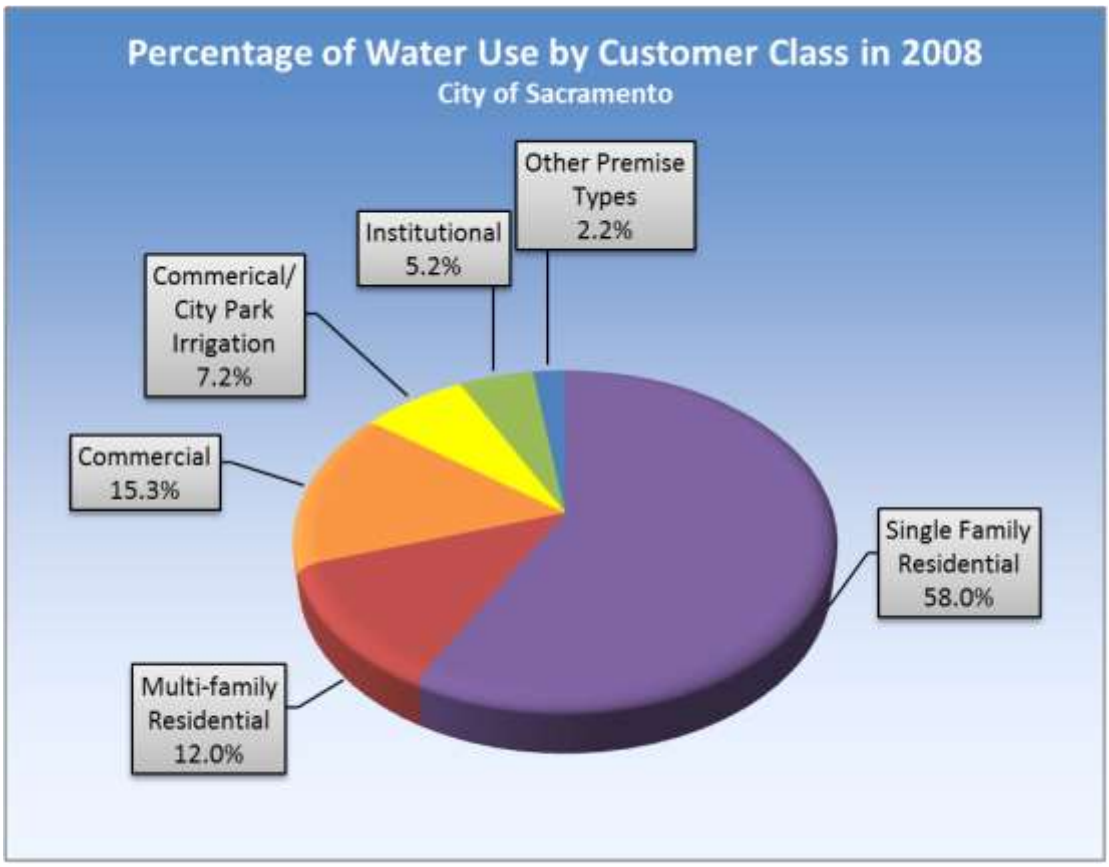
Water production data for the City was analyzed on a monthly basis for the period of March 2005 to April 2013. Water production data was measured at their respective sources. Water consumption data was measured at the customer meters. The difference between the amount of water produced and the amount of water billed is termed the non-revenue water. It is also quantified by what is called the "metered sales ratio" or the ratio of the volume of water consumption to volume of water production. The City roughly estimates that the metered sales ratio is approximately 85 percent (or water loss of approximately 15 percent) based on the 2010 City of Sacramento Urban Water Management Plan. A precise estimate cannot be made since the City is not fully metered. The CUWCC BMP 1.2 goal is to have the metered sales ratio above 90 percent (or total water losses less than 10 percent).

2.2 Estimated Total Consumption by User Category

The City has several different types of water users (e.g., customers that use water supplied by the City water distribution system). The City's various user categories may be generally classified as single family residential, multifamily residential, commercial, institutional, landscape irrigation,

and other premise types. The City is predominantly a residential community, with some light commercial and large institutional users (California State University Sacramento and Sacramento City Community College, State Capitol, government buildings, and regional hospitals). The largest category of users of water in the City is single family residential users that consume an estimated 60 percent of the water sold. Figure 2-2 shows the estimated annual consumption of the various user categories, based on the calendar year 2008 water use data from the City. Where necessary, consumption for unmetered accounts was estimated based on best available information[2]. The total average daily consumption was 118 MGD in 2008, excluding wholesale and wheeling[3] demands.

Figure 2-2: Estimated Annual Breakdown based on Total Consumption by User Category



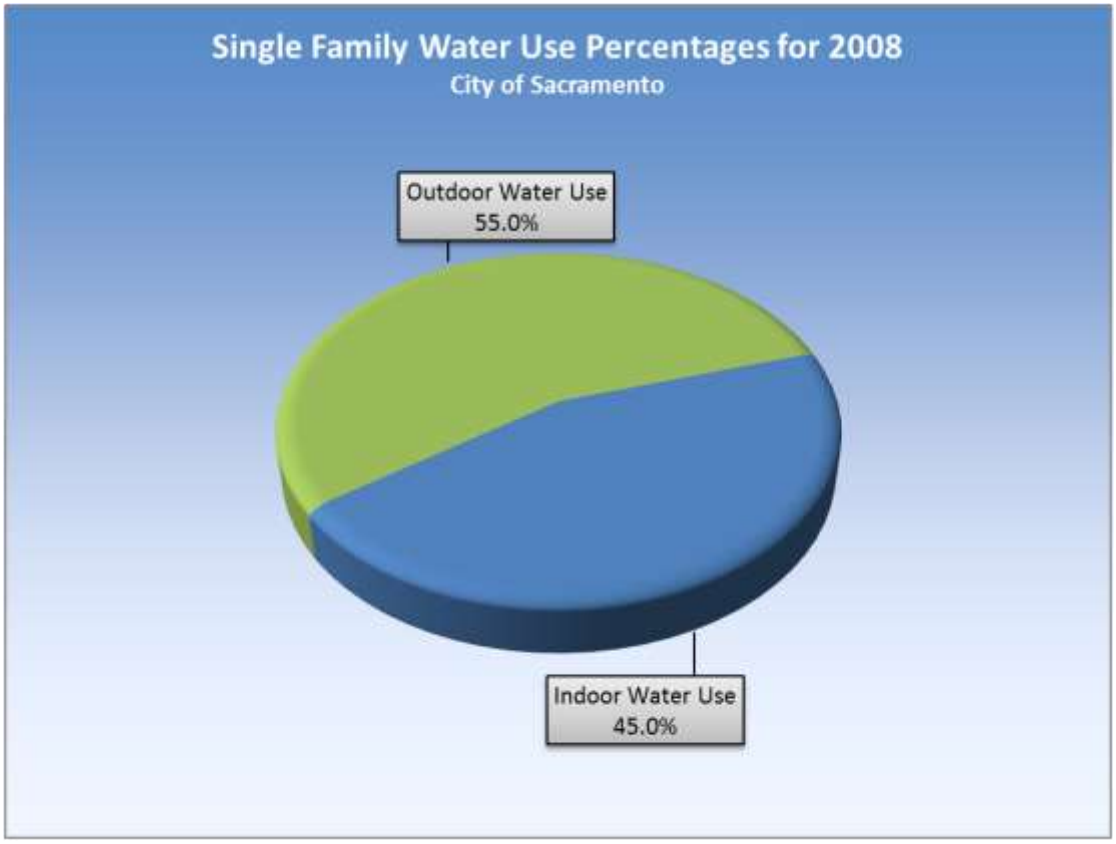
[2] 2008 based on rainfall data and billing data was considered the best representation of recent City Water Use. The 2009-2012 years were not selected for the base period for analysis due to the depressed economic conditions.

[3] Wheeling demand refers to the City using its treatment and distribution system to deliver water to another water provider, such as the County of Sacramento, that has its own rights to that water.

Overall residential use is estimated to be 70 percent of the total, which is typical of a city without significant industrial uses. Since single family residential uses formed the major portion of the City's water use (58%), it was analyzed further. Figure 2-2 highlights the breakdown of single family residential use as indoor and outdoor based on the assumption that indoor use is approximately equal to the minimum use in the winter. The year 2008 was selected for this profile as it was evident that there was minimal winter watering of landscape in this year. Recent water use has been depressed due to economic conditions and low rainfall, therefore 2009-2012 data was not directly used in the Annual Consumption by User Category analysis. The goal of the analysis by customer sector, shown in Figure 2-2, and the breakdown of indoor and outdoor water use, shown in Figure 2-3, was provided to help planners design conservation programs and key marketing messages to educate customers on ways to obtain the highest water savings.

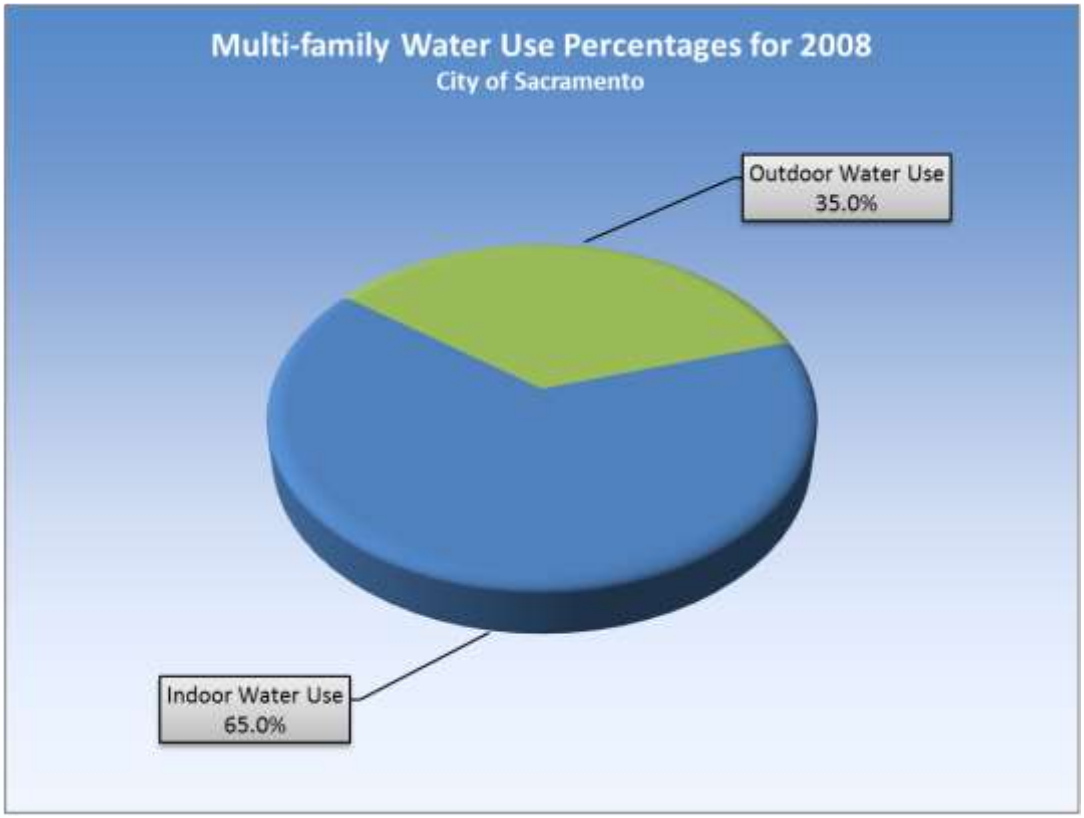
As seen in Figure 2-3, an estimated 45 percent of the average single family water use may be indoors based on winter use. Given residential customers are partially metered; winter outdoor irrigation will remain an estimate until the City is fully metered in 2025.

Figure 2-3: Single Family Residential Water Use: Indoor vs. Outdoor



As seen in Figure 2-4, an estimated 65 percent of the average multi-family accounts water use may be indoors based on winter use and the remaining 35% is estimated as outdoor use. Given that multi-family accounts typically are served by a master meter, winter outdoor irrigation may not be fully quantifiable even after the City is fully metered.

Figure 2-4: Multifamily Residential Water Use: Indoor vs. Outdoor



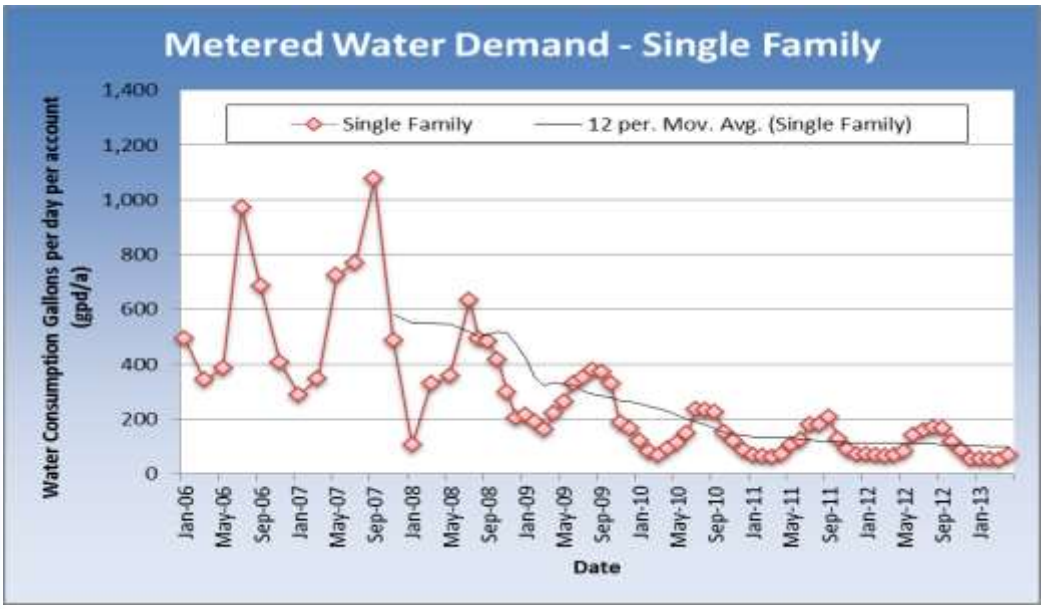
The remaining charts that follow show the average monthly usage per account per day for the specific types of customer categories: single family, multi-family, commercial, institutional, dedicated irrigation and other premise types. All categories exhibit a strong seasonal pattern where water use is higher in the summer.

Several observations can be made when looking at Figures 2-5 through 2-10 as follows:

- Base Year Demands are set at 2008 levels to match pre-economic down turn levels
- The Non-Revenue Water (NRW) percentage is assumed to be 15% based on available information, which matches the percentage used in the 2010 UWMP. Since only 45% of all accounts are metered as of July 2012, NRW was not able to be calculated directly and was estimated.
- Population estimates were from the City's 2010 UWMP while employment estimates were from the Sacramento Climate Action Plan, Appendix E.
- Water billing records and census information was used to create an estimate of what type of residential accounts house the City's population as listed below.
- Household sizes for single family accounts were set to 2.97 people per dwelling, which closely matches the 2010 census value of 2.80 for one attached and/or one detached unit per structure.
- The household size for multifamily dwellings within a water billing account was set to 2.25 people per dwelling, which closely matches the 2010 census value of 2.12 for two or more dwelling units per structure.
- The indoor residential per capita use for single family homes is set to 73 GPCD, which is about 45% of the total single family residential per capita water use of 161 GPCD.
- The indoor residential per capita use for multifamily homes is set to 63 GPCD, which is about 65% of the total water use.
- The total population was split into three categories, single family (SF), multifamily (MF) and institutional population. The percentages were set to 73% single family, 25% multifamily and 2% institutional.
- When MWM prepared the City's water balance based on water demand from the City's billing system and compared to 2010 Census data for institutional population, the usage on a gallon per day per person basis appeared low. It was estimated that demands for the institutional customer category should be on the order of about 8% to align the demand with the anticipated gallons per day per account. There was no additional population or water consumption data available to validate this observation. The assumed missing population may be due to temporary population from CSUS or other housing developments or institutional occupants (i.e. hospital patients) which are classified by the census as MF or SF or reside outside of City limits and are not classified by the City of Sacramento as institutional population.
- Economic conditions starting in late 2008 and statewide drought conditions in 2007 led to a reduction in demand. Therefore, some of the decrease in water use is not actually a true long term reduction in water use, but only a reflection of the abnormal economic and drought conditions.

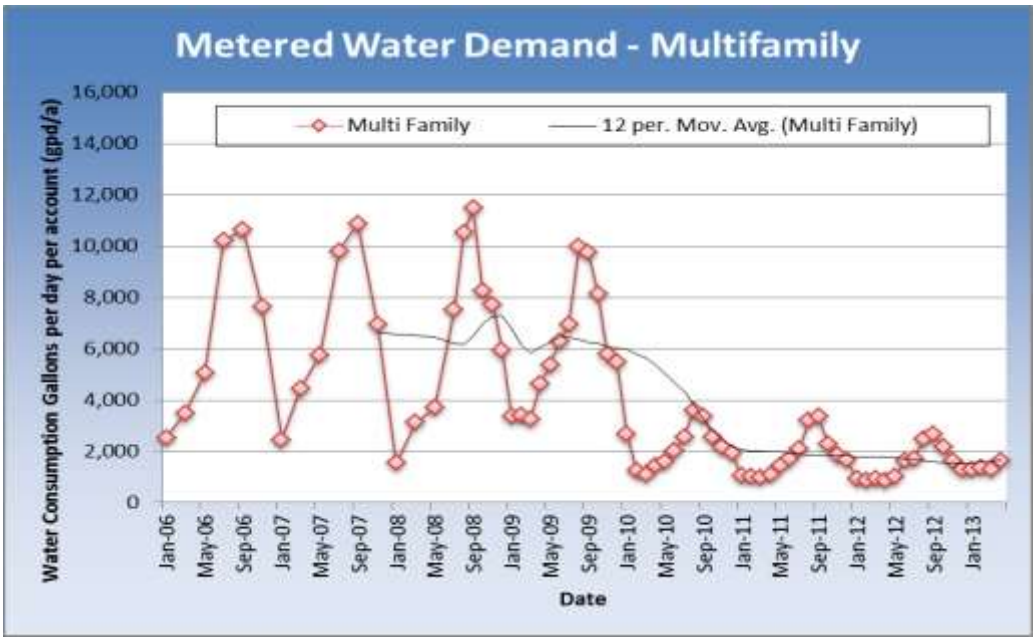
- The residential growth is predicted to occur equally in both single family and multifamily accounts at about 1% growth per year in each category. Single family and multifamily accounts have grown on average 1% per year over the last six years. Commercial accounts are predicted to grow at 1% per year based on the Sacramento Climate Action Plan. Single family per account water use for the metered accounts had a stable average daily water use per account over the past six years. This can indicate that new homes have a similar water use pattern as existing homes (per account) over the past six year period. Growth in recent years has slowed due to the current economic conditions.
- Multifamily water use per account has a downward trend that suggests that newer accounts may have lower occupancy (i.e. vacant or only one resident), and have been of the smaller size units, or have separate irrigation meters and/or conservation programs that drive the lower use per account.
- Irrigation water use per account remains the same, suggesting that new accounts may continue to use approximately the same amount of water without intervention from conservation activities (like a large landscape survey or incentive to upgrade).

Figure 2-5: Single Family Consumption per Metered Account per Day



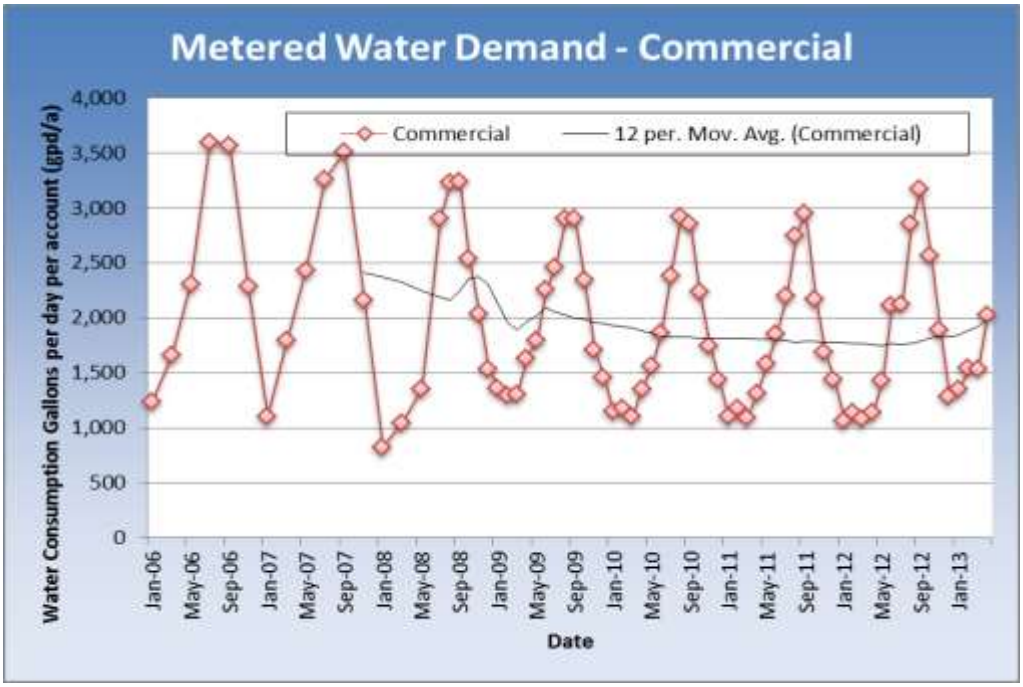
Note: As of the end of FY 2012, approximately 40% approximately or 44,000 of the City's single-family accounts were metered.

Figure 2-6: Multifamily Consumption per Metered Account per Day



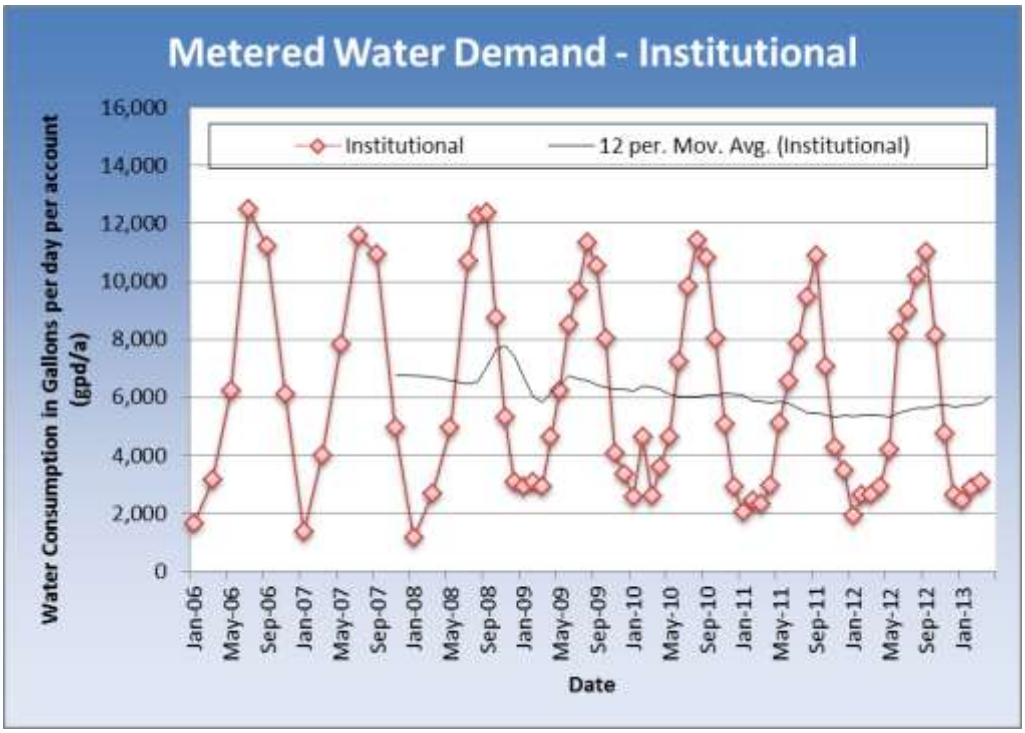
Note: As of the end of fiscal year 2012 (June 30, 2012), 2900 or approximately 30% of the City's multi-family accounts are metered.

Figure 2-7: Commercial Consumption per Metered Account per Day



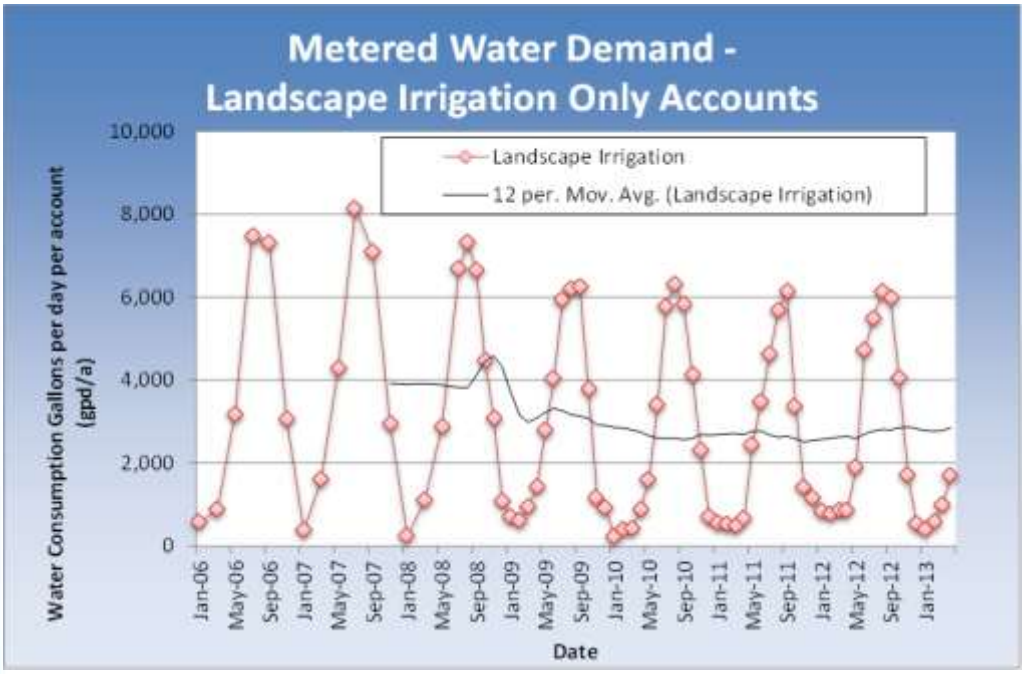
Note: As of June 30, 2012 (end of fiscal year 2012), approximately 95% of the City's commercial accounts are metered.

Figure 2-8: Institutional Consumption per Metered Account per Day



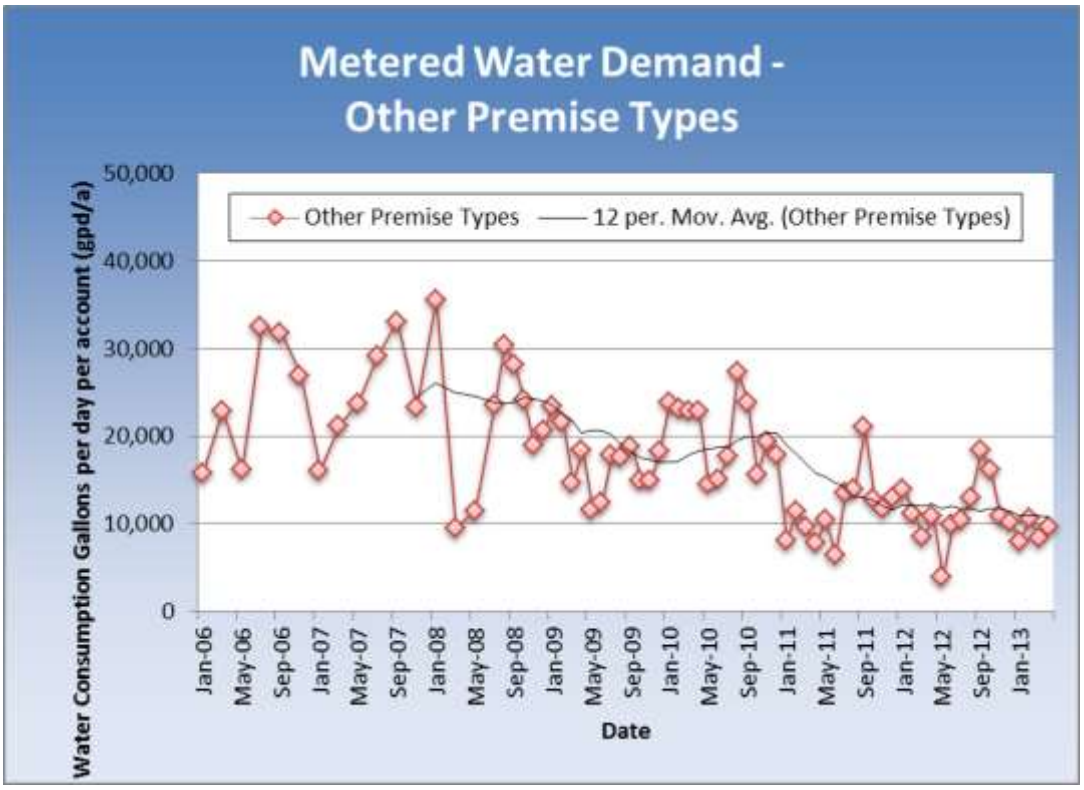
Note: As of June 30, 2012 (end of fiscal year 2012), 88% of the City's institutional accounts were metered

Figure 2-9: Irrigation Consumption per Dedicated Metered Account per Day



Note: As of June 30, 2012 (end of fiscal year 2012), 97% of the City's landscape irrigation accounts were metered

Figure 2-10: Other Premise Types Consumption per Metered Account per Day



Note: *As of June 30, 2012 (end of fiscal year 2012), 91% of the City's accounts coded as "other premise types" were metered*

The age of housing was analyzed for the City from the 2010 census data and provided in Table 2-1. The Table shows that the age of City homes is mostly older with about 62 percent of the homes built before 1980. Typically, older homes have older fixtures and more leaks and, therefore, have higher indoor usage. We would expect commercial and governmental buildings to be of a similar age (although the City has many historical buildings like the State Capitol with legacy fixtures and appliances). Building age is important in determining what types of plumbing fixtures were in the buildings when constructed. California began modifying plumbing codes starting in 1977. The latest requiring 1.6 gallon/flush toilets and water efficient shower heads and faucets (U.S. Energy Policy Act) took effect nationally in 1992. Since that time only about 16 percent of the buildings in Sacramento would have been built with these newer fixtures. Prior to 1977 toilets flushed with 4.5-7.0 gallons and there was no requirement on shower heads and faucets. Since January 2011, the California State Building Standards have new water efficiency requirements (referred to as Cal-Green building code) for new and remodeled homes and have required 20% more indoor water efficiency, commonly met by installing 1.28 gallons per flush (GPF) toilets. A new state law will take effect in the year 2014 requiring only 1.28 GPF toilets and 0.5 GPF urinals or lower to be sold in California, but as this law is not yet in effect, it has not significantly impacted the natural replacement of toilets for sale at this time.

However, note that the age of a building is only an indicator of its water usage. Additional analysis is required to determine the number of homes that have been remodeled or upgraded with more water efficient fixtures. This typically occurs at the rate of 3-5 percent of fixture replacements per year. In addition, the City has sponsored rebates on fixtures and given away thousands of conservation retrofit kits containing higher efficiency showerheads and faucet aerators. So clearly, although the buildings started out inefficient by today's standard, the stock of more efficient fixtures is unknown without a statistically valid saturation survey, which is not available at this time.

Table 2-1: Age of Housing from Census 2010

Age of Housing from Census 2010 City of Sacramento			
Year Structures Built	**No. of Structures**	**Percentage**	**Cumulative Percentage**
Built 2005 or later	13,741	7.14%	100.00%
Built 2000 to 2004	16,906	8.79%	92.86%
Built 1990 to 1999	14,624	7.60%	84.07%
Built 1980 to 1989	26,958	14.01%	76.47%
Built 1970 to 1979	31,951	16.61%	62.45%
Built 1960 to 1969	24,479	12.72%	45.84%
Built 1950 to 1959	25,910	13.47%	33.12%
Built 1940 to 1949	17,411	9.05%	19.65%
Built 1939 or earlier	20,392	10.60%	10.60%
Total	**192,372**	**100.00%**	

The breakdown of indoor versus outdoor water use taken into account along with the age of building indicates that further conservation efforts provided by City staff focused toward the indoor uses of water may be warranted. Further research is needed to determine saturation of water efficient fixtures due to rebates, replacements and remodels. Subsequent sections of this WCP describe the conservation programs already being run by the City and further programs that the City could consider to reduce its water use.

2.3 Analysis of High Water Users

An analysis was conducted of the City's top 100 water users. The users were organized by type of customer such as single family, irrigation, commercial, multifamily, and institutional. The top 10 accounts have an average use of more than 268,000 gallons per day and the average of all 100 customers was 75,900 gallons per day. The average daily use falls off dramatically moving down the list, so that the user that is ranked number 100 uses about 30,850 gallons per day. The higher use per day may indicate increased opportunities to save water. The major top users fall into the following categories:

- Large commercial businesses (power companies, Proctor & Gamble, Nestle Waters, LPB Energy Management, Air Products & Chemicals)
- City and County of Sacramento (parks and city buildings)
- State of California (State and Federal buildings)
- Large landscape irrigation (parks and golf courses)
- Schools (California State University Sacramento, Los Rios Junior College, Sacramento Unified)
- Hospitals (UC Davis Hospital, Sutter General Hospital, Methodist Hospital, Shriners Hospital)
- Hotels (Hyatt, Sheraton)
- Large apartment and mobile home parks

The average use for all 8,500 commercial customers is approximately 1,880 gallons per day. This is almost four times the use of a typical single family home. However many of the commercial accounts are small and use less water than a home.

One use of this data would be to set a goal of water use reduction through targeted conservation efforts. If the City set a goal to save 10 percent of Commercial/Industrial (CII) water use, that would amount to 1.58 MGD. This goal could be achieved by working with the top 100 high-water customers and attempting to average 21 percent per large account. Identifying these additional opportunities for conservation may require detailed analysis to determine customer specific opportunities for water savings.

2.4 Local Climate Effects on Irrigation

The City's climate is characterized by hot dry summers and cool moist winters with moderate rainfall. The hot dry summers result in heavy irrigation water use while the winter demands are mostly for domestic uses. Rainfall occurs generally from October to April, averaging 20 inches a year, but varying widely from year to year. Monthly precipitation has been as high as 10 inches (February 2000) and as low as 0 inches in summer months.

Temperatures range from lows in the 20's in the winter to above 100 degrees Fahrenheit in the summer and fall, and the relative humidity ranges from 41 to 92 percent. Monthly evapotranspiration (ET0) values, which serve as indicators of how much water is required to maintain healthy agriculture and landscaping, range from 0.94 inches during December to 8.02 inches in June. The 30-year average is estimated to be 56 inches, one of the highest Climate Zones in the state, which helps to explain the higher GPCD compared to coastal communities. Additional climate information may be found in the City of Sacramento 2010 Urban Water Management Plan (UWMP).

2.5 Effects of Drought and Climate Change on Future Demands

As is noted in City's 2010 UWMP, there are a number of likely impacts due to climate change that will affect the City's future water demand:

- More frequent, intense and longer-duration of heat waves, which could cause a significant rise in heat-related mortality
- More frequent, intense or persistent periods of drought due to decreasing snow pack in the Sierra Nevada mountains
- Significant increases in sustained peak electrical power demand and greater stress placed on local utilities and emergency responders

Implementation of the City's WCP will help it meet the challenges of climate change, as demand is reduced through improved water efficiency. The City's peak demand, influenced heavily by irrigation demand, will be reduced and the City will be better able to mitigate the impacts of future drought.

3. WATER DEMANDS WITH AND WITHOUT PLUMBING CODE

This section presents the demographic and future water demands forecasted for the City of Sacramento.

3.1 Future Population and Employment Projections

There are generally three main sources of population and employment projections commonly used to generate future water demands for Water Conservation Master Plans.

Available Demographic Projections

1. Water Supply & Utility Planning Reports including the 2010 Sacramento Urban Water Management Plan, Climate Action Plans, etc.
2. Local General Plan (population and employment) – Typically these plans, depending upon when they were published, have a population and jobs forecast through 2030.
3. Sacramento Area Council of Governments (SACOG) (population and employment) -The SACOG is an association of Sacramento region governments formed from the six area counties—El Dorado, Placer, Sacramento, Sutter, Yolo and Yuba—and the 22 member cities.

At the City's request, the population projections is based on Table 3 in the 2010 Urban Water Management Plan (City of Sacramento, October 2011) and employment projections were based on the Sacramento Climate Action Plan Appendix E, Page E-3 Projections (the report contains a table summarizing employment figures for 2005, 2020, 2030 and 2050) as presented below in Figure 3-1 and Table 3-1. Climate Action Plan projections are consistent with the 2030 General Plan projections adopted in 2009, which were used for Green House Gas (GHG) emission forecasts in the Climate Action Plan. The projections data have not been adjusted for the economic downturn.

For existing population and employment information for 2011, information is available from the California Department of Finance *E-1 Cities, Counties, and the State Population Estimates* (January 1, 2012 and 2013) Research and Demographic Reports, from http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/

SACOG's adjusted regional projections were used in the recently adopted 2035 Metropolitan Transportation Plan (MTP). City Planning has not officially updated projections to match the SACOG projections, but will consider doing so in the development of the General Plan 5-Year Update, which will begin late 2012 and be completed by 2014. More information on SACOG's 2035 MTP growth projections can be found at the Metropolitan Transportation Plan Sustainable

Communities Strategy *Blueprint for Sustainable Communities* from: http://www.sacog.org/demographics/

Figure 3-1: Population and Employment Projections

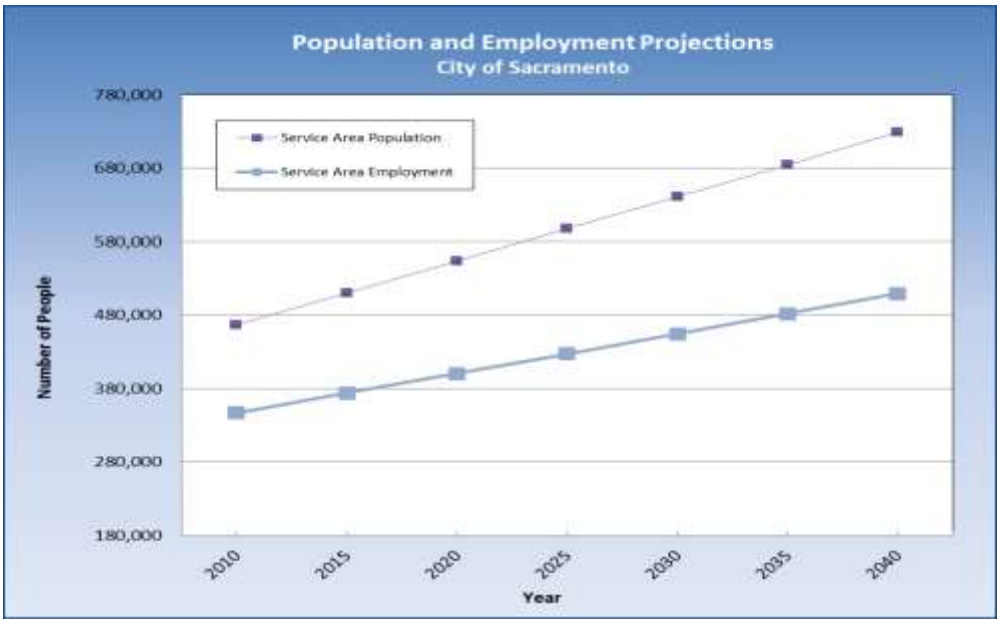


Table 3-1: Population and Employment Projections

Current and Projected Population and Employment City of Sacramento		
Year	Service Area Population	Service Area Employment
2010	466,488	346,697
2015	510,086	373,440
2020	553,724	400,183
2025	597,362	427,202
2030	641,000	454,221
2035	684,638	481,514
2040	728,276	508,806

Sources: 2010 Urban Water Management Plan for Population Estimates, 2011 Climate Action Plan, Appendix E for Employment Projections

3.2 Key Assumptions for the DSS Model

Table 3-2 shows the key assumptions used in the Demand Side Management Least Cost Planning Decision Support System (DSS) Model which is described further in Appendix A. 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.

Table 3-2: List of Key Assumptions

List of Baseline Demand Projection Assumptions for DSS Model City of Sacramento	
Parameter	**Model Input Value, Assumptions, and Key References**
Model Start Year	2010
Water Demand Factor Year(s)	2008
Peak Day Factor	1.60
Water Loss in the Start Year	15.0%
Population Projection Source	Sacramento 2010 UWMP Table 3 Page 2-8
Employment Projection Source	Sacramento Climate Action Plan Appendix E
Number of Water Accounts for Start Year	133,696
Avoided Cost of Water $/AF	Conversion AF to MG
Distribution of Water Use Among Categories	Single Family: 58%
	Multifamily: 12%
	Commercial: 15.3%
	Institutional: 7.2%
	Landscape Irrigation: 5.2%
	Other Premise Types: 2.2%
Indoor Water Use by Category	Single Family: 45%
	Multifamily: 65%
	Commercial: 63%
	Institutional: 42.2%
	Other Premise Types: 66.9%
Water Demand Factor by Customer Class for 2012 in gallons per day per account (gpd/a)	Single Family: 513 gpd/a
	Multifamily: 1,220 gpd/a
	Commercial: 1,920 gpd/a
	Institutional: 7,541 gpd/a
	Landscape Irrigation: 3,780 gpd/a
	Other Premise Types: 20,512 gpd/a
Residential End Uses	AWWARF Report "Residential End Uses of Water" 1999, DWR California Single Family Home Water Use Efficiency Study, 2011
Non-Residential End Uses, %	AWWARF Report Commercial End Uses of Water" 2000
Efficient 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 July 23, 2005.
	Reference Consortium for Efficient Energy (www.cee1.org)
Water Savings for Fixtures, gal/capita/day	AWWARF Report "Residential End Uses of Water" 1999, , CUWCC Cost and Savings Study April 28, 2005, Agency supplied data on costs and savings, professional judgement where no published data availble

Table 3-2: List of Key Assumptions Cont.

List of Baseline Demand Projection Assumptions for DSS Model City of Sacramento	
Parameter	**Model Input Value, Assumptions, and Key References**
Non-Residential Fixture Efficiency Current Installation Rates	U.S. Census, assume commercial establishments built at same rate as housing, plus natural replacement
Residential Frequency of Use Data, Toilets, Showers, Washers, Uses/user/day	Falls within ranges in AWWARF Report "Residential End Uses of Water" 1999
Non-Residential Frequency of Use Data, Toilets and Urinals, Uses/user/day	Estimated based using AWWARF Report "Commercial and Institutional End Uses of Water" 1999
Natural Replacement Rate of Fixtures	Residential Toilets 3% (1.28 gpf toilets), 3% (1.6 gpf and higher toilets)
	Commercial Toilets 2% (1.28 gpf toilets), 2-4% (1.6 gpf and higher toilets)
	Residential Showers 4%
	Residential Clothes washers 9.1%
	A 3% replacement rate corresponds to 33 year life of a new fixture.
	A 9.1% replacement rate corresponds to 11 year washer life based on Energy Star web site July 2012, Internet address: www.energystar.gov
Future Residential Water Use	Increases Based on Population Growth
Future Commercial Water Use	Increases Based on Employment Growth
Future Non-Residential Non-Commercial Water	Increases Based on Population Growth

3.3 Water Demand Projections With and Without the Plumbing Code

Water demand projections were developed out to the year 2040 using the DSS Model.

This model incorporates information from the:

- Table 3-2: "Key Assumptions"
- Questions asked of the City of Sacramento staff
- Agency provided data including the following:
    - Historical water use data on a monthly basis for the different classes of water users.
    - Peaking factors for the water system.
    - Complete descriptions of past, present, and proposed future conservation programs including historic annual participation rates (described in Section 5).
    - Results of any independent analyses of water savings due to prior City programs.
    - Historical and projected water system service area population, employment, land use data, and growth projections through the year 2040, along with maps of the water system, political jurisdiction boundaries, and study area(s).

    - Customer characteristics and data needed to characterize water conservation measures, such as household size, dwelling unit mix, and number of facilities or businesses of a particular type.
- 2000 and 2010 Census data
- Local General Plans
- Sacramento Climate Action Plan Projection (Employment projection)

Water demand projections were inputted for 30 years using the DSS Model.

This model incorporates information from the:

- City selected population and employment forecasts.
- Data provided by City of Sacramento staff including estimates for value of water saved, historical water use, past conservation efforts, and water system facilities.

Table 3-3 shows the projected demands with and without plumbing codes and appliance standards. This data is presented both as a table and a graph. Key codes and standards are described below.

National Plumbing Code

California is subject to national and state standards. The most stringent standards apply to new construction and fixture replacement. The Federal Energy Policy Act of 1992, as amended in 2005 requires only fixtures meeting the following standards can be installed in new buildings nationwide:

- Toilet – 1.6 GPF maximum
- Urinals – 1.0 GPF maximum
- Showerhead - 2.5 GMP at 80 psi
- Residential Faucets – 2.2 GPM at 60 psi
- Public Restroom Faucets - 0.5 GPM at 60 psi
- Dishwashing pre-rinse spray valves – 1.6 GPM 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 U.S. 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, high efficiency models of clothes washing machines use 30-50 percent less water than conventional models (which are still available). In the analysis for the City, the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 19 gallons or less) so that by the year 2020 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 commonly last about 15 years, eventually all machines in the City service area will be of this type.

State Plumbing Code

The Plumbing Code includes the new CCR Title 20 California State Law (AB 715) requiring High Efficiency Toilets and High Efficiency Urinals to be exclusively sold in the state by 2014. The California building code has required water efficient fixtures as part of the Cal Green code that was effective January 1, 2011. Please see Section 6.1 for more information on Cal Green required elements.

Figure 3-2 below describes conceptually how the above listed items are incorporated into the flow of information in the DSS Model.

Figure 3-2: DSS Model Overview Used to make Potable Water Demand Projections "With the Plumbing Code"

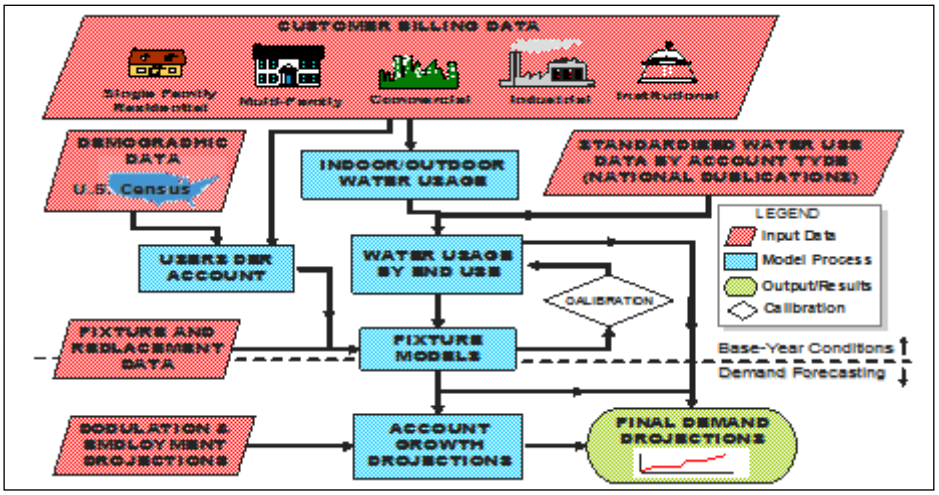


Figure 3-2 shows the potable water demand projection at five-year increments. The graph shows projections for demand with and without the plumbing code through 2040. This graph illustrates that the DSS Model demand projection is consistent with 2010 UWMP projections.

Starting more than 5 years ago, water demand has been repressed due to a potential variety of factors, including the economic downturn. In the 2010 UWMP, the City projected that estimated demands will rebound prior to 2020 to approximately pre-recession levels based on water production levels in 2008 equating to 256 GPCD.

Currently, the City has estimated water demand may return to approximately 256 GPCD under normal economic conditions (without conservation), the amount of water savings estimated to reach the 223 GPCD target specified in SB X7-7 by 2020 is 33 GPCD and serves as the goal for the WCP. Most recently, water production has trended back up from 207 GPCD in 2011 to 217 GPCD in 2012.

Table of water demand projections (Table 3-3)

The table of water demands projections includes:

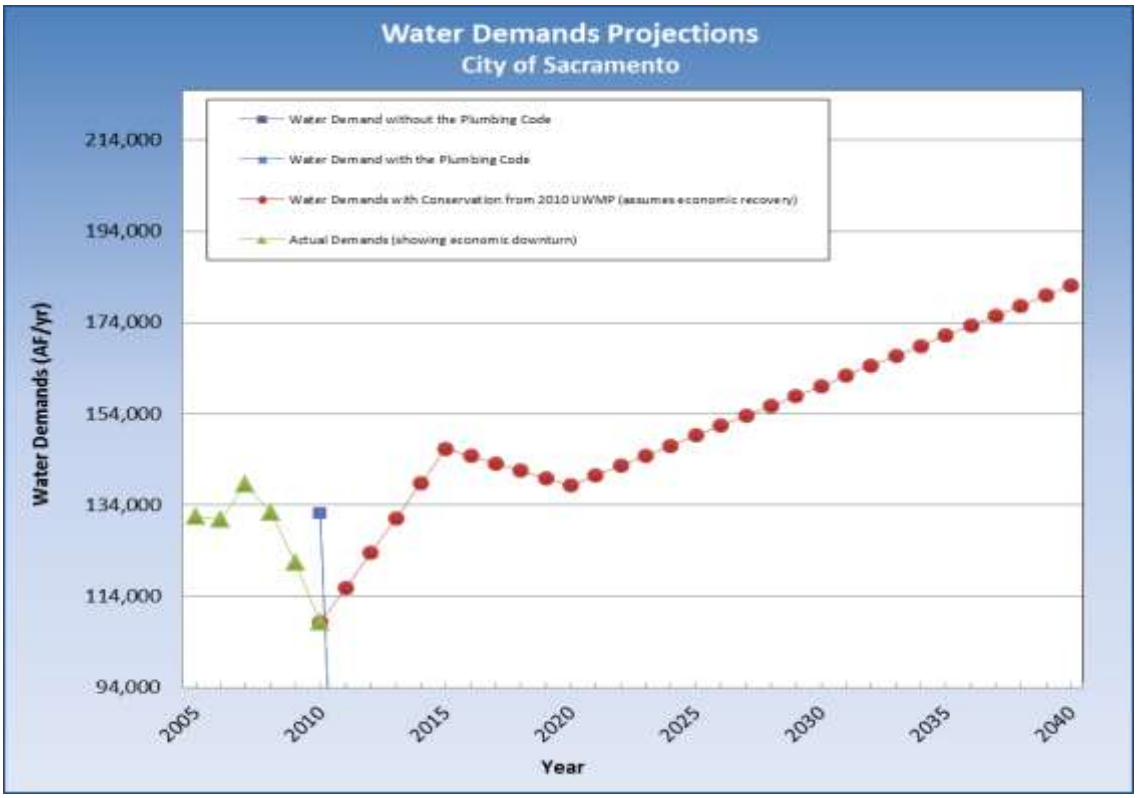
- The water demand projections shown in Table 3-3 are based on the future population projections provided in Table 3-1. The DSS Model uses demands under normal economic conditions in order to accurately reflect changes in demand due plumbing code and conservation program savings.
- Projections were made *with and without* the plumbing codes.
- Projections are for potable water only.

Dry Year and Abnormal Economic Demands

The demand projections reflect average weather conditions and **do not** reflect drier, hotter, non-drought conditions. The demands projections also do not factor in abnormal economic conditions, and conservatively assume the economy will rebound to pre-recession (2008) demands.

The City will continue to track and monitor its water demands (at minimum on an annual basis) and adjust its demand projection and its water conservation program as needed to comply with the CUWCC MOU in the near term and to meet SB X7-7 requirements by 2020. The City will need to remain flexible in gauging the work remaining to lower per capita demands to meet the targets.

Figure 3-3: Water Demand Projections



Source: DSS Model May 2013

Table 3-3: Water Demand Projections

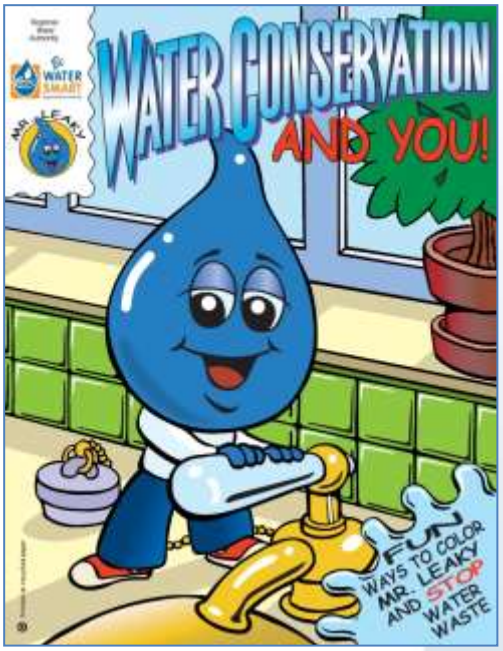
Water Demands Projections City of Sacramento							
Water Demand (AF/Yr)	2010	2015	2020	2025	2030	**2035**	**2040**
Water Demand without the Plumbing Code	132,176	145,408	158,020	170,512	183,008	195,508	208,439
Water Demand with the Plumbing Code	132,176	142,160	158,020	170,512	183,008	195,508	208,439
Water Demands with Conservation from 2010 UWMP (assumes economic recovery)	108,276	146,300	138,300	149,200	160,100	171,100	182,100

Source: DSS Model May 2013. Data is not weather normalized.

4. CURRENT WATER CONSERVATION PROGRAM

The purpose of this section is to evaluate the City's existing water conservation program, and identify appropriate conservation opportunities that would further meet the City's water conservation goals.

4.1 Historical Background



The City has had an evolving conservation program for decades. The City's conservation efforts, like many California water utilities dated back to the extreme drought in the 1970s. The City is a long standing member of Sacramento Area Water Works Association (SAWWA) beginning when it was founded in 1958. The SAWWA Conservation Committee that started during the drought in 1976-77 primarily focused on water waste prevention. In the early 1990s, the City helped lead SAWWA's efforts to begin a regional public outreach and school education program, including a Mr. Leaky mascot that continues today through support by the Regional Water Authority. More information related to SAWWA is found online at www.sacwaterworks.com.

The City also became a formal signatory member of the Memorandum of Understanding for Urban Water Conservation (MOU) overseen by the California Urban Water Conservation Council (CUWCC) in 1995. The City's initial efforts focused on the original list of 16 CUWCC Best Management Practices (BMPs) that was revised to the CUWCC 14 BMPs created in 1997. These 14 BMPs were required of the CUWCC signatories until the end of 2008. Effective January 1, 2009, the CUWCC members are expected to comply with the new and revised CUWCC BMPs. In addition, the City was also a signatory to the 2000 Sacramento Water Forum Agreement that included a Purveyor Specific Agreement for Conservation that followed the original 16 BMPs and in 2009 was modified to follow the CUWCC MOU and future updates. More information related to the CUWCC is found online at www.cuwcc.org and for the Sacramento Water Forum at www.waterforum.org.

As a member of the Regional Water Authority (RWA), a joint powers authority of 22 water purveyors, the City of Sacramento participates in the Regional Water Efficiency Program (RWEP) designed to implement best management practices on a regional basis. Over the past 10 years,

the City has been participating as a dues paying member in active leadership, committee and implementation support roles. As a direct benefit to the City's customers, the RWEP provides dedicated staffing to support regional public outreach and school education programs and regional grant assistance projects through Proposition 13, 50 and 84. More information on RWEP is found online at: www.bewatersmart.info.

The City has been an active participant serving on many committees for both the CUWCC and RWA. The City's current water conservation program design is based on a combination of the City's commitment to carrying out the CUWCC Best Management Practices (BMPs) including Programmatic BMP requirements and the City's desire to be water efficient. This planning effort is charting the new path forward to meeting both the CUWCC MOU and Water Forum Agreement commitments using the CUWCC Gallons Per Capita Per Day (GPCD) track in addition to the SB X7-7 requirements.

4.2 Current Program Overview

The DOU demonstrated its dedication to water conservation and water use efficiency to help meet future water demands and uphold commitments in its recent reporting to CUWCC and the Water Forum. Additionally, the DOU and the Water Forum collaborated to produce the "Interim Water Conservation Plan" (IWCP) in 2009 and 2010. The IWCP was included in the Appendices to the Urban Water Management Plan adopted by City Council in 2010, and communicated the City's approach and commitment to implement a program that reflects environmental stewardship and continues to foster water efficient practices.

The DOU works with its regional and statewide partners to implement the objectives of the CUWCC and Water Forum. In addition to RWA's programs, the City works with several regional associations to promote collaboration and provide a unified voice on Northern California water issues. The City specifically partners with the regional sanitation district, local energy providers, and storm water quality agencies. These agencies and partnerships provide multiple resources and outlets for public education, including but not limited to school education in the classroom, media campaigns, and regional and City-wide special events. They also provide resources for water efficiency programs for businesses, water audits, rebate programs, collaborate grant funding and discount rates for purchasing plumbing and landscape products.

The Sacramento Water Conservation Advisory Group (SWCAG) was established in November, 2010 and works to provide input on water conservation goals, measures and implementation strategies. The DOU Staff, including the Water Conservation Office are dedicated to implementing the most cost-effective programs many of which also benefit the health of the rivers and groundwater resources which are integral to the region's quality of life.

4.3 Description of Current Programs

The following section provides a summary of the City's current water conservation program including partnerships and funding from three main categories: (1) Programs offered directly by the City of Sacramento, (2) Programs offered by the Regional Water Authority (RWA), and (3) Grant funded programs.

Historically, without residential meters, the customer participation rates in the City's conservation program have been lower than desired. As more than 6-7,000 meters are installed per year, more and more customers have an added incentive to participate in the City's programs.

Highlights of the current program are below.

Foundational BMPs

Outdoor Water Conservation Ordinance and Water Waste calls

- Advanced Meter Infrastructure (AMI) and water conservation protocol for addressing customers with leakage. DOU has improved leak detection and reduced lost water, enhanced conservation measures, and encouraged the repair of leaky fixtures.
    - In 2010, AMI Pilot Program resulted in savings in production costs, lower costs to the customer, and water savings. Of approximately 7,000 residences identified with irregular water use, 10 percent were field investigated; 155 million gallons aggregate annual water loss was identified.
        - 20 percent of the customers investigated utilized a free Water Wise House Call resulting in 114 million gallons of water saved.

- Updated the Outdoor Water Conservation ordinance to include leakage, as well as provisions for enforcement such as escalated penalties for outdoor water waste.
- Water Waste Inspectors respond to an average of more than 2,000 Water Waste calls from customers observing water waste annually; all calls are followed up on and approximately three percent of these are issued a Notice of Violation.

Water Loss Control Programs

- The DOU Operations and Maintenance Division currently has one in-house leak detection crew that actively detects and repairs leaks throughout its distribution system. The City intends to add crews over time, as budget allows, to address leak detection and repair.

- Field Services has also been actively addressing apparent losses and replacing large meters along with its meter retrofit program. This includes modifying large meters to be compound meters on sites where irrigation budgets are planned, and replacing aging and often leaking mains located in the back yards of many of the homes within our community.

Metering with Commodity Rates

- The DOU is aggressively pursuing funding opportunities to accelerate meter installations. In 2009, the City secured $22.6M in federal grant and loan funds from the American Recovery and Reinvestment Act (ARRA) which allowed the program to triple the number of meters installed in one year compared to the previous four years combined.

  As of the end of FY 2012, the City installed 61,888 meters (47 percent of all accounts), and had $860,000 budgeted in corrective leak maintenance and $100,000 in leak detection programs.

Conservation Pricing

Now with nearly half of residential customers having meters and paying a volumetric rate for their water use, there is some modest monetary incentive to participate in City programs. Participation is envisioned to increase based on the City taking steps to change its rate structure as described in Section 4.4 below.

Public Outreach Programs

Public Education and Outreach is a major focus of the Water Conservation Office as the City strives to garner more participation in the City's programs.

Water Conservation Brochures, Handouts, Billing Inserts, Website and Partnerships

- Staff participates annually in about 40 outreach events annually;
- Staff sends billing inserts to 136,000 customers, conducts media interviews and community presentations.
- The City's Water Conservation Programs website is www.SpareSacWater.org
- City participates in an Energy-Water Partnership with Sacramento Municipal Utility District (SMUD) including the business walk.

City and Regional Media Campaign

- The City's current water conservation media campaign is "Spare the Water." The DOU announces a

"Spare the Water Alert" when three consecutive days of 100+ degree temperatures are forecasted. During an Alert the City asks customers to voluntarily cut back on their nonessential water use, to follow the City's watering rules, only water on their watering days, and to water lawns before 10 a.m. and after 7 p.m.

- The City participates in the regional "Blue Thumb" program run by the Regional Water Authority focusing on water customer's savings. The Mayor of Sacramento, Kevin Johnson, is featured in the campaign's Public Service Announcement. The Public Information Officer for the City has been a key member of the regional Public Outreach and Education Committee.

"Blue Thumb" pledge promotes the reduction of outdoor water use; from stopping runoff to using a shut-off nozzle on the hose, to watering efficiently. RWA helps people understand that in Sacramento region's hot, dry climate and long summer season, more than 55 percent of a household's yearly water consumption typically goes toward landscape irrigation. Of that, 30 percent is lost due to overwatering or evaporation. The Blue Thumb campaign is being promoted and supported by funding from the 22 local water purveyors throughout Sacramento, Placer and El Dorado Counties and the City of West Sacramento in Yolo County. For more information or photos of people who have taken the "Blue Thumb Pledge" please see the following website: www.bewatersmart.info/blue-thumb/

River Friendly Demonstration Gardens

- The Water Conservation Program has a River Friendly demonstration garden at the City of Sacramento Department of Utilities Water Conservation Office. The Sacramento Water Wise Garden opened on May 23, 2011 and features drought tolerant plants such as butterfly bush, Santa Barbara daisy, lavender and rosemary. It also features high efficiency sprinklers and drip irrigation that help to limit its water usage. The site also utilizes a "smart" irrigation controller that uses local weather data to determine how much water to apply. There is educational signage onsite to provide visitors tips on ways that they can spare Sacramento's water while maintaining a beautiful landscape.

- The Sacramento Water Wise Garden has had success in demonstrating water savings. The City estimates that the new landscaping and irrigation has helped the Office location save about 44% of the water it previously used to irrigate the property. The garden is open to the public year-round. More information regarding the water conservation is located on the City's website, www.sparesacwater.org

Sacramento Water Conservation Community Workshops

- The City Water Conservation Team offers free Water Conservation workshops during the spring and summer. Attendees learn about water efficiency, the City's watering ordinance and how to maintain a beautiful yard while saving water and money.
- Past workshops have been held at the City of Sacramento Department of Utilities Water Conservation Office and utilize the City's Water Efficient Demonstration Garden Attending workshops qualifies attendees to become City of Sacramento Water Conservation Ambassadors and offers customers that have received a second water waste notice the ability to waive the fine.

Sacramento Water Conservation Ambassadors

- Sacramento Water Conservation Ambassadors help spread the word about water conservation and protection of Sacramento's water sources. Ambassadors help educate neighbors, friends, family, and community organizations about conservation and attend community events, conduct "knock and talks," and present at community meetings.
- The City has recruited and trained about 35 Water Conservation Ambassadors. The trainings are held multiple times per year, primarily during the summer months.

School Education Programs

- The City's support for school education programs dates back to more than two decades with the regional SAWWA Conservation Committee activities and continues to this day.
- The Sacramento Bee is the regional newspaper that has long supported the Newspaper in Education Program that touches on a number of topics each week throughout the school year

and has traditionally distributed the "Water: Here to Eternity" print materials out to hundreds of teachers and thousands of students within the City between K through 5th grades.

- The City participated through RWA in a regional video contest among high school students on outdoor water conservation messages. Winning videos are posted online: www.bewatersmart.info.

Outdoor Landscape Ordinance and Audit Programs

The City has multiple programs focused on outdoor water use described below:

Outdoor Water Conservation Ordinance, Water Efficient Landscape Ordinance and AB 1881 Compliance

- Worked with City-wide Technical Advisory Committee to adopt the State's Model Water Efficient Landscape Ordinance in December, 2009.
    - City DOU plans to initiate review of the Water Efficient Landscape Ordinance and enforcement.
- Adopted an Ordinance amending Article XI of Chapter 13.04 of the Sacramento City Code relating to Outdoor Water Conservation and included escalated penalties for water waste in November, 2009. The amendments improved the Outdoor Water Conservation Ordinance, facilitated implementation of the water conservation program, and aided in meeting the City's commitments to improved water efficiency.

Free Surveys/Audits - "Water Wise House Calls" and "Parks Water Use Analyses"

- Water Wise House Calls involve a trained Water Conservation Specialist visiting a home or business to identify potential water savings. Indoors, they check appliances and plumbing fixtures for water leaks and measure the flow rate of faucets and showerheads. Outdoors, they test the irrigation system and look for leaks or broken sprinkler heads, discuss how much water the landscape really needs to be healthy, and help set customer's irrigation timer.

  Water Conservation Specialists perform large landscape water use analyses on approximately 120 City Parks annually. Previously, 2/3 of the parks used more than the maximum applied water allowance, and after the program was initiated, only 1/3 of the parks used more.

Incentive / Rebate Programs

The City program provides rebates for water users to improve their efficiency through appliance and equipment retrofits and replacements. The rebate programs described below are

coordinated with support from the Regional Water Authority's Regional Water Efficiency Program. The clothes washer rebate program is administered by Sacramento Municipal Utility District (www.smud.org). The toilet replacement and clothes washer program is administered by the City and the Regional Water Authority with costs shared by the Sacramento County Regional Sanitation District. The toilet and irrigation rebates are supported with funds through the California Department of Resources Proposition 50 Drought Assistance Grant.

Current Water-Efficient Device Rebate Levels

- Single-Family High Efficiency Clothes Washer: $200.00
- Single-Family High Efficiency Toilet (1.28 GPF or less): $100.00 (with a Water Wise House Call required in advance)
- Multi-Family High Efficiency Toilet (dual flush or 1.28 GPF or less): $100.00
- Multi-Family High Efficiency Clothes Washer: $100.00
- CII High Efficiency Toilet (dual flush or 1.28 GPF or less): $150.00
- Urinal (ultra-low/zero water upgrade - on 1.0 GPF to ultra-low water): $150.00
- Water Smart Irrigation Controllers upgrade: $500 per controller.
- Pre-rinse Spray Valves upgrade: $30

All of the programs and rebate values are subject to change in the future. The values shown were current at the time the WCP work was conducted. The following Table 4-1 shows the participation levels for various conservation rebate activities for the last 4 years:

Table 4-1: Historical Conservation Measure Implementation Rates

Historical Conservation Measure Implementation Rates for Selected Measures City of Sacramento				
Measure Description	**FY 08/09**	**FY 09/10**	**FY 10/11**	**FY 11/12**
Prohibit Water Waste - Water Waste Service Requests	1,740	3522	1,875	1,589
Prohibit Water Waster - AMI Leak Investigations	0	0	564	1,374
Public Education - Plumbing Retrofit Kits	565	567	1,349	816
Public Education - Outreach Events	14	29	14	8
Public Education - New Residential Packets	3,149	3888	3800	2,850
Single Family Surveys / Audits	220	330	578	767
Multi-Family Surveys / Audits	24	277	771	86
Residential Clothes Washer Rebates	0	100	437	250
Institutional Surveys / Audits	13	8	6	9
Commercial Surveys / Audits	54	24	48	34
Residential Toilet Rebates	1050	1486	695	209
Commercial Toilet Rebates	633	229	4	13
Institutional Toilet Rebates	0	2	18	40
Commercial Urinal Rebates	37	37	0	2
Irrigation Surveys	9	5	3	1
Irrigation Budgets	122	122	122	164

4.4 City of Sacramento Water Billing Structure

Commitment to Conservation and Meeting Conservation Requirements

The City is committed to the effective and efficient use of its water resources. In 2005, the City began one of the most significant capital improvement projects in its history – installing more than 110,000 water meters by 2025 and transitioning all water customers to a metered rate[4] at a cost approaching $350 Million. The City is attempting to complete this metering program as quickly as possible. This approach is putting the City's water utility on the right path towards achieving compliance with regulations and best business practice guidelines. As the City's metering program continues and customers are transitioned to the City's water conservation pricing structure, the direct pricing signal it sends will provide an increasing number of customer incentives to conserve water.

City of Sacramento Water Fee Structure Overview

The City currently charges both a flat rate structure and a uniform metered charge for its customers. In areas of the City without meter connections, flat rate charges vary by customer classes. Single family and multi-family customer classes pay different flat rates based on number of rooms per unit. Where meters are installed and charged, metered consumption fees consist of two components – a monthly fixed charge based on meter size; and a volumetric uniform commodity rate charged per hundred cubic feet.

Once a meter is installed, the customer continues to be billed on a flat rate for one year before the metered rate is charged. During this year, the customer's water usage is displayed on the bill allowing the customer to become familiar with his or her water usage and make water conservation choices. This 'shadow billing' is a critical communication and public outreach strategy employed by the City to encourage conservation.

The City's current metered rate was restructured in 2009. At that time, approximately 5% of the total accounts in the City of Sacramento were billed on a metered water rate. As of January 2013, 43% of accounts are billed on a metered basis.

As part of its comprehensive evaluation of water rate structures, the DOU retained FCS Group to conduct a water conservation pricing study. The study, which describes alternative conservation pricing structures and identifies the advantages and disadvantages of such structures, was recently completed. A cursory review of the City's residential water usage data was performed as part of the study, and the results indicate that the City has experienced a natural per capita water

[4] Meter installation costs include the relocation of system laterals and associated distribution infrastructure.

demand reduction and reduced revenue annually for customers transitioned from flat to metered service.

As with other Sacramento Valley water agencies, the City's per capita water demand reduction is due to continued efficiencies in plumbing fixtures, appliances and building codes, current economic conditions, the recent drought, environmentally conscious water usage behaviors, and the effect of price elasticity. While the reduced revenue may be attributable to the various factors impacting demand, the study also suggests that the existing volumetric charge is insufficient to recover the full cost of providing water service. Recognizing the loss in revenue when transitioning customers from flat to metered water rates, the City initially addressed this issue as part of its utility financial planning and rate-setting process.

The FCS study recommended the DOU:

- Continue to make its meter transition program a priority and to collect information on metered consumption to better understand behavioral changes.
- Assess existing volumetric charge for metered accounts to evaluate the sufficiency of cost recovery.
- Identify conservation rate pricing objectives that meet short-term and long-term needs and consider implementing a more conservation-oriented rate design, such as increasing block rates for residential customers.
- Maintain open dialogue with internal and external stakeholders to gather perspective on, evaluate, and implement conservation-oriented rates.
- Monitor utility billing information as it relates to fixed and variable revenue and costs.

With the completion of the FCS Group study, the DOU is evaluating the recommendations and working collaboratively with its stakeholders to establish clear revenue program goals. The study also recommends that the DOU re-evaluate the metered rate structure as the City nears 50% residential metering. According to the City's meter transition plan, 62% percent of residential customers will be metered within the next 3-5 years. Modifying the City's existing conservation rate structure or implementing a new structure will require community engagement and outreach, as cost will necessarily shift between customers and customer classes. It is critical to have representative usage data from the various neighborhoods throughout the City in order to develop a fair and equitable rate structure that adequately generates utility revenues.

Therefore, as one of its first actions, the DOU has retained a consultant to assess the existing volumetric charge, engage stakeholders and ultimately provide a water rate structure recommendation for the future that is conservation-oriented, considers revenue sufficiency, equity, transparency, legal compliance, and the feasibility of implementation.

4.5 City of Sacramento Water Conservation Potential

Section 2 provided an overview of how the City customers currently use water. From the analysis of water consumption data in Section 2, the following is observed:

- Estimated that the majority of the City's water consumption (more than 50%) is by the single family accounts.
- More than 60% of the water use annually by single family customers is used outdoors, primarily to irrigate landscapes.
- Observed water waste in residential neighborhoods throughout the City is perceived to be high by community leaders and state-wide GPCD metrics for reasonable indoor and outdoor use.
- Requests for investigations through the Water Conservation Office continue to increase.

In addition, because many accounts have been unmetered, and the cost of water is low, the expected efficiency of indoor use most likely lags that of other cities where customers have been paying for water volumetrically.

Based on a review of historical conservation activity in recent years with City staff, it is believed that additional conservation potential exists and that the participation level for a number of these measures could be intensified. It is recommended that the City conduct a water conservation devices saturation survey in the next 2-3 years to determine more accurately the market penetration of some of the new higher efficiency plumbing fixtures and appliances to best determine the conservation potential remaining. The estimates used in the DSS model are described in Appendix B.

Additionally the City could consider new conservation measures not currently being implemented to further address the water conservation potential. This topic is discussed in the next section.

5. ALTERNATIVE WATER CONSERVATION MEASURES

The City's goal is to develop a conservation plan that will result in the greatest efficiency of program administration, the lowest cost of implementation, and the greatest water savings. As part of this effort, the DOU and SWCAG held a meeting on March 21, 2012 to review potential conservation measures. A screening process was then undertaken through a series of Working Groups that met in April-May 2012 to gain input on the various potential measures. With the assistance of City staff and an independent facilitator from California Center for Collaborative Policy, there were 36 conservations measures selected for further evaluation by the DOU, SWCAG

Working Group and the Consultant Team, which included taking into account the existing measures currently implemented.

5.1 Conservation Analysis Goals and Approach

The overarching goal of the WCP is to evaluate the existing water conservation program to determine if and how much more conservation is warranted from a cost perspective and feasible from a conservation potential perspective. Based on a review of historical efforts and potential for conservation within the City, it is recognized that the City will need to increase conservation efforts that could lead to more participation from the City's residents and businesses.

The key challenges to be addressed are whether the City:

- can accomplish more conservation due to state mandates and voluntary commitments;
- has an incentive to do more if the cost to conserve water is less than the cost to expand the infrastructure to meet future demands; and
- can provide more support for conservation (beyond cost effectiveness) if the community requests it.

The process involved in answering these questions is described in the following sections. Throughout the process, the DOU and SWCAG provided input to assist with the assessment. The Consultant team was tasked with analyzing the City's current conservation program and assisting with answers to the first two questions above. The recommended plan described in Section 8.0 sets up a strategic framework of how much of which conservation measures will address the City's needs. It is envisioned that SWCAG will continue to provide ongoing input to DOU as the program is implemented.

5.2 Evaluating Existing and Potential New Conservation Measures

An important first step in updating the City's water conservation program was the review of existing conservation measures and screening any potential new water conservation measures. This step included:

1. Review of the current state codes and local ordinances;
2. Assessment of customer volunteer participation levels from current water conservation measures and the current status on meter conversions and existing rate schedule;
3. identification of potential new measures that may be appropriate for the City's service area; and
4. Screening of these measures to a short-list for detailed evaluation (using benefit-cost analysis).

To complete this process, a list of potential demand management measures for qualitative evaluation (screening) was compiled. The list of 80 existing and potential conservation measures includes gaining participation from all the typical customer categories including:

- All customers
- Residential
- Commercial, Industrial, Institutional
- Dedicated Irrigation
- Distribution System (System)

Consideration of Local, State and Federal Codes and Regulations related to Water Conservation

All laws, regulations and ordinances that influence future water demands are an important component of analyzing future water savings. The City did include the new Federal and California laws and regulations into the potential measure table used during the screening process. The following is a summary of which requirements were applicable to the water conservation planning effort.

The Cal Green requirements affect all new development in the State of California after January 1, 2011. As this is a new development law and based on discussions with City, MWM assumed actual water savings seen by the City beginning in the year 2012. The new development requirements under Cal Green are listed in Table 5-1.

Table 5-1: Cal Green Building Code

Cal Green Building Code						
Building Class	Component	Effective Date[i]	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% 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% 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

When measures were selected and later modeled, MWM worked carefully so that applicable laws and regulations were taken into account including any potential overlap with the plumbing code (natural replacement) and rebate programs. For example, SB 407 requires that new High Efficiency Toilets be installed in residential properties beginning in the year 2017 and in commercial properties beginning in 2019. SB 407 program length continues until all the older high flush toilets have been replaced in the service area. Table 6-1 shown in Section 6 includes a list of all the measures analyzed in this project.

List of 80 Potential Measures

The list of 80 potential conservation measures screened for the City includes the conservation measures considered appropriate for this region. The list includes devices or programs (e.g. such as a new high efficiency toilet that would save water if installed by a water retailer, contractor, or customer) that can be used to achieve water conservation, 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 and the City's general experience and includes a review of what other water agencies with conservation programs are currently implementing.

5.3 Screening of Conservation Measures

A screening process was undertaken to reduce the number of new measures being considered to a more manageable number and to eliminate those measures that are not as well suited to the City. As a result, MWM modeled a short-list of existing and new measures for further evaluation (water savings analysis and benefit-cost analysis with the DSS Model). This evaluation was specific to the water use characteristics, economies of scale, demographics, and other factors that are unique to the Sacramento area and the City.

A brainstorming session of all the potential measures was reviewed on March 21, 2012 with the SWCAG and DOU Management Team. Each potential measure was screened based on three qualitative criteria (below), scored on a scale of 1 to 5, with 5 being the most acceptable, and 15 being the maximum possible number of points for all criteria. The screening was completed by four working groups from the SWCAG, in a series of four half day meetings facilitated by the California Center for Collaborative Policy:

- Economic Incentives Workgroup (April 24, 2012)
- Outreach, Messaging and Partnering Workgroup (April 27, 2012)
- Outdoor Landscape Workgroup (May 2, 2012)
- SWCAG Technical Advisory Workgroup (May 21, 2012)
- DOU Management Team Workgroups (May through July 16, 2012)

For a full list of all SWCAG and DOU Management Team meetings and agenda items, please see Appendix D.

Qualitative Criteria

The rating group used the following criteria to evaluate the measures:

- Technology/Market Maturity – Refers to whether the technology needed to implement the conservation measure, such as an irrigation control device, is commercially available and supported by the local service industry. A measure was scored low if the technology was not commercially available or high if the technology was widely available in the service area. A device may be screened out if it is not yet commercially available in the region.

- Service Area Match – Refers to whether the measure or related technology is appropriate for the area's climate, building stock, or lifestyle. For example, promoting River Friendly gardens for multi-family or commercial sites is appropriate where water use analysis indicates significant outdoor irrigation. Thus, a measure scored high in this category if it was well suited for the Sacramento area's characteristics and could save water. Conversely, a measure scored low in this criterion if it was not well suited for the area and not perceived to save water (e.g., incentives for rain barrel watering systems).
  Customer Acceptance/Equity – Refers to whether retail customers within the City's service area would be willing to implement and accept the conservation 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 refers to retail customer equitability (i.e., one category of retail customers receives benefits while another pays the costs without receiving benefits). Retail customer acceptance may be based on:
  - Convenience
  - Economics
  - Perceived fairness
  - Aesthetics

Based upon MWM's past experience, it is reasonable to expect a utility to implement between 10-20 conservation measures at any one time and to focus the analysis on those measures most likely to yield meaningful conservation savings. There was one additional meeting by the DOU key staff to compile all the feedback and develop one consolidated list of suggested measures. After completion of the working groups' screening exercise, the DOU convened its Technical Team and MWM to address any remaining questions and review the overall DOU Importance Rating. The list of selected measures recommended for analysis was reviewed by the DOU Director on May 29, 2012. Then a follow-up review meeting of the SWCAG was held on June 6, 2012 to confirm the selection of the final 30 measures recommended for analysis by MWM.

As discussed and documented at the June 6th meeting, 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. In the end, the process reduced the measures to be evaluated down to 30 measures.

6. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES

6.1 Conservation Measures Evaluated

The following table presents the measure descriptions that were analyzed for the efforts of the WCP.

Table 6-1: Measure Description and Selection

DSS Model Measure Number	Focus Area	DOU Lead/ Partner	Conservation Measure	Measure Description	Key Commitments to CUWCC or Other Agencies
1	Water Waste	CO/DS/CE	**Investigate Customer Potential Leaks and Water Waste Ordinance Enforcement**	Continue to enforce water waste ordinance with required customer leak repairs. Effort is based on calls through customer complaints (through City call 3-1-1 system). Additionally, customers are notified through Computerized Maintenance Management System (CMMS) with automated written letters generated to customers with continuous flowing meters as flagged by the AMI Leak Report. Water Conservation Office follows-up with customers with potential leaks, first as a desktop review to see if potential leak is resolved. If continuous flow is still present, CO staff performs a Field Leak Investigation.	Existing CUWCC Foundational BMP 1.1
2	Water Loss	O&M	**Water Loss Control Program**	Continue to implement AWWA Manual M36 Methodology. (1) Use System Audit to track annually Infrastructure Leakage Index (ILI) Progress. Goal to lower the (ILI) and non-revenue water every year by pre-determined amount based on cost-effectiveness. (2) Analyze and Address Apparent Losses (i.e. data for billing system errors, and address meter testing and repair/replacement to insure more accurate meter reads and revenue collection). (3) Covers current efforts to address Real Losses (i.e. find and repair leaks in the distribution system to reduce real water loss and take other actions. Specific goals and methods are in progress by DOU - a program to implement best practices is ongoing (i.e., installation of data loggers and proactive leak detection, accelerated meter replacement and will be done over time). Leak repairs would be handled by existing crews.	CUWCC Foundational BMP 1.2 - Assume combine with other Water Loss measures
3	Metering	O&M	**AMI System with Meter Retrofits and Conservation Benefits**	Continue with approved AMI system installation. The AMI web portal that is being developed by City of Sac indicates to the customer and Utility where and how their water is used thereby facilitating water use reduction and helps customers identify leaks. Require that new customers with AMI capability review hourly consumption data when taking advantage of City incentives (i.e. online bill pay, rebate incentives).	Supporting CUWCC Foundational BMP 1.3.
4	Pricing	IPM	**Conservation Pricing**	Currently City has volumetric uniform rate for all new customers and one year after customer has a meter retrofit. Future Water Rate Study is planned. Seek a rate structure that would be more equitable among metered users than uniform volumetric rate. Goal is to complete study by 2014 and to implement a new tiered pricing structure designed and in place by 2016.	CUWCC Foundational BMP 1.4. Pending Rate Study conclusions
5	Education & Conservation General Administration	PI/ CO/RWA	**Public Information, Regional Outreach, Media Campaign**	Public education is necessary to raise awareness of conservation measures available to customers. Coordinate with the RWA Be Water Smart Regional Outreach Programs and use various methods to teach customers about efficiency measures. Include speakers to community groups, educational material, conservation website, radio, TV spots, demonstration gardens, etc. Refine and develop media messages, social marketing plan that will use public input to assist in changing attitudes. This measure also includes the Program Management and Administration needed by the Public Information Officer and Conservation Office staff.	Existing CUWCC Foundational BMP 1.1 & BMP 2

Table 6-1 (Continued)

DSS Model Measure Number	Focus Area	DOU Lead/ Partner	Conservation Measure	Measure Description	Key Commitments to CUWCC or Other Agencies
6	Single Family Residential Surveys	CO/RWA	**Single Family Residential Audits (Surveys)**	Continue conventional indoor and outdoor water surveys for existing single-family residential customers. Normally those with high water use are targeted and provided customized water saving information, tips and tools. Outdoor water surveys for existing single family residential customers (4 units or more). Target those with high water use and provide a customized report to owner.	CUWCC BMP 3.1 & 3.2
7	Multi-family Residential Surveys	CO/RWA	**Multi-family Residential Audits (Surveys)**	Continue conventional indoor and outdoor water surveys for existing multi-family properties. Normally those with high water use are targeted and provided customized water saving information, tips and tools. Outdoor water surveys for existing multifamily residential customers (less than 4 units). Target those with high water use and provide a customized report to owner.	CUWCC BMP 3.1 & 3.2
8-Int	SF Residential Incentives - Indoor	CO/ SMUD/ SRCSD	**Residential High Efficiency Washer Rebate Intensive**	Continue to provide a SF rebate for the installation of a high efficiency washer (HEW). Rebate amounts have been $100 (www.sparesacwater.org). Program will be short lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation.	CUWCC BMP 3.3. Assume Keeping Existing Partnership with SMUD
9	Multi-family, Commercial and Institutional - Incentives	CO/ RWA /SMUD /SRCSD	**Commercial High Efficiency Washer Rebate Intensive**	Provide an incentive to MF and CI customers for the installation of a high efficiency washer (HEW).Program will be short lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation.	Supports CUWCC BMP 4
10-Int	Residential Incentives - Indoor	CO/ RWA/ SRCSD	**Residential High Efficiency Toilet (HET) Rebates**	Continue to provide a rebate for the high efficiency toilet (HET). HET's are defined as any toilet flushing at 1.28 gpf or less and include dual flush technology. Rebate amounts have been $100 (www.sparesacwater.org). Move to lower flush volume of 0.8 gpf after new AB 715 law goes into effect in 2014.	CUWCC BMP 3.4. Prop 84 funding for DACs.
11-Int	Commercial and Institutional - Surveys	CO/ RWA /SMUD /SRCSD	**CII Surveys and Top 100 Users Program**	All CII customers would be offered a free water survey that would evaluate ways for the business to save water and money. The CII surveys would be for large accounts (accounts that use more than a significant amount of water per day) such as hotels, restaurants, stores and schools. Will need to prioritize and staff properly. Emphasis will be on supporting the high water users including monitoring the high water users (e.g., Cal State University campus, U.C. Medical Center, etc.).	Supports new CUWCC BMP 4 that requires savings be met. Need supporting surveys.
12-Int	Commercial and Institutional - Incentives	CO/ RWA /SMUD /SRCSD	**CII Rebates to Replace Inefficient Equipment Intensive**	Provide an incentive for a standard list of water efficient equipment or on a case by case basis. Included would be icemakers, water-cooled ice machines, steamers, washers, efficient dishwashers, replace once through cooling, and add conductivity meters on cooling towers. Pattern after Southern Nevada Water Authority, East Bay MUD or Seattle Water Department programs.	Supports CUWCC BMP 4
13	Commercial and Institutional - Incentives	CO/RWA/ SRCSD	**Promote Restaurant Spray Nozzles**	Provide lower than a 1.6 gpm spray nozzles for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door, very cost-effective because saves hot water. Contact the Food Science Technology Center for more information: http://www.fishnick.com/	New State Title 20 Regs. Very cost effective. Assume included.
14-Int	Commercial and Institutional - Incentives	CO/RWA/ SRCSD	**Commercial High Efficiency Toilet (HET) Rebates**	Continue to provide an incentive for the high efficiency toilet (HET). HET's are defined as any toilet flushing at 1.28 gpf or less and include dual flush technology. Historically, rebate amounts have been $150 (www.sparesacwater.org)	CUWCC BMP 3.4. New State Law AB 715 after 2014.

Table 6-1 (Continued)

DSS Model Measure Number	Focus Area	DOU Lead/ Partner	Conservation Measure	Measure Description	Key Commitments to CUWCC or Other Agencies
15	Commercial and Institutional - Incentives	CO/RWA/ SRCSD	**High Efficiency Urinal Rebate (<0.25 gallon)**	Continue to provide a rebate for high efficiency or waterless urinals to existing high use CII customers (such as restaurants). (www.sparesacwater.org)	Supports CUWCC BMP 4
17	Large Dedicated Irrigation Only - Surveys	CO/RWA/ SSQP	**Irrigation Water Surveys**	All public and private irrigators of landscapes would be eligible for free landscape water surveys upon request. Normally those with high water use would be targeted and provided a customized report. Assume 10 percent of large turf areas are surveyed per year.	CUWCC BMP 5.
18	Large Dedicated Irrigation Only - Budgets	CO/RWA/ SSQP	**Irrigation Water Budgets**	Irrigators of landscapes with separate irrigation account (meter) use would receive a monthly or bi-monthly irrigation water use budget.	CUWCC BMP 5 and Pending Prop 84
20	Residential Incentives - Outdoor	CO/RWA/ SSQP	**Residential Financial Incentives for Irrigation and Landscape Upgrades**	For SF customers with landscape, provide a Smart Landscape Rebate Program with incentives towards the purchase and installation of selected types of irrigation equipment upgrade excluding smart controllers (see below). Planned to include rotation nozzles, drip conversion, water wise plants and mulch.	Pending Prop 84 funding support.
21	Large Accounts Irrigation - Incentives	CO/RWA/ SSQP	**Financial Incentives for Irrigation and Landscape Upgrades**	For MF, CII, and IRR customers with large landscapes (i.e. greater than 1 acre), continue to provide a Smart Landscape Rebate Program with rebates towards the purchase and installation of selected types of irrigation equipment upgrade excluding smart controllers (see below). Planned to include rotation nozzles, drip conversion, water wise plants and mulch.	CUWCC BMP 5
24	Residential Incentives - Outdoor	CO/RWA/ SSQP	**Residential Financial Incentives for Smart Controllers**	Provides for SF customers with an incentive to install smart controllers. Also includes training support. Assume administered together with Smart Landscape Rebates program (above).	Pending Prop 84 funding support.
25	Commercial Incentives - Outdoor	CO/RWA/ SSQP	**Commercial Financial Incentives for Smart Controllers**	Provides for larger landscape MF, CI and IRR customers with an incentive to install smart controllers. Assume administered together with Smart Landscape Rebates program (above).	Pending Prop 84 funding support.
27	Residential and Non-Residential Irrigation for New Development	DS/CE	**Enforce new Landscape and Irrigation Requirements and Ordinance**	Enforce City's Water Efficient Landscape Design Standards and Ordinance. Standards specify that development projects subject to design review be landscaped according to River Friendly principals, with appropriate turf ratios, plant selection, efficient irrigation systems and smart irrigation controllers.	Existing. Assume Included.

Notes:

DOU Lead: CO = Conservation Office, FO = Field Operations, PI = Public Information, IPM = Integrated Planning & Business Operations, DS = Development Services, CE = Code Enforcement

Customer Categories: SF – Single Family, MF – Multi-family, CII – Commercial, Industrial and Institutional, All – All of the Above, System – Utility's Distribution System, IRR - Dedicated Irrigation Meter; DOU - City of Sacramento Dept. of Utilities

Partnerships: RWA = Regional Water Authority, SMUD = Sacramento Municipal Utility District, SRCSD = Sacramento Regional Sanitation District, SSQP = Sacramento Stormwater Quality Partnership

6.2 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 through avoided costs for building additional infrastructure and/or operating expenses, such as chemical and energy that is not required when less volume of water is treated. This analysis was performed using the DSS Model (see Section 3 and Appendix A for further description). The DSS Model 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.

Economic analysis can be performed from several different perspectives, based on which party is affected. For planning water conservation programs for utilities, the perspectives most commonly used for benefit-cost analyses are the "utility" perspective and the "community" perspective, which are defined as follows:

- Utility Perspective - benefit-cost analysis is based on the benefits and costs to the water provider.
- Community Perspective - 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 savings (benefits) plus costs of implementing the measure, beyond what the utility pays, such as installation costs.

The utility perspective offers two advantages. First, it considers only the program costs that will be directly borne by the utility. This enables the City to fairly compare potential investments for saving versus supplying more 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 such that City 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 producing water and the reduction in retail revenue that results from reduced water sales due to conservation. Effects on budgets due to reduced customer demand impact occurs slowly, typically less than 0.5-2 percent annually, and can be accounted for in water rate planning. As it is the City DOU's role in developing a conservation plan that is paramount in this analysis, the utility perspective was primarily used to evaluate elements of the plan.

Other factors external to the utility, such as environmental benefits, are often difficult to quantify, and are not necessarily under the control of the utility. They are therefore frequently excluded from economic analyses but are required to be noted as per Exhibit 3 of the California Urban Water Conservation Council's Memorandum of Understanding Regarding Urban Water Conservation in California. For the purposes of this analysis, the DSS Model assumes $75 per acre-foot environmental avoided cost per the 2000 Water Forum Agreement.

6.3 Present Value Parameters

The time value of money is explicitly considered. 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 2010), at the real

interest rate of 3.0%. The DSS Model calculates this real interest rate, adjusting the current nominal utility cost of borrowing money (assumed to be approximately 6.1%) by the assumed rate of inflation (3.0%). Cash flows discounted in this manner are herein referred to as "Present Value" sums.

6.4 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by the City. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. The model was run for 30 years, (each year between 2010 and 2040) to encompass the 10-year conservation planning period of 2012 to 2020 provides estimated water savings needed for period of SB X7-7. The long period from 2012 to 2040 provides estimated water savings for the City's Water Master Plan. Costs were spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

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

6.5 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 thirty years after the start of implementation, depending upon the implementation schedule.

6.6 Assumptions about Avoided Costs

The main source of water for the City is local surface water pumped and treated from either the Sacramento or American Rivers. For this evaluation the avoided costs were taken from the estimated cost of a future water treatment plant (WTP) expansion cost of $138 million and associated infrastructure, such as new pipelines at $22.7 million (15% of the WTP expansion cost). The size of the WTP expansion was on the order of 60 million gallons per day (MGD) triggered when demands hit 248 MGD. This expansion is computed to be needed based on the demand projections and current water treatment capacity to occur in the year 2030. It is recommended

that these costs are updated whenever appropriate based on when revised cost information is developed for future revisions to the City's Water Master Plan.

6.7 Measure Assumptions including Unit Costs, Water Savings, and Market Penetrations

Appendix B includes the assumptions used in the DSS Model to evaluate the water conservation measures selected by the City. 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 the utility) to implement measures.
- 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 local agency 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. Appendix B shows the unit costs and other measure assumptions used in the study for each measure analyzed. The model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

Annual Utility Cost = Annual market penetration rate x total accounts in category x unit cost per account x (1 + administration and marketing markup percentage)

Annual Customer Cost = Annual number of participants x unit customer cost

Annual Community Cost = Annual utility cost + annual customer cost

Unit costs and savings are provided on per account basis, and some account types may be multiple "units" as described in the comments with Appendix B on cost assumptions unique to each conservation measure.

6.8 Comparison of Individual Measures

Table 6-2 presents how much water the measures would save over 30 years, how much each would cost, and what the cost of saved water would be 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)). Only the net water savings for overlapping conservation measures was included in each program. 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% of the prior water use then the net effect is not the simple sum (20%). Rather it is the cumulative impact of first measure reducing the use to 90% of what is was without the first measure in place and then reducing the use another 10% to result in the use being 81% of what it was originally. In this example, the net savings is 19%, not 20%. Using impact factors the model computes the reduction as follows 0.9 x 0.9 = 0.81 or 19% water savings.

Since interaction between measures has not been accounted for in Table 6-2, it is not appropriate to include totals at the bottom of the table. However, the table is useful to give a close approximation of the cost effectiveness of each individual measure.

Cost categories are defined below:

- Utility Costs - those costs that the City as the water utility would incur to operate the Water Conservation Program, including administrative costs.
- Utility Benefits - the avoided cost of deferred capital costs and reduced operating costs
- Customer Costs - those costs customers would incur to implement a measure in the City's Conservation Program 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. Reduced water and sewer bills are not included because they are a transfer payment among water users and any lost revenue would be made up with an overall rate increase. 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 Table 6-2, as well as those used later in Table 7-4, are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits ($) = the present value of the 30-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 30 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 30 years
- Utility Cost of Water Saved per Unit Volume ($/AF) = PV of Utility Costs over 30 years divided by the sum of the water saved over 30 years.. 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.

Table 6 2: Estimated Conservation Measure Costs and Savings

City of Sacramento Conservation Measure Costs and Savings				
Measure Name	**Water Utility Benefit to Cost Ratio**	**Water Savings in Year 2020 (afy)**	**Average Yearly Water Savings (afy)**	**Cost of Savings per Unit Volume ($/af)**
Prohibit Water Waste Leak Investigations	0.09	93	80	$1,704
Water Loss Reduction	0.42	2,642	3,572	$218
Water Loss Reduction Int	0.51	5,210	6,930	$178
AMI Meter Installation & Customer Benefits (to reduce Customer Leaks)	0.14	3,459	3,482	$1,109
Pricing Measure Model	NA	NA	NA	NA
Public & School Education Program & General Program Administration	0.11	345	333	$1,426
SF Water Surveys (Audits)	0.28	112	102	$548
SF Water Surveys (Audits) 2012-2014	0.24	-	12	$601
SF Water Surveys (Audits) Intensive	0.35	254	207	$449
MF Water Surveys (Audits)	0.52	60	64	$286
Single Family HE Washer Rebate	0.48	59	71	$290
Single Family HE Washer Rebate Intensive	0.21	123	159	$646
MF, CII HE Washer Rebate	0.30	63	90	$461
MF, CII HE Washer Rebate Intensive	0.14	125	179	$959
Residential HE Toilet Rebate	0.37	30	25	$383
Residential HE Toilet Rebate Intensive	1.58	258	171	$87
Commercial Surveys	0.39	59	98	$369
Commercial Surveys Current	3.35	14	12	$45
Commercial Surveys Intensive	0.34	135	274	$420
MF Residential and Institutional Buildings Retrofit	0.06	34	66	$2,322
MF Residential and Institutional Buildings Retrofit Intensive	0.03	67	132	$5,002
COM Rebate to Replace Inefficient Equipment	0.27	52	83	$480
COM Rebate to Replace Inefficient Equipment Intensive	0.36	144	232	$360
CII Promote Pre-rinse Spray Nozzles	3.27	46	36	$42
CII High Efficiency Toilet Rebate	0.67	55	39	$207
CII High Efficiency Toilet Rebate Intensive	0.50	68	49	$276
CII High Efficiency Urinal Rebate (<0.25 gal/flush)	0.25	19	12	$561
Irrigation Water Surveys	0.15	72	67	$1,077
Irrigation Water Budgets	2.11	201	178	$80
Water Budgets with Meter Conversion - Mixed Use to Dedicated Irrigation Meter	0.12	383	333	$1,371
Res Financial Incentives for Irrigation and Landscape Upgrades	0.15	86	178	$1,081
Financial Incentives for Irrigation and Landscape Upgrades	0.28	132	275	$585
Rain Sensors Single Family	0.57	66	170	$284
Rain Sensors Irrigation	8.75	26	69	$18
SF Smart Irrigation Controllers	0.18	75	151	$908
CII Smart Irrigation Controllers	0.18	234	506	$876
Water Group Scheduling	9.76	715	608	$17
Verification of Landscape Plans and Update Model Water Efficient Landscape Ordinance	1.11	143	164	$158
Developer Financed Reduced Footprint New Development	0.30	289	537	$507
Require Multi Family Submetering on New Accounts	0.12	339	707	$1,204

Note: Descriptions for each measure are provided in Table 6-1.

7. RESULTS OF CONSERVATION PROGRAM EVALUATION

Following the analysis of the individual measures, MWM prepared four scenarios of alternative programs by combining individual measures together. Within the program alternatives, there are benefits from:

- Ongoing or new plumbing codes or ordinances - counted as passive savings due to natural replacement of fixtures and appliances where new models have been required to be manufactured to use less water (have higher efficiency). For example, in California only high efficiency toilets are for sale starting in January 1, 2014 per SB 407. Another example is that all new non-residential accounts with over 5,000 square feet landscaping are required to have weather based irrigation controllers per AB 1881 and dedicated irrigation meters
- Continuing with existing conservation measures
- More intensive efforts for existing conservation measures – which involves adding more budget and/or staffing to support getting more customer participation. These are typically twice the budget and twice the participation levels as appropriate to the measure (i.e., potential for market saturation).
- New conservation measures not currently implemented by the City

Table 7-1 provides a summary of which measures are included in each of the four alternative programs. The four packages are designed to illustrate a range of various measure combinations and resulting water savings as described in the following section.

7.1 Selection of Measures for Alternative Programs (A to D)

These alternative programs are not intended to be rigid programs but rather to demonstrate the range in savings that could be generated if selected measures were run together. In this step, MWM accounts for the combined savings and benefits from programs or packages of measures that goes beyond the passive savings (i.e. natural replacement due to the plumbing code).

A summary list in Table 7-1clearly presents which measures are in which alternative program. More details on the measures are available in Appendix B. A description of each program evaluated follows.

Program A – "Existing" 14 Measures

Savings for the "Existing Program" include the measures that have been run during the time period of FY 2008 - FY 2012. For the City, the following measures were included:

Existing Program Conservation Measures:

General Measures:

- Water Waste Prohibition
- Automatic Meter Retrofits
- System Water Loss Reduction
- Public Outreach, School Education and General Administration

Residential Measures:

- Single Family Audits (Water Wise House Call Surveys)
- Multi-family Audits (Surveys)
- High Efficiency Washer Rebates
- High Efficiency Toilet Rebates

Commercial, Institutional and Industrial Measures:

- CII Audits (Surveys)
- CII Incentives for Inefficient Equipment
- High Efficiency Toilet Rebates
- High Efficiency Urinal Rebates

Irrigation Only Measures

- Financial Incentives for Non-Residential Irrigation Accounts
- Irrigation Water Audits

Program B – "Reach 2020" – 24 Measures

For some existing conservation measures being implemented by the City (Program A), there are lower participation rates historically than might be expected based on experience from agencies elsewhere in the region or state, or estimated when examining remaining conservation potential. Based on initial results of the DSS Model analysis, it was determined that some of these measures have a relatively low cost to implement compared to the water savings, or in other words, cost less than approximately $400-$500/AF. As a result, the City and MWM determined that selecting these measures using more intensive efforts was appropriate, namely in terms of more budget (i.e., higher customer incentives or rebates) and outreach to market availability would be used to target higher participation rates.

The following measures were added or made more intensive from the Program A listed measures shown above:

Additional General Measures:

- System Water Loss Reduction (Intensive)

Additional Residential Measures:

- Residential High Efficiency Clothes Washers Rebates (Intensive)
- Residential High Efficiency Toilet Rebate (Intensive)
- Residential Smart Weather Based Irrigation Controller Rebates

Additional Commercial Measures:

- Commercial Clothes Washers Rebates
- Pre-rinse Spray Valves
- CII Audits (Intensive)
- CII Incentives for Inefficient Equipment (Intensive)
- High Efficiency CII Toilet Rebates (Intensive)
- CII Smart Weather-based Irrigation Controllers

Additional Landscape Measures

- Financial Incentives for Residential Irrigation and Landscape Upgrades
- Update Ordinance and Verify Landscape Plans

Program C – "Meet 2020 with Conservation Pricing" – 25 Measures

Program C is one step more intensive than Program B by including conservation pricing (to come into compliance with CUWCC BMP 1.4). The program goal is to meet the City's target of using no more than 223 GPCD.

Program D – "All Modeled Measures" – 30 Measures

Program D is one step more intensive than Program C with additional intensive and new measures. The program goal was to increase water savings.

Figure 7-1 and Table 7-2 present projected water demands with and without the plumbing code and the impact of each program's water savings on overall water demand. Figure 7-2 and Table 7-4 depict the projected average daily per capita water use and how it could be affected by each conservation program. The per capita values in the figure are calculated from the total water production and divided by the projected population for each given year.

Table 7-1: Conservation Programs and Measures

Conservation Programs and Measures City of Sacramento Measure Name	Program A	Program B	Program C	Program D
Prohibit Water Waste Leak Investigations	✓	✓	✓	✓
Water Loss Reduction	✓			
Water Loss Reduction Int		✓	✓	✓
AMI Meter Installation & Customer Benefits (to reduce Customer Leaks)	✓	✓	✓	✓
Pricing Measure Model			✓	✓
Public & School Education Program & General Program Administration	✓	✓	✓	✓
SF Water Surveys (Audits)	✓			✓
SF Water Surveys (Audits) 2012-2014		✓	✓	
SF Water Surveys (Audits) Intensive		✓	✓	
MF Water Surveys (Audits)	✓	✓	✓	✓
Single Family HE Washer Rebate	✓			
Single Family HE Washer Rebate Intensive		✓	✓	✓
MF, CII HE Washer Rebate		✓	✓	
MF, CII HE Washer Rebate Intensive				✓
Residential HE Toilet Rebate	✓	✓	✓	
Residential HE Toilet Rebate Intensive		✓	✓	✓
Commercial Surveys	✓			
Commercial Surveys Current		✓	✓	
Commercial Surveys Intensive		✓	✓	✓
MF Residential and Institutional Buildings Retrofit				
MF Residential and Institutional Buildings Retrofit Intensive				✓
COM Rebate to Replace Inefficient Equipment	✓			
COM Rebate to Replace Inefficient Equipment Intensive		✓	✓	✓
CII Promote Pre-rinse Spray Nozzles		✓	✓	✓
CII High Efficiency Toilet Rebate	✓			
CII High Efficiency Toilet Rebate Intensive		✓	✓	✓
CII High Efficiency Urinal Rebate (<0.25 gal/flush)	✓	✓	✓	✓
Irrigation Water Surveys	✓	✓	✓	✓
Irrigation Water Budgets	✓	✓	✓	✓
Water Budgets with Meter Conversion - Mixed Use to Dedicated Irrigation Meter				✓
Res Financial Incentives for Irrigation and Landscape Upgrades		✓	✓	✓
Financial Incentives for Irrigation and Landscape Upgrades		✓	✓	✓
Rain Sensors Single Family				✓
Rain Sensors Irrigation				✓
SF Smart Irrigation Controllers		✓	✓	✓
CII Smart Irrigation Controllers		✓	✓	✓
Water Group Scheduling				✓
Verification of Landscape Plans and Update Model Water Efficient Landscape Ordinance		✓	✓	✓
Developer Financed Reduced Footprint New Development				✓
Require Multi Family Submetering on New Accounts				✓

Note: Descriptions for each measure are provided in Table 6-1.

Figure 7-1 shows annual water demand with no conservation, plumbing code only, and the four alternative programs. Table 7-2 shows the savings in five year increments for all four programs.

Figure 7-1: Water Demand Projections with Conservation Program Savings

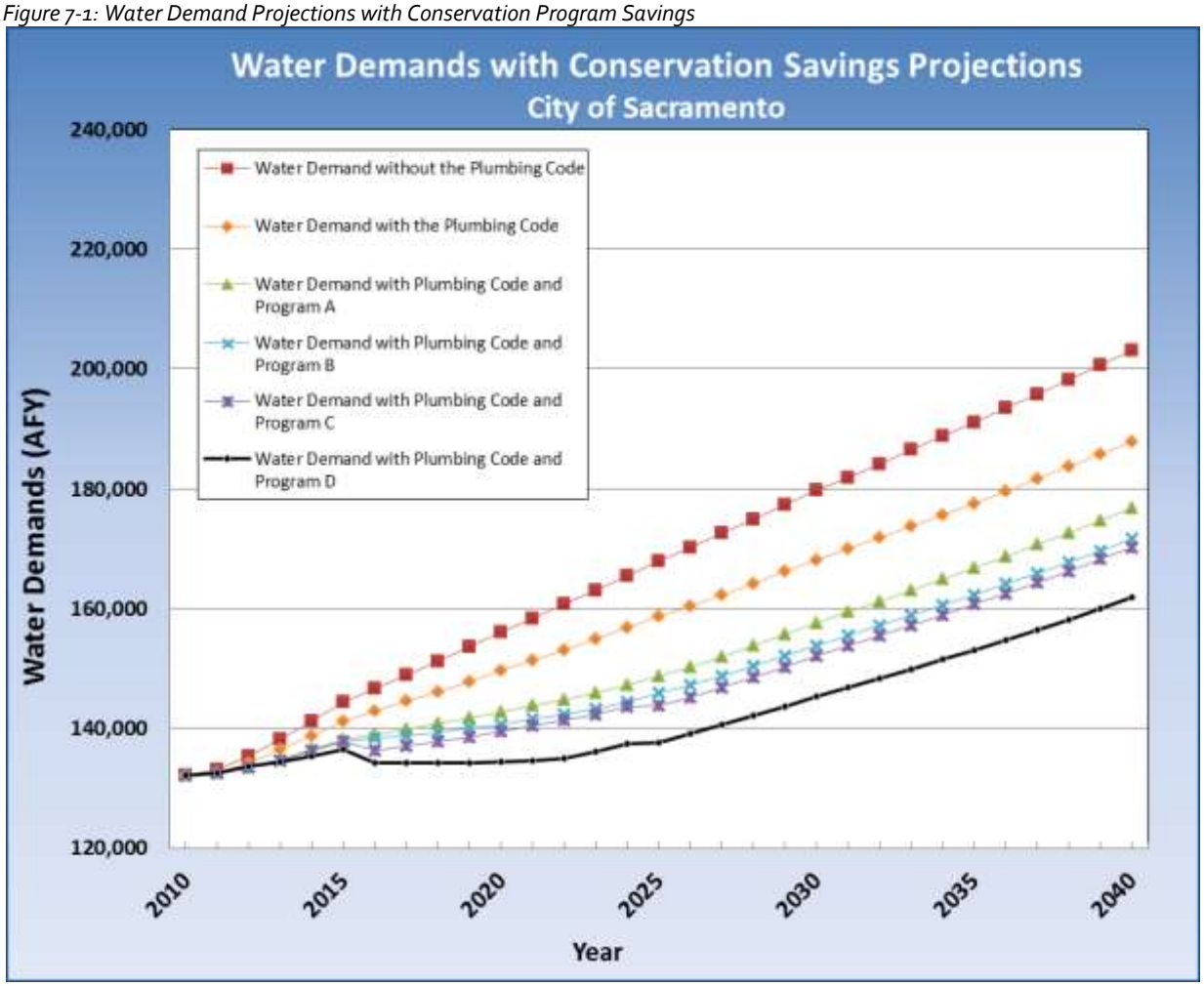


Table 7-2: Long Term Conservation Program Projected Water Savings

Water Demands with Conservation Savings Projections City of Sacramento			
Water Demands (AF/Yr)	**2015**	**2020**	**2040**
Water Demand without the Plumbing Code	145,408	158,020	208,439
Water Demand with the Plumbing Code	142,160	151,515	192,333
Water Demand with Plumbing Code and Program A	139,206	144,695	180,919
Water Demand with Plumbing Code and Program B	139,252	140,871	171,726
Water Demand with Plumbing Code and Program C	139,229	138,556	167,109
Water Demand with Plumbing Code and Program D	138,938	137,000	163,260

Figure 7-2 shows estimated annual average per capita daily use without conservation, with the plumbing codes only, and each of the four alternative programs. Table 7-3 shows the estimate per capita savings in five year increments for all four programs. The savings in Table 7-4 are from the conservation programs and do include the plumbing code savings. Additionally, the benefit cost ratios from the utility and community perspectives are presented. These values are based on the full cost of the conservation program including the metering retrofit and water loss control program budgets.

Figure 7-2: Estimated Per Capita Average Daily Water Use

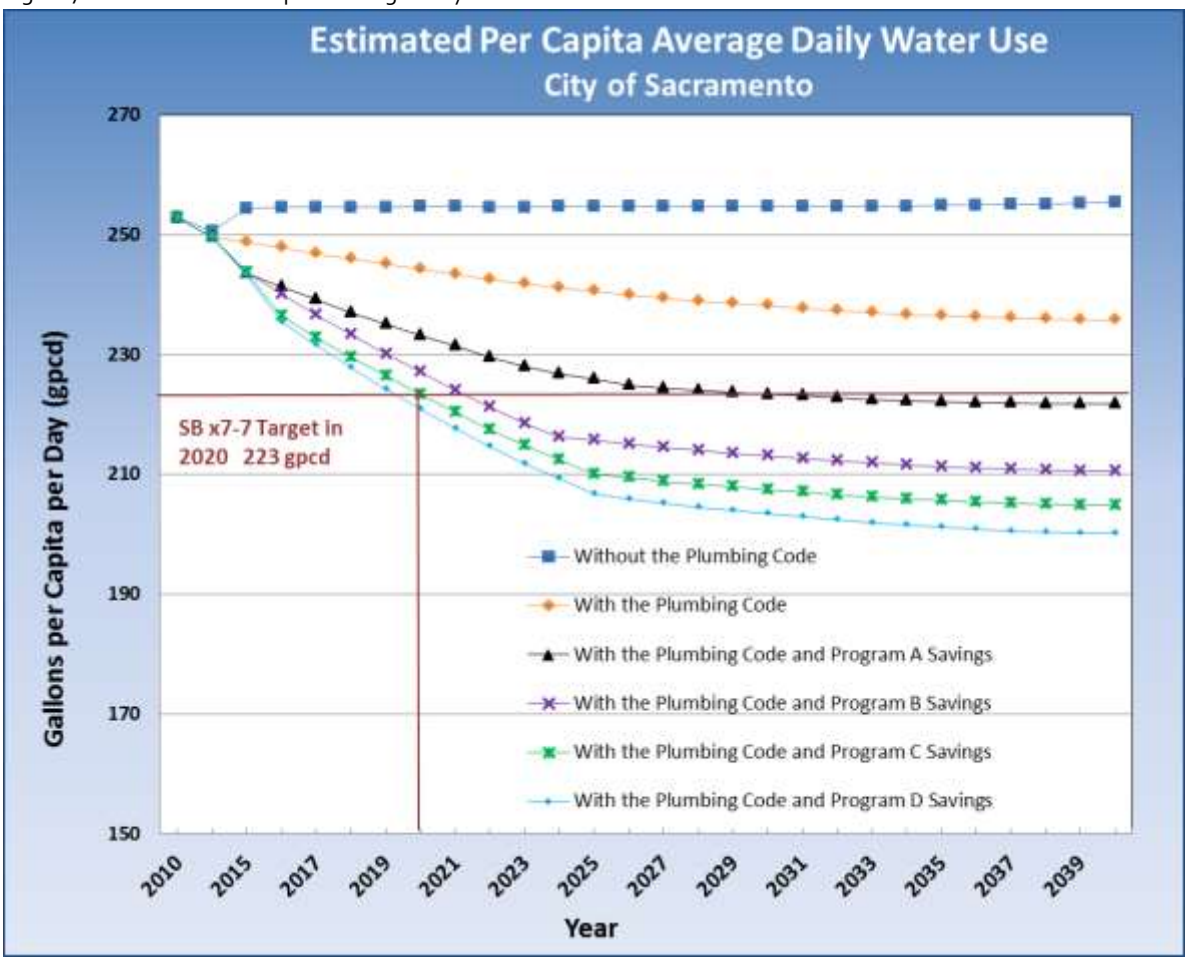


Table 7-3: Estimated Per Capita Average Daily Water Use

Estimated Per Capita Average Daily Water Use City of Sacramento			
Per Capita Average Daily Water Use (gcd)	**2015**	**2020**	**2040**
Without the Plumbing Code	254	255	256
With the Plumbing Code	249	244	236
With the Plumbing Code and Program A Savings	244	233	222
With the Plumbing Code and Program B Savings	244	227	211
With the Plumbing Code and Program C Savings	244	223	205
With the Plumbing Code and Program D Savings	243	221	200

Figure 7-3 illustrates how marginal returns change as more money is spent to achieve water savings. As the figure shows the costs increase as the per capita water usage declines from Program A to D which corresponds to increasing budget, staffing and participation in the conservation programs.

Figure 7-3: Present Value of Utility Costs vs. Per Capita Water Use in 2020

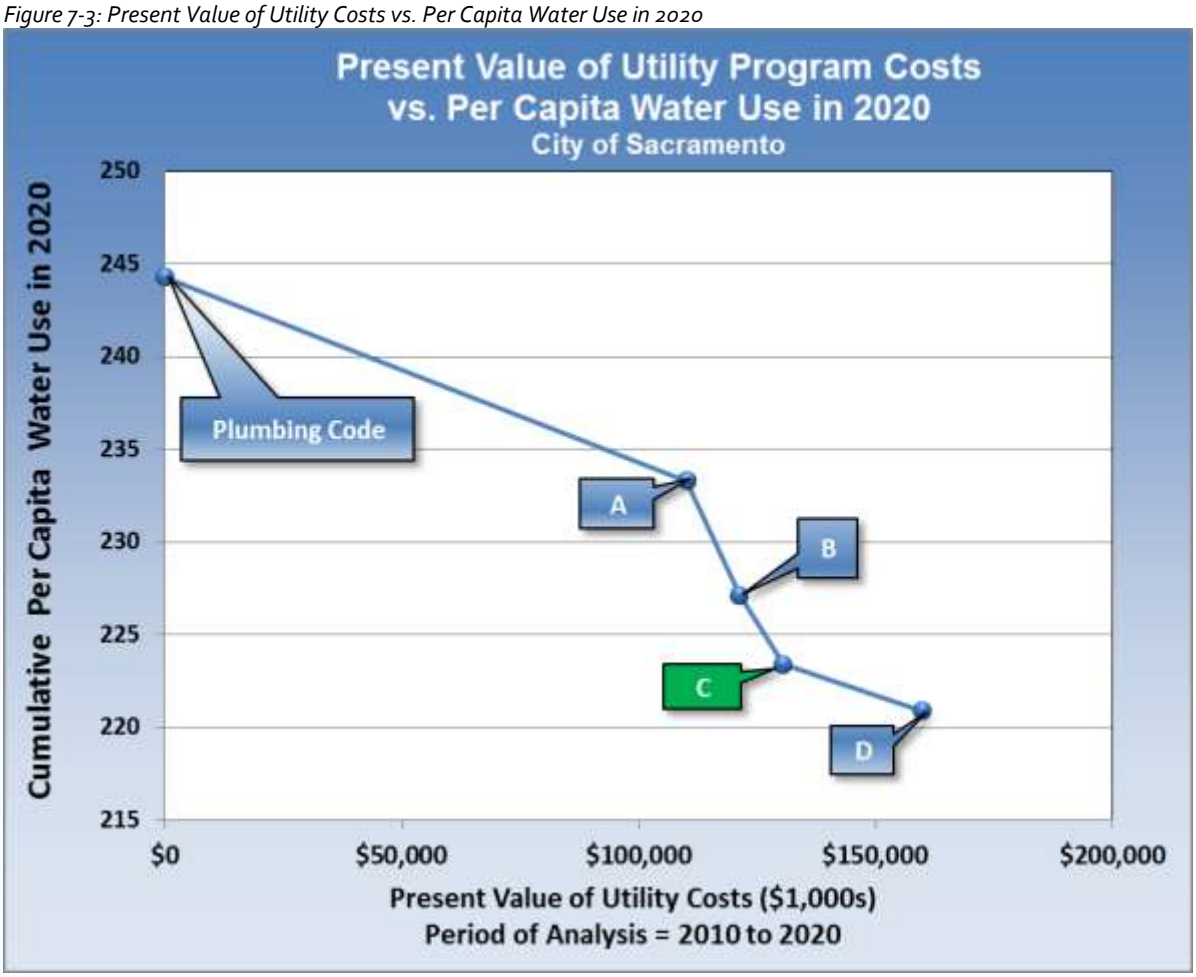


Table 7-4 presents key evaluation statistics compiled from the DSS Model. Assuming all measures are successfully implemented, projected water savings for 2020 and 2040 in AF are shown, as are the costs of achieving this reduction. Water savings for programs in 2020 and 2040 are also shown in Table 7-4.

The costs are expressed two ways:

- Total present value over the analysis period,
- The cost of water saved. Cost of water saved is presented two ways: for the utility and the total community (customer plus utility).

These cost parameters are derived from the estimated annual utility, customer and community costs.

The water savings in Table 7-4 are expressed as a percentage of the projected 2040 demand. One column indicates the percentage of the new water demand in 2020 each program could provide. The new water needed by new customers over the full planning period is the difference between 2012 demand and 2040 demand without the plumbing code. The plumbing code is an additional savings that could be added on top of the per capita water savings shown in Table 7-3. This allows the plumbing code savings percent and water savings in AF/Yr shown in Table 7-4 and to be additive to the conservation program savings in AF/Yr and percentages shown.

Table 7-4: Comparison of Conservation Program Estimated Costs and Water Savings

Comparison of Conservation Program Estimated Costs and Savings
City of Sacramento

Conservation Program	Water Utility Benefit-Cost Ratio	2040 Water Savings (AF/Yr)	2040 Indoor Water Savings (AF/Yr)	2040 Outdoor Water Savings (AF/Yr)	Total Water Savings as a Percentage of Total Production in 2040	Present Value of Water Utility Costs	Total Utility Cost for First Five Years (2011 to 2015)	Water Utility Cost of Water Saved ($/AF)
Program A	0.20	11,414	8,594	2,820	5.9%	$171,725,569	$81,116,977	$714
Program B	0.26	20,606	15,317	5,289	10.7%	$210,987,535	$92,432,233	$528
Program C	0.31	25,223	15,857	9,366	13.1%	$225,314,317	$102,553,019	$462
Program D	0.27	29,073	17,326	11,747	15.1%	$299,069,928	$124,511,544	$543

Notes:

- Present Value is determined using an interest rate of 3%
- Cost of water saved is present value of water utility cost divided by total 30-year water savings.
- Total water savings in 2040 as a percent of production is relative to no plumbing code production
- Conversion 1 MGD is equal to 1,120 AF/Yr

7.2 Ongoing Monitoring Approach

The results in this analysis were prepared by MWM with careful review and agreement by the City related to the assumptions used to address known sources of uncertainty, which includes:

- If and when economic recovery will occur and how water demand would be impacted
- Rate study pending in the next two years
- Partially metered system
- CUWCC BMP database unit water savings are under review
- Future City budget availability given current economic conditions that may require higher budgets and staffing support in subsequent years if underfunded in earlier years and targets are not being met and water demands are increasing faster than projected
- Grant funding is uncertain given state and federal funding availability
- SB X7-7 Water Conservation Act allows for an adjustment in targets and methodology if it is estimated by DWR that the statewide water conservation goal is not projected to be achieved. DWR is required to submit their report to the state legislature by December 31, 2016. This could lead to higher savings goals, in other words, lower per capita usage targets.

Fundamentally, there is an expectation for monitoring the conservation program performance and per capita water usage: it should be periodically updated as per capita water usage is tracked. Ideally these updates would happen annually, most likely with the annual budgeting process. Due to unforeseen impacts on per capita water use it is anticipated that activity levels and budgets for planned programs will need to be adjusted as needed (at minimum on an annual basis) to stay on track. A significant update would need to be undertaken during the preparation of the 2015 UWMP.

8. RECOMMENDED PLAN

This section presents an overview of the recommended conservation plan for the City of Sacramento service area. The recommended plan includes several elements:

- How the plan was selected from the alternatives presented in Section 7;
- A more detailed description of the recommended measures including overall benefits, perceived challenges and relative cost effectiveness along with a relative priority ranking for DOU compared to other measures;
- Implementation suggestions; and
- The estimated costs and schedule for implementation.

8.1 Selection Criteria and Process

The selection of both the recommended individual measures and overall program was fully vetted through a variety of meetings, including:

- Reviewing the preliminary draft results with the DOU Technical Team meeting held July 16, 2012 to check assumptions related to:
    - Projections for future demand
    - Review decision criteria, which included:
        - Water savings to meet per capita targets
        - Ease of implementation
        - Availability of technology
        - Cost-effectiveness
    - Water savings projected from existing City conservation efforts (Program A), would not be projected to reach the target of 223 GPCD based on the assumed economic recovery prior to 2020
    - Results for the conservation measures selected by the DOU and SWCAG Options for combining measures into programs to meet City goals

- Seeking guidance on the final selected measures and program with the Director of Utilities on July 30, 2012 and his request to add estimates for conservation pricing benefits in terms of costs and water savings. As a result, an additional proposed Program C was added to the options and designated as the recommended program as of August 2013.

- Receiving additional feedback from the Sacramento Water Conservation Advisory Committee (SWCAG) and the City Water Ad Hoc Committee that reviewed the proposed programs at their meeting in August and September 2012. Both groups conceptually supported Program C

as the "Recommended Program." SWCAG members were given additional time to provide written comments for consideration.

- DOU staff collected and reviewed comments and directed MWM to select the suite of Program C conservation measures listed in the four program scenarios presented above in Section 7.0.

- The initial draft (including Water Ad Hoc and SWCAG comments) and with input from DOU Staff, of the Water Conservation Plan was released in September 2012, and another SWCAG meeting to review comments was hosted by DOU on September 19, 2012. Upon review of the SWCAG and Water Ad Hoc comments and additional comments from DOU staff, the Director of Utilities had a DOU technical team develop an Implementation Strategy or Work Plan that would be generally consistent with the DOU anticipated water conservation budget and other budgets such as for system wide water loss reduction, AMI, etc. It was relayed to the SWCAG that there may be some level of resource allocation necessary and not an immediate, full ramp up to level C (See Section 8.3 of this Plan for Implementation Strategy).

- The DOU technical team met in Oct., Nov., 2012, and Jan. 2013 to develop an Implementation Plan.

- A new Water Conservation Program Administrator was hired in February 2013.

- The Plan was reviewed and finalization of the Plan was initiated in March 2013.

- To address SWCAG and new DOU technical team comments, include additional data from 2012 through April 2013 and use additional feedback from the new Program Administrator, adjustments to the DSS Model were made in March-May 2013 and a new Draft Final Water Conservation Plan was released on June 12, 2013.

- The SWCAG met on June 12, 2013 to provide additional comments on the Draft Final Plan in the preceding week.

- DOU addressed the final comments and submitted the Plan for adoption by the City Council (scheduled for October 8, 2013).

Program C, the current recommended program in the Plan, assumes conservation pricing no later than FY 2016 and increases efforts on existing and new water loss control, and conservation measures. Program C is perceived as having the highest probability of meeting the state mandated water use reduction target as described in the City's UWMP. Program C assumes that

conservation pricing is implemented and achievements made in water loss control, along with customer demand reductions due to high levels of conservation program participation. A more aggressive but more costly program for the benefit of the Water Master Plan was also reviewed (Program D).

Table 8-1 below presents the four program scenarios evaluated and the corresponding per capita water use reductions. The City's existing program (Program A) is not projected to meet the SB X7-7 target from a 10 year baseline of 279 GPCD reduced to 223 GPCD using the 2020 Method 1 of 20% reduction by 2020. Only Programs C and D are estimated to meet or exceed this goal of 223 GPCD.

Table 8-1: Comparison of 2020 Costs and Savings to Meet State's Per Capita Use Targets

Comparison of Program Savings and Water Conservation Office Estimated Costs City of Sacramento					
Program	2020 Per Capita	2040 Per Capita	Meet SB X7-7 Targets?	Annual Conservation Program Only Estimated Cost in 2020*	Estimated Annual Costs in 2020 ($/person)**
A (Existing)	233	222	No	$ 1,520,000	2.73
B (2020)	227	211	No	$ 3,940,000	7.11
C (2020+Pricing)	223	205	Yes	$ 3,940,000	7.11
D (All modeled)	221	200	Yes	$ 8,480,000	15.31
Notes:					
* Excludes planned budgets for AMI and meter retrofits and water loss control programs.					
** Based on estimated population of 553,724					

Notes:
** Excludes planned budgets for AMI and meter retrofits and water loss control programs.*
*** Based on estimated population of 553,724*

At the conclusion of the review, a consensus was reached on the best way forward. The implementation approach DOU agreed upon is:

- Implement Program C with a more intensive effort on existing measures and the addition of new measures.
- Leverage existing Regional Water Authority and DOU grants to the maximum extent possible through 2013-14. Add to funding as needed in FY 2016to support more effort and new water loss control and conservation measures needed.
- Pursue conservation pricing to the extent feasible and compliant with Proposition 218 requirements.
- If and when the current uniform volumetric rate is switched to conservation pricing scheme (assume 2016), then rebalance the conservation measures dependent on the progress towards meeting 2020 target of 223 GPCD.

The SWCAG and DOU went on to highlight additional major benefits of Program C:

- Projects meeting all of the City defined goals for water conservation;
- Complies with State SB X7-7 law (and per capita use targets) and the CUWCC MOU targets in 2018;
- Provides more control of City's future water supply availability and assurance of meeting future demands;
- Allows the City to direct necessary investments in rehabilitation of infrastructure and meter retrofits, rather than future expansion of treatment and delivery capacity that is escalating in cost;
- Comparative in costs to the expansion of the existing water treatment plant(s) projected to be needed in 2030;
- Seeks to expand partnerships with the Regional Water Authority, Sacramento Municipal Utility District, Pacific Gas & Electric, Sacramento Regional Sanitation District, Sacramento County Stormwater Quality Partnership;
- Engages high water users through targeting conservation incentives to those most able to save the water; and
- Supports the City's need for new development offsets with new stormwater permit requirements.

8.2 Description of Recommended Plan

A comprehensive list of conservation measures was evaluated and included in this Plan. This Plan is flexible and will evolve with changing technology, new or altered standards and codes, varying achievements in water loss control and metering retrofits; participation levels from customers, grant opportunities and it is meant to be adaptable to changing conditions. The recommended plan consists of a suite of key measures summarized in Table 8-2. The detailed descriptions of measures are presented in Table 6-1. Appendix B contains measure descriptions for the measures evaluated for the Plan as described in Section 6.3 above.

Table 8-2: Elements of Recommended Conservation Program Measures

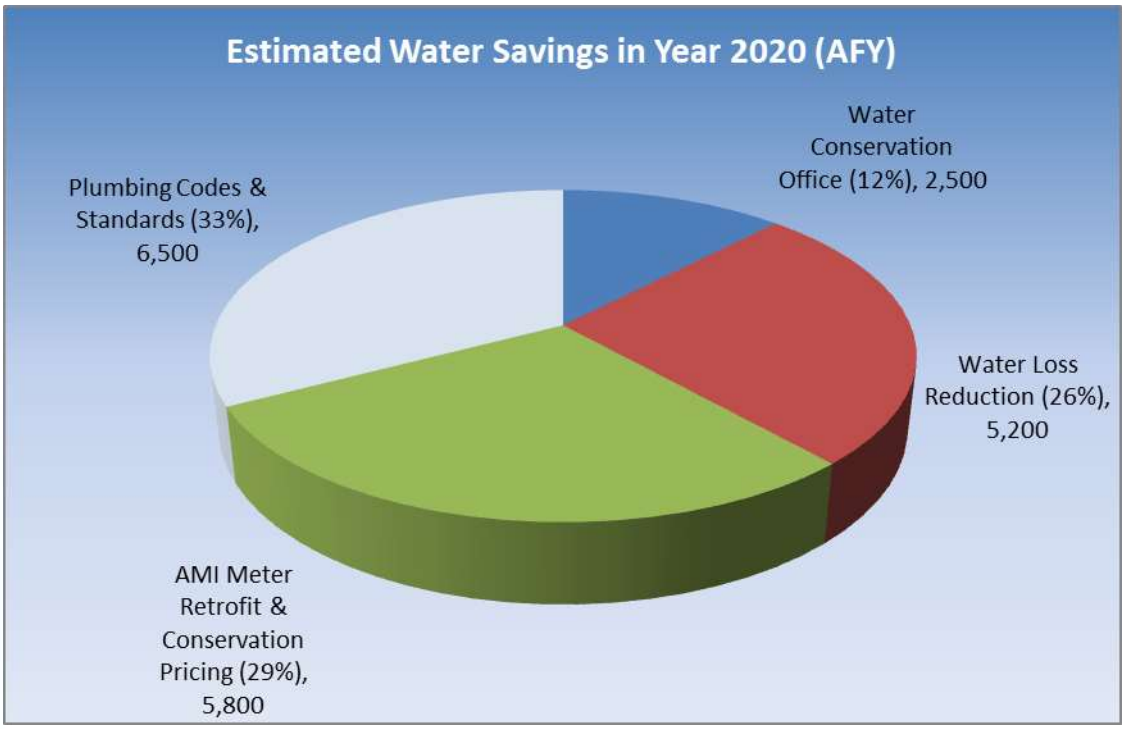
Elements of Conservation Program C (The Recommended Plan) City of Sacramento			
General Measures	**Residential Measures (Indoor)**	**Commercial Measures (Indoor)**	**Irrigation Measures (Outdoor)**
Public Education	High Efficiency Toilets Rebates*	High Efficiency Toilets Rebates*	Residential Financial Incentives for Irrigation Upgrades*
Water Waste	Clothes Washer Rebates*	Inefficient Equipment Replacement Rebates*	Commercial Financial Incentives for Irrigation Upgrades*
Automated Meter Infrastructure (AMI)	SF Water Use Efficiency Surveys (Audits)	Water Efficiency Surveys (Audits)*	Irrigation Water Surveys (Audits)
Water Loss Reduction	MF Water Use Efficiency Surveys (Audits)	High Efficiency Urinal Rebates	Irrigation Water Budgets
Conservation Pricing		Pre Rinse Spray Nozzles	Verification of Landscape Plans + Ordinance Update
*Denotes intensive measures		Comm. Clothes Washer Rebate	SF and CII Irrigation Smart Controllers

Water savings anticipated from this Plan derive from the following key elements:

- Water savings from existing plumbing codes and standards in federal or California state law.
- Ongoing meter retrofits and conversion of existing accounts to AMI;
- Expanding the water loss control program;
- Increased intensity in public outreach and education efforts to attract more participants to the program;
- Expansion of existing water conservation programs
- Adding new measures to meet the City's targets, such as residential landscape incentives program, that while not likely to be cost effective, targets the highest sector of use: Residential outdoor irrigation.

Four key quantifiable estimates for water savings are presented in Figure 8-1.

Figure 8-1: Estimated Water Savings in Year 2020



The City's service area has a relatively high portion of residential water use and a significant amount of outdoor water use. Consequently, residential meter retrofits, conservation pricing and irrigation related conservation measures are expected to produce the most savings. The City's service area is an employment center for the metropolitan area as the state capital of California and also contains a number of hospitals and universities, and as a result the conservation potential in the commercial sector is also significant. Based on the relatively low avoided cost of new water given the City pumps directly from two rivers within the City, water conservation programs are marginally or sometimes not cost-effective (explained below).

Overall conclusions are:

- More than half of the conservation potential in 2020 is in reducing outdoor use; the rest is indoor use reduction potential.
- Benefit-cost ratio of the plan without metering or water loss control to meet SB X7-7 targets is generally not cost-effective from the City's perspective purely from water supply perspective. However, the recommended plan suggests first implementing the most cost effective measures.
- Total savings from the Plan Program C would be about 13.1% percent (without the plumbing code) in 2020 (25,223 AF/Yr) as shown on Table 7-4. While the current per

capita usage is lower than in 2008, it is anticipated to rebound some as water demands have recovered from the recent economic recession and past droughts.

- The average cost of water saved for the Plan from the utility standpoint (as shown on Table 7-4) is lower than the 2012 price of treated water at $579 per AF.

Table 8-3: Basis for Recommended Conservation Plan

Conservation Measure	Key Commitments to CUWCC or Other Agencies	Basis for Inclusion in Plan	DOU Priority[1]	Overall Benefits	Perceived Challenges
Investigate Customer Potential Leaks and Water Waste Ordinance	Existing CUWCC Foundational BMP 1.1	Water waste ordinance with enforcement is required. Innovative use of AMI system (possible future best practice) to track potential water waste.	High	Maximizes the City's Goals to rid the City of water waste. Most customer-side of the meter leaks are due to leaking indoor toilets or exterior irrigation valves.	Adequate staffing levels. With rapid increase in AMI endpoints, more customers will be identified, letters issued and assume follow-up needed.
Water Loss Control Program	CUWCC Foundational BMP 1.2 - Assume combine with other Water Loss measures	Foundational Best Practice & ongoing efforts along with moving to a fully metered system, losses can be more easily quantified and control strategies targeted.	High	Leads to operational cost savings and overall lowers total gpcd to help meet targets.	Still more than 10 years to have a fully metered system and full validation of a water system audit.
AMI System with Meter Retrofits and Conservation Benefits	Supporting CUWCC Foundational BMP 1.3.	Planned Program. Going beyond State Law by installing state-of-the-art AMI system	High	Allows for accurate measurement and billing by volume for all customers.	Costly program, especially with challenges of back-yard mains.
Meter Conversion - Mixed Use to Dedicated Irrigation Meter	Prohibitively Expensive. Requires Feasibility Study.	Feasibility Study required. Highly NOT cost effective but necessary to do water budgets.	Medium	Ability to manage irrigation sites via water budget an important strategy to address appropriate irrigation. Large customers espeically those with cooling towers may be incentivized to convert to save on sewer bills (sewer system managed by City of Sacramento DOU).	Site conditions vary and generally very costly retrofits for replacement of concrete and/or asphalt to match existing site conditions.

Abbreviations: SF = Single family, MF = Multifamily, CII = Commercial, Industrial, Institutional, GOV = Government, IRR = Irrigation, HET = High Efficiency Toilet (1.28 gal/flush or less), ULFT = Ultra Low Flush Toilet (1.6 gal/flush), AMI = Automatic Meter Infrastructure (System)

Table 8-3: Basis for Recommended Conservation Plan (Cont'd)

Conservation Measure	Key Commitments to CUWCC or Other Agencies	Basis for Inclusion in Plan	DOU Priority[1]	Overall Benefits	Perceived Challenges
Conservation Pricing	CUWCC Foundational BMP 1.4. Pending Rate Study conclusions	Planned and Foundational Best Practice. Cost effective means for the City to put conservation in individual customers hands to make the changes possible in their own home/business.	High	Allows for the recovery of cost of service with equity among customers where customers that use more pay more.	Water savings due to tiers and the price of water are estimates, and significant rate increases may be needed to implement an effective conservation pricing program. Rate increases must comply with Proposition 218's cost of service limitations, and may be challenged by rate payers.
Public Information, Regional Outreach, Media Campaign	Existing CUWCC Foundational BMP 1.1 & BMP 2	Ongoing and Foundational Best Practice. Also benefits City stormwater permit requirements.	High	Necessary to gain awareness and need for conservation and attract participation in other measures. Connects to many messages being given to promote sustainability by City residents to preserve quality of life and our local environment (e.g., healthy rivers).	Water conservation competes with lot of messages in the community. Takes costly media buys to really push the message to be more visible.
Single Family Residential Audits (Surveys): Water Wise House Calls	CUWCC BMP 3.1 & 3.2	Included due to on-going customer service need to respond to high bill calls, newly metered accounts, etc. Labor intensive measure (equates to low cost effectiveness).	Medium	Best means to get tailored information given to homeowners and multi-family properties, such as changing their irrigation schedules. Also identifies key opportunities on site for incentive programs (can serve as a pre-inspection).	Requires customers to volunteer. Participation levels have historically been about 2% which is standard. Metering gains some attention but not sharp increases in surveys requested.
Multi-family Residential Audits (Surveys)	CUWCC BMP 3.1 & 3.2	Included due to on-going customer service need to respond to high bill calls, newly metered accounts, etc. Labor intensive measure (equates to low cost effectiveness).	Medium	Best means to get tailored information given to homeowners and multi-family properties, such as changing their irrigation schedules. Also identifies key opportunities on site for incentive programs (can serve as a pre-inspection).	Requires customers to volunteer. Participation levels have historically been about 2% which is standard. Metering gains some attention but not sharp increases in surveys requested.
Residential High Efficiency Washer Rebate Intensive	CUWCC BMP 3.3. Assume Keeping Existing Partnership with SMUD	Higher cost effectiveness than most other measures. Turn-key measure with support from Sacramento Municipal Utility District implementation.	High	Typically the second largest indoor use. Water, energy (and greenhouse gas) benefits. Long useful life means market not saturated with highest level (Tier 3) machines.	Freeridership (customers would have bought the machine anyway). Mitigate by only rebating the highest level of efficiency with Water Factor of 4.5.

Table 8-3: Basis for Recommended Conservation Plan (Cont'd)

Conservation Measure	Key Commitments to CUWCC or Other Agencies	Basis for Inclusion in Plan	DOU Priority[1]	Overall Benefits	Perceived Challenges
CII Rebates to Replace Inefficient Equipment Intensive	Supports CUWCC BMP 4	More cost effective than other measures. Important to have incentives with survey programs to support customers implementing recommended changes.	High	Menu approach to CII incentives can be tailored to most all business customers. High efficiency equipment is cost prohibitive in some cases. Helpful in tough economic times.	CII facility managers can be challenging to schedule time to conduct audit and may not have budgetary control to make changes. Requires follow-up by City staff to see that incentives are installed in timely manner.
Promote Restaurant Spray Nozzles	New State Title 20 Regs. Usually cost effective. Assume included.	Highly cost effective measure. Assume promote as part of the menu of CII incentives.	High	Saves water, energy and wastewater.	Employee training for use of device essential given change in spray pattern. State law now requires more efficient devices, however lower flow rate devices (less than 1.6 gpm) should be promoted.
Commercial High Efficiency Toilet (HET) Rebates Intensive	CUWCC BMP 3.4. New State Law AB 715 after 2014.	More cost effective than other measures. Important to have incentives with survey programs.	Medium	Saves water and wastewater.	Market penetration on 1.6 Ultra Low Flush is reaching saturation as National Plumbing Code was in place in 1992. Freeridership (customers would have bought the toilet anyway). Mitigate by design of implementation (not just submit receipt). Freeridership can be an issue, however requiring a survey first curbs this issue.
High Efficiency Urinal Rebate (<0.25 gallon)	Supports CUWCC BMP 4	Useful to have included given HET and other CII incentives and SRCSD partnership.	Medium	Saves water and wastewater.	Market penetration is progressing to more efficient models. Seek guidance from manufacturers as retrofits not suited to all facilities.
Irrigation Water Surveys	CUWCC BMP 5.	Useful to support implementation of Irrigation Water Budgets.	Medium	Saves outdoor irrigation, targets over irrigation, and also supports stormwater benefits.	Very labor intensive, many meters are mixed use.

Abbreviations: SF = Single family, MF = Multifamily, CII = Commercial, Industrial, Institutional, GOV = Government, IRR = Irrigation, HE = High Efficiency Toilet (1.28 gal/flush or less), ULFT = Ultra Low Flush Toilet (1.6 gal/flush), AMI = Automatic Meter Infrastructure (System)

Table 8-3: Basis for Recommended Conservation Plan (Cont'd)

Conservation Measure	Key Commitments to CUWCC or Other Agencies	Basis for Inclusion in Plan	DOU Priority[1]	Overall Benefits	Perceived Challenges
Irrigation Water Budgets	CUWCC BMP 5 and Pending Prop 84	Necessary to track water budgets and use as communication tool back to customers on their irrigation usage.	High	Same as above.	Large number of sites to develop budgets for. Desktop reviews may not prove to be enough accuracy and requires field verification anyway.
Financial Incentives for Irrigation and Landscape Upgrades	CUWCC BMP 5	Important to have incentives to pay for upgrades recommended from surveys.	Medium	Saves outdoor irrigation, targets over irrigation, enhances public perception with removing water waste in public spaces. And also supports stormwater benefits.	Site upgrades are expensive, so hard to hit price point by offering enough incentives for the projects to move forward. Labor intensive to pre-survey sites, time to make changes and then post survey.
Commercial Financial Incentives for Smart Controllers	Pending Prop 84 funding support.	Request was to analyze separately. Companion program to measure for residential landscape incentives.	High	Addresses peak demand for MF and non-residential outdoor irrigation.	Difficult to target high water users until system is fully metered.

Abbreviations: SF = Single family, MF = Multifamily, CII = Commercial, Industrial, Institutional, GOV = Government, IRR = Irrigation, HE = High Efficiency Toilet (1.28 gal/flush or less), ULFT = Ultra Low Flush Toilet (1.6 gal/flush), AMI = Automatic Meter Infrastructure (System)

8.3 Implementation Strategy

The overall strategy is to implement each measure on an increasing intensive schedule such that per capita use targets are met by 2020. Starting in 2007 through 2011, water demand was depressed. This trend followed along with dry year conditions from 2007-2009 and the economy downturn starting in 2007 through2011. Water demand has now been observed to start to recover in 2012. With the continuing upward trend of the economic recovery, it is anticipated that water demand will also continue to rebound. Without continued efforts by DOU to address water loss control, metering installation, more aggressive conservation pricing and increasing participation in conservation program activities by customers, the City is at risk for not meeting 2018 CUWCC MOU goals and 2020 SB X7-7 targets. As the City steps up its efforts and monitors performance, it will build on past efforts to have a program leading the efforts within the Sacramento region and seeking to excel beyond efforts by other areas of the state with more

temperate climates. Annually, the DOU team will be preparing a detailed work plan and budget for implementation of each respective upcoming year's activities. It is envisioned that each annual work plan will be discussed with the Sacramento Water Conservation Advisory Group.

MWM recommends City consider the following:

1. Continue working with regional partners (RWA, SMUD and SRCSD) on rebates and other existing conservation programs to minimize administrative costs and prioritize staff time.
2. Look for new or expanded partnerships with RWA and other neighboring utilities as much as possible to leverage more outreach and hands-on training programs to customers.
3. Seek additional new funding sources, such as Proposition 84 and 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 least cost effective measures.
4. 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 City stormwater permit needs.
5. Market through accredited programs 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 City's DOU goal is to prepare a comprehensive water conservation pricing and rate study by 2014, and will work with other City departments to initiate a review of the City's Water Efficient Landscape Ordinance, including enforcement. The City will actively pursue applications for state and federal grants, and partnering opportunities.

Table 8-4 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 8-4: Implementation Suggestions for Recommended Conservation Plan

Conservation Measure	Overall Implementation Strategy	Next Steps	Target and Cost Basis Assumptions	Added Budget and/or Staffing Needs	Potential Cost Saving Strategies
Investigate Customer Potential Leaks and Water Waste Ordinance	Follow-up on all Water Waste Calls to City through 3-1-1 (generating a work order). Use "Leak Reports" from the AMI system to identify potential leaking accounts. Perform desktop review to ensure leak potential remains. Send out field staff based on prioritized list of higher leaking accounts first.	Review annually to refine and streamline approach and staffing needs.	Based on AMI Approved Plan A with assumption of 15% of accounts may have continuous running meter flagged (same percentage as FY11-12). Assume 1 hour per account at $32 per hour.	Retrain Meter Readers to be Water Waste Investigators. Hire summer temporary staff to perform desktop reviews and send seasoned investigators in the field, if warranted.	Maximize desktop checks. When in the field and warranted attempt to convert field investigations into Water Wise House Calls. To the extent feasible, link to HET and Landscape incentive programs.
Water Loss Control Program	Update Water System Audit annually. Continue to refine assumptions in the Water System Audit (per CUWCC MOU requirements). Follow AWWA M36 best practices.	Review current strategies with Water Loss Control Expert.	Assumes an average up to $1.45 million per year for spending on water loss control program.	Budget planned for Water Loss Control Study in FY2013.	Address issues with both apparent losses and real losses. Billing system may need closer review, given replacement of new meters on large accounts are helping to address meter accuracy issues and leak detection efforts indicate less issues with real losses than historically estimated.
AMI System with Meter Retrofits and Conservation Benefits	Continue with AMI and meter retrofit program.	Stay on track with funding and implementation.	Already approved with DOU AMI Plan "A"	Economize as much as possible.	Continue to seek funding support and cost efficiencies.
Meter Conversion - Mixed Use to Dedicated Irrigation Meter	Continue with the mixed use conversions per the replacement schedule of large meters. Consider separate dedicated meters instead of compound meters where practical (sites with large cooling tower and landscape demands).	To be determined based on Feasibility Study findings. Confirm if compound meter is sufficient to track irrigation demand using AMI to enable online water budgets tracking.	Lowest cost is to change along with meter replacement program for large metered accounts.	Depending on if acceleration of the schedule possible get more water budgets done more quickly. Assume done with meter change-outs over time.	Assume combined with other metering and irrigation related measures.

1 Priority based on benefits, challenges and relative cost effectiveness. See Appendix B for detailed cost effectiveness evaluation by conservation measure.
2 Based on analysis assumptions for market penetration needed to meet Gallons Per Capita Per Day (gpcd) water savings goals and based on cost effectiveness results.
DOU Lead: CO = Conservation Office, FO = Field Operations, PI = Public Information, IPM = Integrated Planning & Business Operations, DS = Development Services, CE = Code Enforcement
"Customer Categories: SF – Single Family, MF – Multi-family, CII – Commercial, Industrial and Institutional, All – All of the Above,
System – City's Distribution System, IRR - Dedicated Irrigation Meter; DOU - City Dept. of Utilities"

Partnerships: RWA = Regional Water Authority, SMUD = Sacramento Municipal Utility District, SRCSD = Sacramento Regional County Sanitation District, SSQP = Sacramento Stormwater Quality Partnership

Table 8-4: Implementation Suggestions for Recommended Conservation (Cont'd)

Conservation Measure	Overall Implementation Strategy	Next Steps	Target and Cost Basis Assumptions	Added Budget and/or Staffing Needs	Potential Cost Saving Strategies
Conservation Pricing	Assumed switch to tiered pricing in 2016. And more aggressive pricing structure in subsequent 3 year adoption cycles.	Issue RFP for Rate Study in 2013. Research more case studies for volumetric and budget based rate schedules.	Added budget for rate study consultant in 2013-14.	Consider joining together with other utilities that are or recently completed metering in Sacramento region to gain potential cost efficiencies.	Leverage lessons learned by others.
Public Information, Regional Outreach, Media Campaign	Update Marketing Plan as needed when new incentive programs are added. Promote new Landscape Calculator being developed by RWA.	Refine the overall marketing budget and strategy for each conservation and determine support by the Public Information team and support by the Water Conservation Office or contractors implementing the measures in the program.	Budget estimate based on 50% of all single family residential accounts per year. Actual participation is difficult to track. See assumptions in Appendix B. Added budget would support needed outreach efforts (i.e., updated web site, hands-on irrigation workshops). Each conservation measure also has marketing support.	Seek to expand on partnership opportunities with RWA and other utilities (i.e., County Stormwater) to broaden River Friendly, Blue Thumb campaigns.	Continue to ramp awareness programs, especially focused on residential customers as more meter retrofits are installed. Heavier promotion on River Friendly themes and new County demonstration gardens.
Single Family Residential Audits (Surveys): Water Wise House Calls	Call for voluntary sign-ups through all avenues possible. Public outreach campaigns, events, workshops, web site, voicemail messages, print and radio media, etc. Push for selling the "opportunity for a sprinkler check" to tailor watering schedules and new residential measures.	Train up less expensive staff resources to be Irrigation Association auditors in support of the "Follow-The-Meter" grant or seek to modify grant requirements.	Follow-the-Meter grant has a costly implementation strategy to have IA trained auditors providing on-the-spot surveys.	Continue with Follow-the-Meter grant. Focus on assisting RWA launching the Prop 84 grant for exterior surveys. Consider strategy for leveraging staff to the most appropriate skill set.	Due to low cost effectiveness due to field labor required, City may forgo tying to getting a rebate unless want more support for also meeting Programmatic BMP 3.1 (not current focus of City strategy).
Multi-family Residential Audits (Surveys)	Call for voluntary sign-ups through all avenues possible. Host monthly Property Manager online meetings, similar to Irvine Ranch Water District does on a Wednesday morning each month. Push for selling the "opportunity for a sprinkler check" to tailor watering schedules and other incentives.	Use staff resources wisely, for large properties may need to be Irrigation Association auditors. Review site inventory and random sample units to validate.	Includes efficient surveys with random inspections of units, not a complete inventory (unless rebate verification required).	Assumes prioritizing of staff time to larger MF priorities.	Consider strategy for leveraging staff to the most appropriate skill set. Assume for larger properties (more than 6 or 10 units) that any incentives are tied to getting a rebate and also serves as inspection.
Residential High Efficiency Washer Rebate Intensive	Continue with SMUD Partnership.	Seek additional support for PG&E rebates increasing on the energy side. Continue to track and promote benefits of the new pending federal regulations.	Consider increasing the rebate on the highest efficiency or Consortium for Energy Efficiency Tier 3 machines.	After supporting more promotion and tracking participation rates, consider the need to increase rebate from $100 up to $150. Priority would be on outdoor measures before adding more funds to indoor measures that have potential for new regulations like washing machines.	Continue with the SMUD administrative support at $6 per application.

Table 8-4: Implementation Suggestions for Recommended Conservation (Cont'd)

Conservation Measure	Overall Implementation Strategy	Next Steps	Target and Cost Basis Assumptions	Added Budget and/or Staffing Needs	Potential Cost Saving Strategies
Multi-family and Commercial High Efficiency Washer Rebate	Consider expanding SMUD partnership to multi-family and CI sectors.	Meet with SMUD.	See Appendix B for assumptions.	Assume efficient inspections associated with survey programs.	Explore with the SMUD administrative support at $6 per application.
Residential High Efficiency Toilet (HET) Rebates Intensive	Consider revising the program to lower the free ridership and leverage toilet leaks uncovered through the AMI investigations. Several examples: San Antonio Water System (SAWS) Plumbers to People, Denver Water's GreenPlumbers Partnership, or private sector like Niagara Conservation Inc. has turnkey solutions.	Consider shifting incentives to a direct install HET program connected to properties through the AMI program have been determined to have a toilet leak.	Assumed increase in the "intensive" approach in the near term perhaps with a direct install option for implementation. Includes additional funding for administrative and marketing support. Ramp down over time as shift funds to more residential outdoor measures.	Near term will have potential for Prop 84 funding support. Assume sites indentified through the AMI leak investigation program with up to $200 per toilet replacement that includes coverage for plumber costs. City's overall priority is to shift to outdoor measures before adding more funds to indoor measures that have potential for new regulations.	If outsourced turnkey solutions are pursued, then can shift of focus CO staff resources on residential outdoor measures.
Residential Financial Incentives for Irrigation and Landscape Upgrades	Offer incentives along with weather based "smart" irrigation controllers (below) in support of River Friendly Landscape Program. In support of the Water Wise House Call program to encourage customers to take action on City's recommendations. Seek regional partnership to expand City of Roseville's program, especially turf replacement region-wide. Set up program as turn key as possible.	Set up program leveraging from recent CALFED grant program. Use lessons learned from others like City of Roseville and include homeowner and property manager training support through RWA to teach customers and/or promote the Green Gardeners.	See Appendix B for assumptions.	New conservation measure, needs added support for funding and staffing. Costly program and price point may not be high enough for customer to participate. Need to support customer training on appropriate set-up and use.	Costly measure but deemed necessarily based on customer requests and SWCAG feedback. Seek grants and cost sharing with stormwater utilities. Turnkey programs are important for more challenging for outdoor landscape programs.
Residential Financial Incentives for Smart Controllers	Merge as part of the menu landscape incentives above. Very important technology to help with eliminating dry weather flows to the stormwater system that are very costly to treat.	Leverage from the lessons learned of others.	Assume up to $400 per rebate incentive.	Not a current program. Needs staffing strategy align with Smart Landscape Rebates program.	Combine with Landscape Incentives Program. Push for manufacturer support to customers as much as possible to mitigate repeat calls from customers with support needs.
CII Surveys and Top 100 Users Program	Use specialty trained staff or outsource surveys. Include a targeted few large customers per year for surveys.	Determine the ability to use in-house staffing, needed outsourcing or combination to achieve savings goals.	Assumed two staff, one more skilled and one technician to conduct walkthroughs. At level of effort planned, would be about 2 FTEs assigned to the CII survey program. Historic performance is low, assume 80 surveys per year, approximately 2 surveys of all types per week.	Best to have cross training for staff of four that could perform CII surveys or on-call contractor.	Consider having staff perform the more simplistic surveys and higher skilled contractor perform the more complex sites. A regional contractor may provide more cost effective CII surveys. Outsourcing may allow current staff to focus on outdoor measures.

Table 8-4: Implementation Suggestions for Recommended Conservation Plan (Cont.)

Conservation Measure	Overall Implementation Strategy	Next Steps	Target and Cost Basis Assumptions	Added Budget and/or Staffing Needs	Potential Cost Saving Strategies
CII Rebates to Replace Inefficient Equipment Intensive	Continue with program similar to current menu of incentives used in the Proposition 50 grant assistance program.	Review examples like Southern Nevada Water Authority's Water Efficient Technologies (WET) Program and East Bay MUD's WaterSmart Customized Rebates	Assumes $2,000 per account added with other menu items below. Determine future funding sources beyond Prop 50.	Requires one more highly skilled and specially trained staff and one technician. Assumes 2 FTEs and four staff would be trained for conducting surveys.	Tie to surveys to perform the pre-inspections. Seek grant opportunities. May be outsourced for more complex sites (larger hospitals, schools, etc.).
Promote Restaurant Spray Nozzles	Assume implemented as part of the CII incentives program above.	Combine with survey and incentives strategy.	Large number of sites with broad array of customer types have significant numbers of valves and that many would be given away per CII survey. Assumes less than 1.6 gpm valve that is the current state Title 20 Appliance Efficiency Standard.	Assume embedded in other measures.	Seek to continue to bulk purchase new higher efficiency than 1.6 gpm valves.
Commercial High Efficiency Toilet (HET) Rebates Intensive	Consider more marketing especially promotion to GreenPlumbers and streamlined approach to finding sites with high volume of higher flushing toilets.	Decide on marketing strategy and seek to move more grant and cost share funding prior to end of grants.	Assume increase to average total cost of $800 per limited number of toilets to allow for direct install program. Consider lowering incentive and including more sites.	Requires pre and post inspection for targeted large sites.	Target larger sites. Promote private sector vendors performing change-outs.
High Efficiency Urinal Rebate (<0.25 gallon)	Run as companion program to HET program and link to CII incentives program.	Same as above.	Assumes average total incentive of $300 per urinal. Target limited number of large sites through survey program.	Same as above.	Seek to streamline as much as possible. Less cost effective than HET program.
Irrigation Water Surveys	Target sites with high potential for over irrigation based on review of water budgets and billing data.	Set up priority list and staffing plan. Should be key focus.	Assume serves as field verification for the water budgets developed online.	Seek to have more IA certified auditors on staff or consider outsourcing.	Seek labor efficiencies with one IA auditor and apprenticeship technician performing audits.
Irrigation Water Budgets	Continue to perform desktop reviews. Based on physical verification surveys, determine if level of accuracy is sufficient.	Create priority list based on check of billing data and depth of applied water to seek most water savings potential.	Assume continue 120 or more per year.	Cost effective assuming high accuracy that saves on field labor if accuracy high enough.	Cost efficient assuming high accuracy that saves on field labor if accuracy high enough.
Financial Incentives for Irrigation and Landscape Upgrades	Target sites that have clearly defined needs based on physical surveys priority list and consider incentives priority list.	Discuss targeting implementation approach. Also discuss regional program and stormwater partnership.	Assume up to $5,000 on average per site constrained by cost effectiveness and combine with Smart Controller Rebate (below).	Price point assumed higher than $5,000 per site but constrained by cost effectiveness. Could use case by case approach based on physical validation for large landscape surveys.	Seek to establish a turn key program and minimize labor effort. Seek grants and outsourcing if possible to be more cost efficient.

Table 8-4: Implementation Suggestions for Recommended Conservation Plan (Cont.)

Conservation Measure	Overall Implementation Strategy	Next Steps	Target and Cost Basis Assumptions	Added Budget and/or Staffing Needs	Potential Cost Saving Strategies
Commercial Financial Incentives for Smart Controllers	Merge as part of the menu landscape incentives above. Considered very important technology to help with eliminating dry weather flows to the stormwater system that are very costly to treat.	Same as above.	Assume up to $500 per MF rebate incentive and $1,000 per non-residential property as constrained by cost effectiveness.	Seek to continue support continuation of Prop 50 grant. Assume professionals doing installation and minimal tech support needed.	Combine with Landscape Incentives Program.

1 Priority based on benefits, challenges and relative cost effectiveness. See Appendix B for detailed cost effectiveness evaluation by conservation measure.
2 Based on analysis assumptions for market penetration needed to meet Gallons Per Capita Per Day (gpcd) water savings goals and based on cost effectiveness results.
DOU Lead: CO = Conservation Office, FO = Field Operations, PI = Public Information, IPM = Integrated Planning & Business Operations, DS = Development Services, CE = Code Enforcement
"Customer Categories: SF – Single Family, MF – Multi-family, CII – Commercial, Industrial and Institutional, All – All of the Above,
System – City's Distribution System, IRR - Dedicated Irrigation Meter; DOU - City Dept. of Utilities"

Partnerships: RWA = Regional Water Authority, SMUD = Sacramento Municipal Utility District, SRCSD = Sacramento Regional County Sanitation District, SSQP = Sacramento Stormwater Quality Partnership

8.4 Performance Based Approach and Monitoring Progress

As the City further implements its water conservation programs, progress will be made and the City 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 City is following a "water savings based performance approach." This allows the City 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% of all single family residential accounts were to be surveyed). This BMP approach was traditionally followed by all Group 1 Water Utilities, including the City of Sacramento, 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 City 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 feedback received from the SWCAG during the planning process was to increase emphasis for the water conservation program on outdoor conservation measures rather than indoor measures. This is logical for the following reasons:

- 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);
- 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); and
- The greatest perceived need by City customers, based on interactions with the Public Information Office is 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 DOU Management Team made the decision that even though the indoor measures are more cost effective, that the City would also continue to increase support for outdoor measures and public outreach and education. As a result, the Plan reflects the City'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 Sacramento Water Conservation Advisory Group to reconfirm the goal of meeting this SB X7-7 mandate and CUWCC MOU goals, as well as other City goals for the Water Master Plan. As part of this planning process, an annual evaluation of progress will be important given the water demand for City 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 City will need to 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 DOU Technical Team.

8.5 Estimated Total Annual Budget and Water Savings

Figure 8-2 and Figure 8-3 presents a summary of all measures and gives an estimated implementation total annual program budget and water savings estimates to guide the City in developing an annual work plan for the implementation of planned actions by the key four elements: water loss control, metering with conservation pricing, water conservation office activities and plumbing codes and standards. The total program budget was developed as part of the DSS Model evaluations for level of desired participation by year by the measures that were quantifiably analyzed. The budgets shown include labor and expenses for conservation measures evaluated. Additional labor expenses, outsourcing or consulting support, may be warranted for accelerating programs or for studies and development of ordinances or other supporting efforts beyond what is necessary to implement the quantifiable measures included in the DSS Model. The budget levels represent the total budgeted need irrespective of funding sources. The City DOU currently has several grants to support near term expenses and will be seeking additional opportunities for State grants or cost sharing partnerships. To the extent feasible, the City will work together with other Regional Water Authority member utilities to find the means for lowering the costs of measure implementation.

The City intends to develop a detailed annual work plan, and use the DSS Model to monitor progress on demand reductions; along with updates to the implementation cost estimates, staffing and associated schedule on an annual basis.

Figure 8-2. Estimated Annual Budget

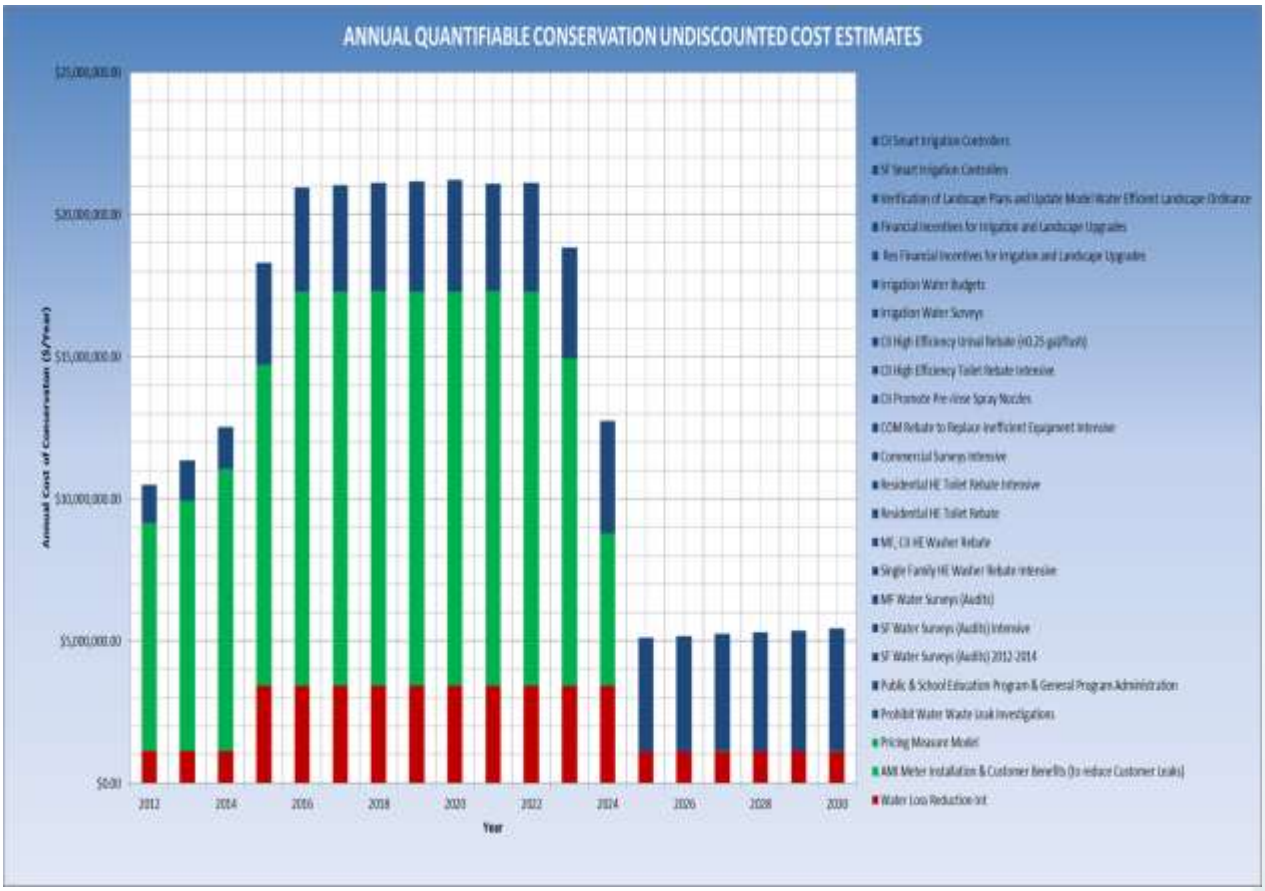
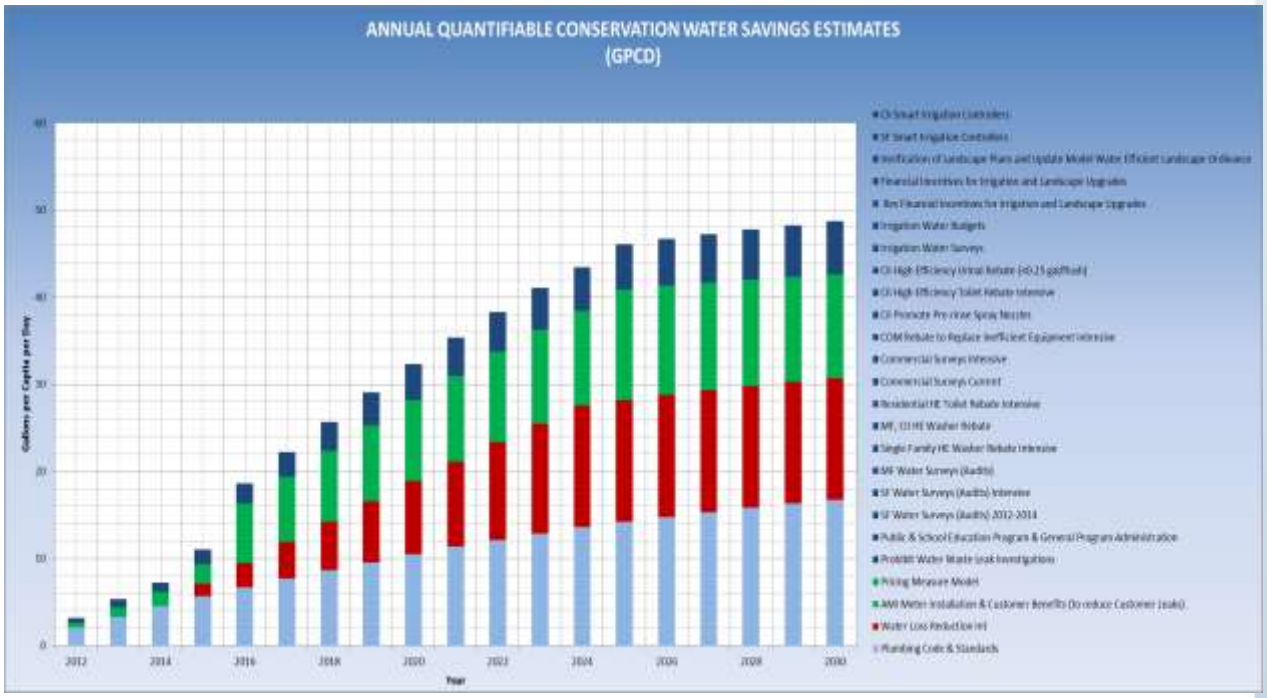


Figure 8-3. Estimated Annual Water Savings



8.6 Recommended Next Steps

Successful implementation of the Plan following this water savings performance based approach will require a significant increase in level of effort on the part of the City. Many of the existing measures have had lower than targeted participation rates historically due to a low percentage of customers with meters and low cost of water. New and more targeted conservation measures are planned to be employed in order to increase participation levels that are needed to achieve Plan goals and ensure achieving the SB X7-7 mandate.

Recommendations to assist with implementation include the following next steps:

1. Continue to strengthen existing partnerships and forge new relationships and apply for grants where available and cost efficient (i.e., turnkey solutions);
2. Reassess program focus based on progress annually to help decide on priorities for the next plan year using the recommendations from the WCP;
3. Prioritize measures for implementation with those that contribute the most to meeting the per capita use targets given highest priority for implementation (see Figure 8-3);
4. Conduct a market penetration study within the next few years to determine the saturation of the higher efficiency plumbing and appliances focused particularly on the residential single family sector. Accelerate the shift in the WCP emphasis to residential outdoor measures based on study findings, if significant saturation of 60-70% or more is found for residential indoor fixtures and appliances.
5. Continue to manage and measure performance by utilizing the work order system to store, manage and measure participation, cost and other data to gauge successes and failures in performance for meeting desired participation levels and readjust the program as needed;
6. Use the DSS Model to annually update the plan including actual measure participation, projected water savings and expected per capita water use reductions to ensure plan is on track to meet 2020 targets; and
7. Continue engaging the Sacramento Water Conservation Advisory Group to review and provide input on the Plan to meet the City's GPCD target.

REFERENCES

American Water Works Association, Manual of Practice M52 – Water Conservation Programs – A Planning Manual. Denver Colorado, 2006. www.awwa.org

DeOreo, W.B., P.W. Mayer, Leslie Martien, Matthew Hayden, Andrew Funk, Michael Kramer-Duffield, Renee Davis, James Henderson, Bob Raucher, Peter Gleick, and Matt Heberger, California Single-Family Water Use Efficiency Study, Department of Water Resources, Sacramento California, July 20, 2011. http://www.aquacraft.com/sites/default/files/pub/DeOreo-%282011%29-California-Single-Family-Water-Use-Efficiency-Study.pdf

DeOreo, W.B., P.W. Mayer, E.M. Opitz, B. Dziegielewski, J.C. Kiefer, W.Y. Davis, and J.O. Nelson. 1999. Residential End Uses of Water: Final Report. AWWA Research Foundation. Denver, Colorado. http://www.waterrf.org/PublicReportLibrary/RFR90781_1999_241A.pdf

Dziegielewski, B., J. C. Kiefer, W. DeOreo, P. Mayer, E. M. Opitz, G. A. Porter, G. L. Lantz, and J. O. Nelson. 2000. Commercial and Institutional End Uses of Water. Published by AWWA, Research Foundation and American Water Works Association with Cooperation of the U.S. Bureau of Reclamation, Denver, Colorado (September 2000). Catalog No.90806. 264 pp. ISBN 1-58321-035-0.

Climate Action Plan, City of Sacramento, Approved February 12, 2012. http://www.sacgp.org/cap.html

CUWCC Cost and Savings Study April 28, 2005

Sacramento 2030 General Plan, Approved March 3, 2009. http://www.sacgp.org/index.html

"High Efficiency Plumbing Fixtures - Toilets and Urinals" Koeller & Company July 23, 2005.

Mayer, Peter W., Erin Towler, William B. DeOreo, Erin Caldwell, Tom Miller, Edward R. Osann, Elizabeth Brown, Peter J. Bickel, Steven B. Fisher. (2004) National Multiple Family Submetering and Allocation Billing Program Study. Aquacraft, Inc. and the East Bay Municipal Utility District

Sacramento Greenwise Program: http://uptownstudios.net/greenwise/

SACOG Metropolitan Transportation Plan (MTP) www.sacog.org/mtp

Sacramento Sustainability Master Plan (will provide date and Website)

U.S. Department of Energy, EnergyStar Calculators: www.energystar.gov

Urban Water Management Plan, City of Sacramento, October 2011

United Nations 2003, Guide to preparing urban water efficiency plans, Maddaus (Ed.), Water Resources Series, vol. No. 83, Economic and Social Commission for Asia and the Pacific (ESCAP).

United States Environmental Protection Agency (US EPA) 2004, Water conservation plan guidelines, part 5: Advanced guidelines for preparing water conservation plans. http://www.epa.gov/owm/water-efficiency/wave0319/index.htm

Water Master Plan City of Sacramento, (pending publication estimated to be 2013)

APPENDIX A – DESCRIPTION OF THE DSS MODEL

The Demand Side Management Least Cost Planning Decision Support System or DSS Model prepares long-range and detailed water demand projections. The purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand.

The DSS Model is an end-use model that breaks down total water production (water demand in the service area) to specific water end uses such as toilets, faucets, or irrigation. The end-use 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.

To forecast urban water demands using the DSS Model, customer-billing data is obtained from the water agency being modeled. The billing data is reconciled with available demographic data to characterize the water usage for each customer-billing category in terms of number of users per account and per capita water use. The billing data is further analyzed to approximate the split of indoor and outdoor water usage in each customer-billing category. The indoor/outdoor water usage is further divided into typical end uses for each customer-billing category. Published data on average per-capita indoor water use and average per-capita end use are combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer-billing category.

Figure AP-1: Schematic of DSS Model as applied to an urban water agency or regional area for water conservation

The DSS Model evaluates conservation measures using benefit cost analysis with the present value of the cost of water saved ($/Acre-Foot) and benefit-to-cost ratio as economic indicators. The analysis is performed from various perspectives including the utility and community (utility plus customer). Benefits are based on savings in water and wastewater facility O&M and savings from deferring or downsizing future capital facilities, such as water treatment plant expansions or new source development or water purchases from wholesalers. Figure 1 presents the six steps, illustrates the process for forecasting conservation water savings, including the impacts of fixture replacement due to plumbing codes and standards already in place.

In the past five years Maddaus Water Management has used its DSS Model to work on multiple regional studies including:

1. 16 counties in the Atlanta, Georgia Metropolitan area
2. 28 agencies in the San Francisco Bay Area
3. 9 agencies in Sonoma County
4. 6 agencies in the Sacramento area

The DSS Model has been used for practical applications of conservation planning in over 215 service areas including extensive efforts nationally in California, Colorado, Utah, Georgia, Florida, Ohio, North Carolina and internationally in Australia, New Zealand and Canada.

APPENDIX B – Potential Water Conservation Measure for City of Sacramento Showing Selected Measures

Conservation Measure Assumptions			
DSS Model Measure Number	**1**	**2**	**2-Int**
Measure Name	**Prohibit Water Waste Leak Investigations**	**Water Loss Reduction Program**	**Water Loss Reduction Program Intensive**
Measure included in which Program Scenario	All Programs	Program A,B,C	Program D
Customer Classes	SF,MF,COM,INST,IRR,OTH	System	System
Applicable End Uses	Leakage	Non Revenue Water	Non Revenue Water
Market Penetration by End Of Program (%)	30%	100%	100%
Annual Market Penetration (%)	5% of AMI meter end points per year are actually repaired leaks	NA	NA
Water Use Reductions For Targeted End Uses Description	5%	See note below	See note below
Evaluation Start Year	2012	2012	2012
Evaluation End Year	2040	2040	2040
Program Length, years	29	29	29
Measure Life, years	5	Permanent	Permanent
Saves Hot Water	No	No	No
Utility Unit Cost for SF accounts, $/unit	$32	See note below	See note below
Utility Unit Cost for MF accounts, $/unit	$32	See note below	See note below
Utility Unit Cost for non-Res accounts, $/unit	$32	See note below	See note below
Customer Unit Cost. $/SF unit	$0	$0	$0
Customer Unit Cost. $/MF unit	$0	$0	$0
Customer Unit Cost. $/CII unit	$0	$0	$0
Annual Utility Admin & Marketing Cost	30%	15%	15%
Water Savings Documentation & Assumptions	Based on City of Sacramento data that 6% of accounts have a leak of 1,000 gallons per day. Assumed 5% water savings per account to be conservative.	0.2% of production each year until FY 25/26, then maintenance program until 2040. Program total of 3% of production by FY 25/26.	Continue current program and then increase program in FY 16 to 0.6% of production each year until FY 22/23, then maintenance program until 2040. Program total 5.8% of production by FY 24/25.
Cost Documentation & Assumptions	Current calls per year is approximately 2,000 at 45 minutes per call and 45 minutes for drive time and etc. with $21 per hour labor charge. Assumes there will be leak calls 15% of existing total AMI meters which is based on meter installation information provided by Terrance. In addition this measure includes 1,000 AMI leak investigations.	Based on data provided by the City of Sacramento staff - Annual cost of $1.1M plus $350,000 backlog for a total cost of $1.45M 2013 to 2040.	Annual Cost was increased to $3.2M for the years FY 2016 to 2022 to allow for additional crews and equipment to obtain the higher water savings goals. Annual cost of $1.1M for the years 2025 to 2040 to maintain the 5.8% production water savings.

Notes:

SF = Residential Single Family
MF = Residential Multi Family
GOV = Government
COM= Commercial
OTH = Other
IRR = Dedicated irrigation meters
INST = Institutional/Public, buildings / grounds owned by the Water Utility or City

Conservation Measures Assumptions			
DSS Model Measure Number	**3**	**4**	**5**
Measure Name	**AMI Meter Installation & Customer Benefits (to reduce Customer Leaks)**	**Conservation Pricing**	**Public & School Education Program & General Program Administration**
Measure included in which Program Scenario	All Programs	Program C, D	All Programs
Customer Classes	SF,MF	SF	SF
Applicable End Uses	ALL	ALL	All
Market Penetration by End Of Program (%)	100%	100%	100%
Annual Market Penetration (%)	Follows meter installation schedule, and assumes backyard meters are installed in the year FY 18/19 to 23/24	NA	50%
Water Use Reductions For Targeted End Uses Description	10%	Elasticity's: -0.05 indoor; -0.2 outdoor	1%
Evaluation Start Year	2012	2019	2012
Evaluation End Year	2024	2040	2040
Program Length, years	13	22	29
Measure Life, years	Permanent	9	2
Saves Hot Water	No	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$1,350	$2	$11
Utility Unit Cost for MF accounts, $/unit	$1,350	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$0	$0	$0
Customer Unit Cost. $/SF unit	$75	$0	$0
Customer Unit Cost. $/MF unit	$150	$0	$0
Customer Unit Cost. $/CII unit	$200	$0	$0
Annual Utility Admin & Marketing Cost	45%	25%	15%
Water Savings Documentation & Assumptions	Conservative assumption on water savings based on long term observations from City of Davis and Citrus Heights Water District from Rex Meurer. Discussed with Jim Peifer at length and agreed on a value of 10% for long term savings on July 13, 2012.	Pricing study not yet completed. Assumed elasticity factors based on literature values.	Water savings are conservative as behavior water savings hard to quantify. It is also assumed low savings as to not overlap with other program water savings.
Cost Documentation & Assumptions	Front yard meter cost $1,350. Back yard meter cost $6,160 from Christie Lupercio on June 29, 2012. Assumes 34,204 meters are located in the back yard and the remainder of the meters are in the front yard. Admin and Marketing used to make budget match actual provided FY 11 value of $7,795,000.	Cost includes initial rate study and updates to the rate study every 3 years.	Cost assumes labor, salary and benefits for conservation coordinator, education and outreach efforts, and general administration of the overall conservation program.

Conservation Measures Assumptions			
DSS Model Measure Number	**6**	**6-Cur**	**7**
Measure Name	**SF Water Surveys (Audits)**	**SF Water Surveys Current**	**MF Water Surveys (Audits)**
Measure included in which Program Scenario	All Programs	All Programs	All Programs
Customer Classes	SF	SF	MF
Applicable End Uses	Internal and External	Internal and External	Internal and External
Market Penetration by End Of Program (%)	19%	1%	38%
Annual Market Penetration (%)	0.7%	0.7%	1.3%
Water Use Reductions For Targeted End Uses Description	5% indoor, 5% outdoor	5% indoor, 5% outdoor	5% indoor, 5% outdoor
Evaluation Start Year	2012	2012	2012
Evaluation End Year	2040	2014	2040
Program Length, years	29	3	29
Measure Life, years	5	6	5
Saves Hot Water	Yes	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$84	$84	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$84
Utility Unit Cost for non-Res accounts, $/unit	$0	$0	$0
Customer Unit Cost. $/SF unit	$30	$30	$0
Customer Unit Cost. $/MF unit	$0	$0	$100
Customer Unit Cost. $/CII unit	$0	$0	$0
Annual Utility Admin & Marketing Cost	30%	30%	30%
Water Savings Documentation & Assumptions	Savings are conservative as the toilets are covered under the Toilet Program, Washer Program, Irrigation Equipment. Leakage and Behavioral elements can be under this program.	Savings are conservative as the toilets are covered under the Toilet Program, Washer Program, Irrigation Equipment. Leakage and Behavioral elements can be under this program.	Savings are conservative as the toilets are covered under the Toilet Program, Washer Program, Irrigation Equipment. Leakage and Behavioral elements can be under this program.
Cost Documentation & Assumptions	Assumes 8 hours to coordinate with homeowner, drive to survey, conduct survey, drive back, do a report with results at $21 per hour	Assumes 8 hours to coordinate with homeowner, drive to survey, conduct survey, drive back, do a report with results at $21 per hour	Assumes 8 hours to coordinate with homeowner, drive to survey, conduct survey, drive back, do a report with results at $21 per hour

Conservation Measure Assumptions			
DSS Model Measure Number	**8**	**8-Int**	**9**
Measure Name	**Single Family HE Washer Rebate**	**Single Family HE Washer Rebate Intensive**	**MF, CII HE Washer Rebate**
Measure included in which Program Scenario	Program A	Program B, C, D	Program B, C
Customer Classes	SF	SF	MF,COM
Applicable End Uses	Laundry	Laundry	Laundry
Market Penetration by End Of Program (%)	6%	16%	10%
Annual Market Penetration (%)	0.3%	0.8%	0.6%
Water Use Reductions For Targeted End Uses Description	58%	58%	58%
Evaluation Start Year	2012	2012	2015
Evaluation End Year	2030	2030	2030
Program Length, years	19	19	16
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	Yes	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$100	$200	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$500
Utility Unit Cost for non-Res accounts, $/unit	$0	$0	$500
Customer Unit Cost. $/SF unit	$150	$100	$0
Customer Unit Cost. $/MF unit	$0	$0	$1,000
Customer Unit Cost. $/CII unit	$0	$0	$1,000
Annual Utility Admin & Marketing Cost	15%	25%	25%
Water Savings Documentation & Assumptions	Based on Energy Star July 2012 website Conventional 9.5 vs. Efficient Washing Machine Water Factors 4.02. Washer size of 3.64 cu ft. Equates to a savings of 58%.	Based on Energy Star July 2012 website Conventional 9.5 vs. Efficient Washing Machine Water Factors 4.02. Washer size of 3.64 cu ft. Equates to a savings of 58%.	Based on Energy Star July 2012 website Conventional 9.5 vs. Efficient Washing Machine Water Factors 4.02. Washer size of 3.64 cu ft. Equates to a savings of 58%.
Cost Documentation & Assumptions	The rebate value is $200 per request of City of Sacramento for washer rebates starting in 2013.	The rebate value is $200 per request of City of Sacramento for washer rebates starting in 2013.	Cost assumes up to 5 machines per account at $100 per a unit (or a total of $500 per account).

Conservation Measure Assumptions			
DSS Model Measure Number	**9-Int**	**10**	**10-Int**
Measure Name	**MF, CII HE Washer Rebate Intensive**	**Residential HE Toilet Rebate**	**Residential HE Toilet Rebate Intensive**
Measure included in which Program Scenario	Program D	Program A	Program B, C, D
Customer Classes	MF,COM	SF,MF	SF,MF
Applicable End Uses	Laundry	Toilets	Toilets
Market Penetration by End Of Program (%)	20%	1%	5%
Annual Market Penetration (%)	1.3%	0.3%	0.8%
Water Use Reductions For Targeted End Uses Description	58%	63%	77%
Evaluation Start Year	2015	2012	2015
Evaluation End Year	2030	2014	2020
Program Length, years	16	3	6
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	Yes	No	No
Utility Unit Cost for SF accounts, $/unit	$0	$220	$55
Utility Unit Cost for MF accounts, $/unit	$1,000	$624	$156
Utility Unit Cost for non-Res accounts, $/unit	$1,000	$0	$0
Customer Unit Cost. $/SF unit	$0	$110	$495
Customer Unit Cost. $/MF unit	$1,500	$312	$1,404
Customer Unit Cost. $/CII unit	$1,500	$0	$0
Annual Utility Admin & Marketing Cost	30%	30%	30%
Water Savings Documentation & Assumptions	Based on Energy Star July 2012 website Conventional 9.5 vs. Efficient Washing Machine Water Factors 4.02. Washer size of 3.64 cu ft. Equates to a savings of 58%.	Assume replace 3.5 gpf toilets with a 1.28 gpf toilet as per current RWA / SRCSD rebate guidelines the City participates in as of July 2012.	Assume replace 3.5 gpf toilets with a 1.28 gpf toilet as per current RWA / SRCSD rebate guidelines the City participates in as of July 2012.
Cost Documentation & Assumptions	Cost assumes up to 7 machines per account at $150 per a unit (or approx. total of $1,000 per account). The rebate value was increased from $100 to $150 to encourage higher participation rate for the "intensive program".	The rebate value is $100 per request of Tyler Stratton at City of Sacramento for toilet rebates after July 1, 2012. Assume 2.2 toilets per SF account. Assume 5.2 Dwelling Units per MF account. Assumes 1.2 toilets per MF dwelling unit. Or a total of 5.2 dwelling units x 1.2 toilets per dwelling unit = 6.2 toilets per MF account.	The rebate value for the intensive program is $200 per toilet which covers the full cost of the toilet or money towards installation. Assumes 2.2 toilets per SF account. Assumes 5.2 dwelling units per MF account and 1.2 toilets per dwelling unit.

Conservation Measure Assumptions			
DSS Model Measure Number	**11**	**11-Cur**	**11-Int**
Measure Name	**Commercial Surveys**	**Commercial Surveys Current**	**Commercial Surveys Intensive**
Measure included in which Program Scenario	Program A	Program A	Program B, C, D
Customer Classes	COM,INST	COM,INST	COM,INST
Applicable End Uses	All	All	All
Market Penetration by End Of Program (%)	14%	1%	42%
Annual Market Penetration (%)	0.5%	0.4%	1.6%
Water Use Reductions For Targeted End Uses Description	5%	5%	5%
Evaluation Start Year	2012	2012	2015
Evaluation End Year	2040	2014	2040
Program Length, years	29	3	26
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	Yes	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$0	$0	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$840	$168	$840
Customer Unit Cost. $/SF unit	$0	$0	$0
Customer Unit Cost. $/MF unit	$0	$0	$0
Customer Unit Cost. $/CII unit	$2,000	$2,000	$2,000
Annual Utility Admin & Marketing Cost	30%	10%	40%
Water Savings Documentation & Assumptions	Savings are conservative as the toilets are covered under the CII Toilet Program, CII Washer Program, CII Ineff Equipment Program, CII Irrigation Equipment and CII Spray Valves. Leakage and Behavioral elements can be under this program.	Savings are conservative as the toilets are covered under the CII Toilet Program, CII Washer Program, CII Ineff Equipment Program, CII Irrigation Equipment and CII Spray Valves. Leakage and Behavioral elements can be under this program.	Savings are conservative as the toilets are covered under the CII Toilet Program, CII Washer Program, CII Ineff Equipment Program, CII Irrigation Equipment and CII Spray Valves. Leakage and Behavioral elements can be under this program.
Cost Documentation & Assumptions	Assume higher use site and more time so $2,000 per site.	Current surveys done with City of Sacramento staff. Assume slightly larger accounts or potential outsourcing to contracts to get this many done.	Increase in cost to do the survey up to $840, and increased the number of participants. Assume slightly larger accounts or potential outsourcing to contracts to get this many done.

Conservation Measure Assumptions			
DSS Model Measure Number	**12**	**12-Int**	**13**
Measure Name	**MF Residential and Institutional Buildings Retrofit**	**MF Residential and Institutional Buildings Retrofit Intensive**	**COM Rebate to Replace Inefficient Equipment**
Measure included in which Program Scenario	None	Program D	Program A
Customer Classes	MF,INST	MF,INST	COM
Applicable End Uses	Indoor Use	Indoor Use	Indoor use
Market Penetration by End Of Program (%)	10%	20%	15%
Annual Market Penetration (%)	0.7%	1.4%	0.5%
Water Use Reductions For Targeted End Uses Description	10%	10%	10%
Evaluation Start Year	2017	2017	2012
Evaluation End Year	2030	2030	2040
Program Length, years	14	14	29
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	Yes	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$0	$0	$0
Utility Unit Cost for MF accounts, $/unit	$2,500	$5,000	$0
Utility Unit Cost for non-Res accounts, $/unit	$2,500	$5,000	$1,000
Customer Unit Cost. $/SF unit	$0	$0	$0
Customer Unit Cost. $/MF unit	$0	$0	$0
Customer Unit Cost. $/CII unit	$5,000	$5,000	$5,000
Annual Utility Admin & Marketing Cost	30%	40%	25%
Water Savings Documentation & Assumptions	Savings based on replacing toilets, urinals, showers, faucets. Assumed conservative value of 10% as toilet may not need to be replaced if already new or not cost effective to replace. Clothes washers are covered in another program.	Savings based on replacing toilets, urinals, showers, faucets. Assumed conservative value of 10% as toilet may not need to be replaced if already new or not cost effective to replace. Clothes washers are covered in another program.	Conservative assumption as an average savings amount program participants.
Cost Documentation & Assumptions	Costs estimated based on fixtures to be replaced up to a maximum of $2,500 per account.	Costs estimated based on fixtures to be replaced up to a maximum of $5,000 per account.	Menu items could be up to a cost of $1,500 per customer. Cooling towers would be included and qualify. Approximate that the average account gets $1,000 as not all accounts will have older fixtures that need replacing.

Conservation Measure Assumptions			
DSS Model Measure Number	**13-Int**	**14**	**15**
Measure Name	**COM Rebate to Replace Inefficient Equipment Intensive**	**CII Promote Pre-rinse Spray Nozzles**	**CII High Efficiency Toilet Rebate**
Measure included in which Program Scenario	Program B, C, D	Program B,C,D	Program A
Customer Classes	COM	COM	COM,INST
Applicable End Uses	Indoor use	50% of Spray Valve end use	Toilets
Market Penetration by End Of Program (%)	42%	10%	4%
Annual Market Penetration (%)	1.4%	1.1%	0.4%
Water Use Reductions For Targeted End Uses Description	10%	56%	63%
Evaluation Start Year	2012	2012	2012
Evaluation End Year	2040	2020	2020
Program Length, years	29	9	9
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	Yes	Yes	No
Utility Unit Cost for SF accounts, $/unit	$0	$0	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$750	$50	$600
Customer Unit Cost. $/SF unit	$0	$0	$0
Customer Unit Cost. $/MF unit	$0	$0	$0
Customer Unit Cost. $/CII unit	$5,000	$100	$1,800
Annual Utility Admin & Marketing Cost	25%	25%	25%
Water Savings Documentation & Assumptions	Conservative assumption as an average savings amount program participants.	Assume replace a 2.5 gpm to a 1.6 gpm valve or lower.	Assume replace 3.5 gpf toilets with a 1.28 gpf toilet as per current RWA / SRCSD rebate guidelines the City participates in as of July 2012.
Cost Documentation & Assumptions	Menu items could be up to a cost of $3,000 per customer. Cooling towers would be included and qualify. Approximate that the average account gets $750 as not all accounts will have older fixtures that need replacing.	Assume only one per account as a trial. Assumes customer replaces two more valves on their own if they like the valve provided by the City. Spray Nozzles currently given away as part of Prop 50 Grant. Spray Nozzles found in grocery stores, restaurants, and a variety of commercial establishments. Sacramento participated in the CUWCC Rinse and Save program valves have been distributed for many years.	Cost per request of Tyler for future CII toilet rebates from Prop 50 Grant after July 1, 2012. Assume 40 employees per account and 10 employees per fixture, so minimum of 4 toilets per account.

Conservation Measure Assumptions			
DSS Model Measure Number	**15-Int**	**16**	**17**
Measure Name	**CII High Efficiency Toilet Rebate Intensive**	**CII High Efficiency Urinal Rebate (<0.25 gal/flush)**	**Irrigation Water Surveys**
Measure included in which Program Scenario	Program B, C, D	All Programs	All Programs
Customer Classes	COM,INST	COM,INST	COM,INST,IRR
Applicable End Uses	Toilets	Urinals	Irrigation
Market Penetration by End Of Program (%)	5%	11%	15%
Annual Market Penetration (%)	0.6%	1.2%	0.5%
Water Use Reductions For Targeted End Uses Description	63%	75%	15%
Evaluation Start Year	2012	2012	2012
Evaluation End Year	2020	2020	2040
Program Length, years	9	9	29
Measure Life, years	Permanent	Permanent	5
Saves Hot Water	No	No	No
Utility Unit Cost for SF accounts, $/unit	$0	$0	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$800	$300	$1,500
Customer Unit Cost. $/SF unit	$0	$0	$0
Customer Unit Cost. $/MF unit	$0	$0	$0
Customer Unit Cost. $/CII unit	$1,600	$900	$1,000
Annual Utility Admin & Marketing Cost	25%	25%	25%
Water Savings Documentation & Assumptions	Assume replace 3.5 gpf toilets with a 1.28 gpf toilet as per current RWA / SRCSD rebate guidelines the City participates in as of July 2012.	Assume replace a 1 gallon urinal with a 0.25 gallon urinal or less.	Assume value based on published reports.
Cost Documentation & Assumptions	Increase to $200 per toilet and 4 accounts (Assume 40 employees per account and 10 employees per fixture, so minimum of 4 toilets per account).	City of Sacramento requested rebate value of $150 per urinal. Assumes 2 urinals per account for a total of $300 per account.	Assumed $1,500 value based on discussions with City of Sacramento staff.

Conservation Measure Assumptions			
DSS Model Measure Number	**18**	**19**	**20**
Measure Name	**Irrigation Water Budgets**	**Water Budgets with Meter Conversion - Mixed Use to Dedicated Irrigation Meter**	**Res Financial Incentives for Irrigation and Landscape Upgrades**
Measure included in which Program Scenario	All Programs	Program D	Program B, C, D
Customer Classes	IRR, INST	COM,INST,IRR	SF,MF
Applicable End Uses	Irrigation	Irrigation	Irrigation
Market Penetration by End Of Program (%)	90%	4%	5%
Annual Market Penetration (%)	3.5%	0.9%	0.2%
Water Use Reductions For Targeted End Uses Description	10%	10%	20%
Evaluation Start Year	2015	2012	2015
Evaluation End Year	2040	2016	2040
Program Length, years	26	5	26
Measure Life, years	5	Permanent	Permanent
Saves Hot Water	No	No	No
Utility Unit Cost for SF accounts, $/unit	$0	$0	$1,000
Utility Unit Cost for MF accounts, $/unit	$0	$0	$1,000
Utility Unit Cost for non-Res accounts, $/unit	$200	$5,000	$0
Customer Unit Cost. $/SF unit	$0	$0	$1,000
Customer Unit Cost. $/MF unit	$0	$0	$5,000
Customer Unit Cost. $/CII unit	$0	$0	$0
Annual Utility Admin & Marketing Cost	30%	30%	25%
Water Savings Documentation & Assumptions	Assumed value based on professional judgment and published case studies.	Assumed value based on professional judgment and published case studies.	Conservative assumption based on data provided by the City of Roseville from Lisa Brown on savings of 16-20% depending on the year.
Cost Documentation & Assumptions	Julie Friedman's cost estimate as reported by Mark Roberson Interim Conservation Plan including: admin costs, 1.3 hours of field labor costs per survey, materials and outside services cost, publicity cost, and follow up and evaluation cost. Total cost was $23K for 116 surveys.	Cost data provided by Oscar at the City of Sacramento on June 29, 2012. "Cost out for changing a mixed meter on park site to a dedicated meter for irrigation only.	Based on estimates from Lisa Brown from City of Roseville on $1 per square foot, and average of 1,000 sq. ft. removed. Customer can elect to use the funds for irrigation system efficiency which was quoted by Tyler Stratton to be $450 per customer. Customer can use funds for a variety of items up to the cap limit of $1,000 per account.

Conservation Measure Assumptions			
DSS Model Measure Number	**21**	**22**	**23**
Measure Name	**Financial Incentives for Irrigation and Landscape Upgrades**	**Rain Sensors Single Family Accounts**	**Rain Sensors Irrigation Accounts**
Measure included in which Program Scenario	Program B, C, D	Program D	Program D
Customer Classes	IRR	SF	IRR
Applicable End Uses	Irrigation	SF Irrigation	IRR Irrigation
Market Penetration by End Of Program (%)	60%	25%	50%
Annual Market Penetration (%)	2.3%	1.0%	0.5%
Water Use Reductions For Targeted End Uses Description	15%	5%	5%
Evaluation Start Year	2015	2017	2017
Evaluation End Year	2040	2040	2040
Program Length, years	26	24	24
Measure Life, years	Permanent	Permanent	Permanent
Saves Hot Water	No	No	No
Utility Unit Cost for SF accounts, $/unit	$0	$60	$0
Utility Unit Cost for MF accounts, $/unit	$0	$60	$0
Utility Unit Cost for non-Res accounts, $/unit	$6,000	$0	$60
Customer Unit Cost. $/SF unit	$0	$50	$0
Customer Unit Cost. $/MF unit	$0	$50	$0
Customer Unit Cost. $/CII unit	$1,500	$0	$50
Annual Utility Admin & Marketing Cost	25%	25%	25%
Water Savings Documentation & Assumptions	Conservative assumption based on data provided by the City of Roseville from Lisa Brown on savings of 16-20% depending on the year.	Water savings percentage is low as there are only rain events avoided in the Spring and Fall in the Sacramento area.	Water savings percentage is low as there are only rain events avoided in the Spring and Fall in the Sacramento area.
Cost Documentation & Assumptions	Rebate would be a menu of options that allows an account to buy what is needed up to a maximum value of $6,000 per account.	Based on Wireless Rain Sensor (like Hunter Rain Click).	Based on Wireless Rain Sensor (like Hunter Rain Click).

Conservation Measure Assumptions			
DSS Model Measure Number	**24**	**25**	**26**
Measure Name	**SF Smart Irrigation Controllers**	**CII Smart Irrigation Controllers**	**Water Group Scheduling**
Measure included in which Program Scenario	Program B, C, D	Program B, C, D	Program D
Customer Classes	SF	MF,COM,INST,IRR	SF,MF,COM,INST,IRR,OTH
Applicable End Uses	Irrigation	Irrigation	Irrigation
Market Penetration by End Of Program (%)	10%	40%	25%
Annual Market Penetration (%)	0.4%	1.6%	2.5%
Water Use Reductions For Targeted End Uses Description	10%	10%	10%
Evaluation Start Year	2015	2015	2016
Evaluation End Year	2040	2040	2040
Program Length, years	25	25	25
Measure Life, years	Permanent	Permanent	5
Saves Hot Water	No	No	No
Utility Unit Cost for SF accounts, $/unit	$400	$0	$5
Utility Unit Cost for MF accounts, $/unit	$0	$1,000	$0
Utility Unit Cost for non-Res accounts, $/unit	$0	$1,500	$0
Customer Unit Cost. $/SF unit	$200	$0	$0
Customer Unit Cost. $/MF unit	$0	$1,000	$0
Customer Unit Cost. $/CII unit	$0	$1,500	$0
Annual Utility Admin & Marketing Cost	25%	25%	30%
Water Savings Documentation & Assumptions	Assumed value based on professional judgment and published case studies.	Assumed value based on professional judgment and published case studies.	Assumed value based on professional judgment and published case studies.
Cost Documentation & Assumptions	The rebate value is $400 per request of Tyler Stratton at City of Sacramento for toilet rebates after July 1, 2012.	The $1,000 is based on request from the City as of May 2013.	Publicity ads for SNWA were mainly targeted at the SF owners.

Conservation Measure Assumptions			
DSS Model Measure Number	**27**	**28**	**29**
Measure Name	**Verification of Landscape Plans and Update Model Water Efficient Landscape Ordinance**	**Developer Financed Reduced Footprint New Development**	**Require Multi Family Submetering on New Accounts**
Measure included in which Program Scenario	Program B, C, D	Program D	Program D
Customer Classes	COM,INST,OTH	SF	MF
Applicable End Uses	Irrigation	Internal and External	All
Market Penetration by End Of Program (%)	70%	40%	90%
Annual Market Penetration (%)	2.7%	Varies with growth of SF homes	Varies with growth of MF accounts
Water Use Reductions For Targeted End Uses Description	15%	20%	10%
Evaluation Start Year	2015	2015	2017
Evaluation End Year	2040	2040	2040
Program Length, years	26	26	23
Measure Life, years	10	Permanent	Permanent
Saves Hot Water	No	Yes	Yes
Utility Unit Cost for SF accounts, $/unit	$0	$1,000	$0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$2,000
Utility Unit Cost for non-Res accounts, $/unit	$312	$0	$0
Customer Unit Cost. $/SF unit	$0	$1,500	$0
Customer Unit Cost. $/MF unit	$0	$0	$2,000
Customer Unit Cost. $/CII unit	$500	$0	$0
Annual Utility Admin & Marketing Cost	30%	25%	25%
Water Savings Documentation & Assumptions	Assumed value based on professional judgment and published case studies.	Assumes the home has best available technology (0.8gpf toilet instead of a 1.28 gpf toilet) due to the offset in fees by developer and installation of the higher water efficiency fixtures.	Assumed value based on professional judgment and published case studies.
Cost Documentation & Assumptions	Hourly rate provided by City of Sacramento Landscape Architect II hourly salary budgeted rate of $39 per hour, fully loaded. 8 hours assumes landscape plan review, and also includes unit cost for staff time to update model landscape ordinance.	Eric DeKolk comment - thought that needs connection fee reduction at about $1,000/SF acct. Assumes pays for toilets, showerheads, faucets, and possibly washing machines and controllers.	Value provided by City of Sacramento staff for a cost of a new submeter would be $4,000 minimum. This would be a 50% / %50 cost share with the City and the customer.

APPENDIX C – Sacramento Water Conservation Advisory Group Comments On Draft Analysis Results

Comments received after circulation of the draft WCP to the Sacramento Water Conservation Advisory Group on 6/12/13:

Name	Section	Table or Figure	Page	Comment	DOU Response
Nanette Bailey, SRCSD	*6.8*	*6-2*	*74*	*Make changes as noted during 6/12 SWCAG meeting: change COM to CII and remove "prohibit" from first listed measure.*	Corrected.
Nanette Bailey, SRCSD	8.2	Table 8-3	93	Foot notes: SRCSD - Sacramento Regional County Sanitation District. Missing "County".	Corrected.
Nanette Bailey, SRCSD	8.3	Table 8-4	98	Foot notes: SRCSD - Sacramento Regional County Sanitation District. Missing "County".	Corrected.
Nanette Bailey, SRCSD	6.1	Table 6-1	62	Foot notes: SRCSD - Sacramento Regional County Sanitation District. Missing "County".	Corrected.
Lysa Voight, SRCSD	2.2		27	Last sentence on page 27 states "Given residential customers are partially metered; winter outdoor irrigation may be an issue which is not quantifiable." Suggest restating this as "Since meters are not installed for all residential customers, winter outdoor irrigation may be estimated (or approximated at zero?) but not accurately measured." (Note: outdoor use is estimated	We have rephrased this sentence
Lysa Voight, SRCSD	2.3		35	Bullet item list, capitalize items in 3rd bullet item for consistency with the rest of the list (Large Landscape Irrigation)	We've changed this section to be consistent
Lysa Voight, SRCSD	3.2		39-40	Table 3-2 shows the model input for Landscape Irrigation under the parameter "Distribution of Water Use Among Categories" as 5.2% for Landscape Irrigation. This seems contradictory to several other portions of the document including: Figures 2-2 and 2-3 and section 2.3. Is this a particular type of landscape irrigation? If so, indicate what type.	Figure 2.3 is our estimate of how much of our total demand is used for irrigation, whereas the 5.2% figure is the estimate of water use by our large landscape irrigation customers.
Lysa Voight, SRCSD	2.2		26	In the last sentence used on the paragraph at the top of page 16, what is a "wheeling demand"?	we added a footnote on this page to explain "wheeling demand"
Tim Horner	7	7.2		Believes there should be a more up front discussion of tiered pricing.	Not sure where he sees that the DOU has committed to 2 tiers. Analysis of options has just begun.
Tim Horner	2	2.2-	30-	add graph showing rainfall on figures 2.2-	
David Todd	all	all	all	Be consistent in listing SB X7-7	Corrected.
David Todd			20	suggest editing description of AB 2572 to also state that the City will also charge a volumetric rate for water.	Added.
David Todd	1.61		21	Include a description of SB 610 and SB 221 (of 2001) which require a water supply assessment for projects and written verification for subdivisions respectively that demonstrate a confirmed twenty year water supply.	Added.
David Todd	2.2		29	Asked if percentage listed was total or single-family residential	This is the overall percentage of metered customers within the City.
David Todd	2.2		29	First two bullet points are identical.	Removed second bullet
David Todd	2.3		34	This is unclear. Where there really single family customers who used enough water to be ranked among the City's top 100 water users? It might be more useful to analyze the top 20 water users in each category.	This section has been rewritten to make it clear that the top 100 water users are primarily institutional customers, large landscape
David Todd	2.3		35	Is 'State and Federal buildings' a combined category or are they separate?	they would both fall under our publicly owned category
David Todd	4.3		44	suggested adding the word "been"	added.
David Todd	4.3		49	suggest changing "12" to 2012"	This paragraph has been updated with the most recent activity and budgeted funding levels for FY 2014
David Todd	4.3		50	suggest capitalizing plant names	Plant names are in lower case since we are not listing their botanical
David Todd	8	8.3	92	freeridership spell as two words	CUWCC spells as one word. We will keep "freeridership" as a single word.

Name	Section	Table or Figure	Page	Comment	DOU Response
Mark Roberson	all			The plan relies on a base year of 2008 that has a GPCD of 256. Since 2008, GPCD has dropped to as low as 208 (2010), currently it is at 217. The justification for selecting 2008 is that it is where the City feels that the GPCD will be in the next few years; however, there is no analysis that supports this position. It is recommended that the City perform an analysis to support the selection of 2008 as the base year.	The City felt that the best use of its resources was to move forward with the Water Conservation Plan at this point. A thorough analysis would still likely highlight that the variables influencing the City's water use are difficult to determine, and at the end of the day, with close monitoring of its water use target, the City ultimately must focus on staying below both its 2015 and 2020 GPCD targets.
Mark Roberson	all			The plan relies on a potential 2030 capital expenditure (based on draft master plan), as the current (2010) avoided cost. The potential impact of using this approach is that it may overstate the benefits of conservation and suggest that the City pursue measures that may cost them more to implement than they save in costs.	Using future avoided cost is an accepted method to evaluate water conservation programs. The City will closely monitor its efforts and its costs, actively pursue grant funding and do all it can to implement programs that save the most water per dollar invested.
Mark Roberson	all			It is recommended that the City prepare a list of all conservation measures considered for the plan, ranked from lowest unit cost/AF of savings to highest unit cost/AF of savings. This list would then be used to formulate which measures to implement each year. For example, using the cost estimates from the Interim Plan, the City would get more benefit from investing in large landscape budgets at $23/AF instead of residential high efficiency clothes washers @ $423/AF.	The City cannot simply implement the water conservation programs that are merely cost effective from a water savings standpoint. Given the low cost of its water, and the water savings target, the City may end up offering programs that are not strictly cost effective. Programs will be evaluated based upon the cost to implement and the total water savings and programs will be implemented that are the most cost effective and have the greatest savings potential.
Mark Roberson	Exec Sum		3	Suggest presenting the % of reduction of non-code conservation from future production along with 30 MGD/day reduction.	Each of the components of the 30 MGD/day water use reduction are outlined within the Water Conservation Plan. We have opted to keep the description generic in the Executive Summary.
Mark Roberson			3	The City does not treat wastewater.	Noted. We changed it to "transport"
Mark Roberson			4	Program C bullet needs context.	We believe there is sufficient context within the Executive Summary.
Mark Roberson, Water Forum		ES-2	5	You have where the City is going but not where they are today. Suggest adding for context.	Good point. We have added where the City is today within the first page.
Mark Roberson, Water Forum			5	Suggest that you delete bullet about market study - this expense would be better spent on conservation measures. Code and replacement of fixtures will probably occur before the activity will be cost-effective for the City.	We respectfully disagree. A full evaluation of conservation measures should include a market saturation study.
Mark Roberson, Water Forum			5	Suggest adding bullet that the City will pursue low cost, high saving measures over higher cost ones.	This is elaborated upon within the main body of the document, but the City's emphasis is on achieving water savings, not merely implementing those that are the most cost effective.
Mark Roberson, Water Forum			17	Please clarify the statement about "as the water savings potential wanes as conservation is achieved..." I don't understand what is being stated.	Noted.
Mark Roberson, Water Forum			18	last paragraph. Is the volume of water pumped for park irrigation accounted for in the document and analysis?	Yes. Ground water is included within the City's production number, which is a variable within its GPCD

Name	Section	Table or Figure	Page	Comment	DOU Response
Mark Roberson, Water Forum			24	Document needs consistency with acronyms. I.e. sometimes MWM, sometimes Maddaus Water.. Sometimes WF, sometimes Sacramento Water Forum.	Corrected.
Mark Roberson, Water Forum		fig 2.1	24	Suggest changing from "Consumption" to Deliveries or Demand. Some of the metered water is consumed through irrigation however most of it moves through to the SRCSD.	Noted.
Mark Roberson, Water Forum		fig 2.1	24	2012 and 2013 were dry years - that might be why the gpcd is increasing.	We will make it more clear that the GPCD for the last two years has yet to be weather normalized. We will see how the CUWCC's weather normalization tool affects the City's non weatherized GPCD when they
Mark Roberson, Water Forum			25	2.1 header - suggest changing "consumption" to "Metered Deliveries" - see comment above	Revised
Mark Roberson, Water Forum			25	2.2 header - suggest that total production by use type (SF, MF etc.)/year be presented instead of use/account.	Revised to better reflect that this is an estimate
Mark Roberson, Water Forum		fig 2-2 to 2-4	26	level of precision on water use by customer class should be to whole numbers.	Revised
Mark Roberson, Water Forum		fig 2-3	27	include the number of metered accounts that the data was based on along with the % of metered SF accounts i.e. 3,200 meters representing 5% (or whatever the number is) of all SF	We will add a sentence that states what percent of our SF accounts were metered in 2008
Mark Roberson, Water Forum			29-33	Suggest that these bullets be redone as paragraphs that directly support the figures. As it is written the reader must do a lot of work to figure out which bullet applies to which figure.	Most of observations are general.
Mark Roberson, Water Forum			29	last bullet - due to sufficient supply, drought conditions in the Sacramento are not like they are in other areas of the state. The City did support statewide concerns but the City's supply was not reduced.	Noted
Mark Roberson, Water Forum			30	First bullet. Metered data in the City over the past six year has been from a mix of new and old (as far back as 1992). Suggest revising the new home vs. existing home statement. All metered growth data in the City is from a mixture of old and new housing stock being metered.	Noted.
Mark Roberson, Water Forum			30	Second bullet. Check the trend on the MF metering. This may be due to more meters going in on existing multifamily accounts and not because only new accounts are being metered. I'd suggest that more analysis be done on the metering before	Will add detail within observations or table regarding the percentage of metered MF accounts
Mark Roberson, Water Forum			30	third bullet - commercial has a downward trend from 07 to 12 but then begins to go up again. Suggest that if you make the statement that you look at new accounts only to see if the trend is as stated. Could the use/account be due to conservation?	We have removed this bullet.
Mark Roberson, Water Forum			30	last bullet - suggest reviewing how many new landscape accounts have been added over time. Also, use could be down because Prop 218 requires the Parks Dept. (not much money) to pay for water and this may have driven down use. Also, City went to odd/even watering and this may have driven down use. There are many variables that have created the curve.	The vast majority of the City's landscape irrigation accounts have been metered for at least 4 years.
Mark Roberson, Water Forum		fig 2-5	30	This fig implies that from 06 to now that use/account has decreased. Unless the reader knows about the lack of metering and the mix of new and old homes being metered the reader might think that use/account in the City has plummeted. There are too many variables to present the data the way it is shown. Consider that you have very few billed accounts in 06, then you begin having more metered accounts some for new homes some for existing. The few accounts in 06 may have the same use in 12 as they did in 06. Suggest removing the trend line and making the numerous variables very clear on the figure and in the text.	The note that is below figure 2-5 will be moved to be right below this figure. It explains the limitations. We will also add that as of May, 2013, approximately 44% of all single family accounts are metered.

Name	Section	Table or Figure	Page	Comment	DOU Response
Mark Roberson, Water Forum		figs 2-7 to 2-10	30-33	Suggest showing total metered delivered/year and use/account. This way the reader will see the trend in annual use. Plot the total on one axis and the use/account on another.	Notes have been added within each chart stating the percentage of metered accounts by account type
Mark Roberson, Water Forum			33	last paragraph - suggest deleting all text after second sentence. This part of the text is to provide context on existing conditions. Save the plumbing code narrative for other areas in the text.	noted
Mark Roberson, Water Forum			34	first paragraph - suggest deleting all text after second sentence. This part of the text is to provide context on existing conditions. Save the plumbing code narrative for other areas in the text.	Noted. We added a header, "Age of Building and its Impact on water Consumption" and kept this section within Chapter 2 since it affects historical water demand
Mark Roberson, Water Forum		table 2-1	34	cumulative percentage does not make sense. How can 100% of structures be built 2005 or later? Also, the precision is not warranted - round to whole numbers.	We have corrected this to say "earlier" and not later.
Mark Roberson, Water Forum	2.3		34	suggest adding "metered" to the header	This additional wording is not necessary. It is understood that in order for the City to do an analysis of its high water users the
Mark Roberson, Water Forum	2.5		36	suggest deleting "drought" from the header or adding a discussion about it in the text. Currently the discussion is only about climate change	noted. (drought is actually mentioned twice within this section)- header will remain
Mark Roberson, Water Forum		table 3-2	39	the input for the avoided cost $/af parameter is "conversion AF to MG" This should be a $ amount	Completed
Mark Roberson, Water Forum	3.3		41	suggest adding the model landscape water ordinance to the plumbing code.	Noted. Water Conservation that occurs through the model landscape ordinance is measure #27 in
Mark Roberson, Water Forum			45	Given the City's water supply it would need to be an extremely dry year for the City to feel a curtailment. Suggest adding text that clarifies this	Noted
Mark Roberson, Water Forum		table 4-1	54	seems like there has been more houses built during the recession - I'd check the accuracy of the new-residential packets	Letters go out when an account turns over and not strictly when
Mark Roberson, Water Forum		table 4-1	54	metering should be added to the table	Noted. This table only represents the water conservation activity coordinated by the City's Water Conservation Office over the past three fiscal years. Metering is noted
Mark Roberson, Water Forum			69	There is no cost to the City to procure water	rephrased to "producing"
Mark Roberson, Water Forum	6.4		70	Suggest making the unit cost of a measure easier to understand. As written, Appendix B is difficult to understand. Consider listing the measure, cost/unit, savings/unit, life of the measure, and decay/yr.	The City will likely need to implement many programs that are not locally cost effective, and will pursue grant funding to keep its costs to a minimum.
Mark Roberson, Water Forum			71	Suggest that the plan be applied to the City only and not the customer	Noted, however the City believes it should highlight all of the benefits of the implemented measure.
Mark Roberson, Water Forum			91	fourth bullet - suggest comparing the $/af to the avoided cost of water not the production cost.	Noted. This number was updated in table 7-3 to $462/AF
Chris Brown, CUWCC	8			Suggest that the City reconsider both group watering scheduling and rain shut off device rebates- both are extremely cheap and save water.	We may evaluate these programs at a later date, however the DOU and the SWCAG spent considerable time narrowing down the list from about 80 to approximately 20 measures.

Comments from SWCAG Members following Sept. 19, 2012 Meeting

Comment Received	Submitted By	Comment	DOU Comment
9/17/2012	JP Tindell	I just went through the Exec. Summary and have a couple of immediate comments: 1. It's still unclear to me exactly how this Plan relates to other Plans of the City. Try to write this part so anyone who's not a govt. employee could follow. 2. What is the timeframe of this plan? thru 2020 to start with? Would it be worth making a date part of the plan title, like we say 2030 General Plan? Am very happy to see emphasis on infrastructure upgrades to include CII (commercial/institutional/industrial) category! We are anxious to support efforts to get additional funding for park irrigation system upgrades.	The timeframe of the plan is intended to be a living Plan. The City will be track and adjusting to meet its SB X7-7 targets
9/18/2012	General Comments during SWCAG Meeting	Revise the Executive Summary to be: • More focused on your key messages • More visual • Provide quick overview of key facts • Briefer (content good but Summary too long) Page 18 – Should be 30 million gallons citywide – not per person Page 20 - Last sentence of 1st paragraph – substitute :minimum flows allowed" for the term "Hedge Flows" NOTE: Recommendation to minimize "jargon" and acronyms throughout the Plan Page 27 - Breakdown single family residential and multi-family residential into indoor and outdoor percentages Page 28 - Add pie chart for multi-family residential Page 29 - Bullet points are great! Page 36 - #2 – delete "and build out" Page 38 – Add a heavy line between Distribution of Water Use and Indoor Water Use by Category. Indoor Water Use by Category items – listed as percentages - are confusing. The total adds up to more than 100%. Consider listing as gpcd. Page 43 - There appears to be a disconnect between the figure and the table. The table lists the same numbers (except for 2015) for water demand without the plumbing code and water demand	

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	General Comments during SWCAG Meeting (continued)	with the plumbing code. Page 47 - Last section; 3rd bullet: URL should be SpareSacWater.org Page 58 - Research should be done to confirm the same requirements apply to both single family and multi-family residential Page 68 - Re-title row "Water Group Scheduling" to be more explanatory. Make table bigger Page 70 - Make clearer why Water Group Scheduling is included in Program D and not Program C. (Answer: not enough AMI connections to implement in the near-term) Page 74 - Add information regarding where Sacramento's usage compares to other cities and include an explanation that Sacramento uses more water than coastal communities because it's hotter and gets less fog and rain. Reference pg 35 §2.4 Local Climate Effects on Irrigation. Also add comparison to Executive Summary, citing differences including higher temperatures, lower population density, lower water costs, and greater reliability of water supply. Should also mention cyclical rainfall and drought in the long-term Page 82 - Summary of Plan need a razzle-dazzle page of its own Page 98 - Remove Org Chart – detracts from Plan Appendices - Make tables in Appendices big enough to read	
9/19/2012 9/19/2012	Mark Roberson Mark	Hand written notes were provided to Jodie Monaghan at the September 19, 2012 meeting. These were notes on consistency, typos, etc. In addition, please remove my name as a technical consultant or as a source for City data and information. All of my previous work was done with data provided by Julie. Please consider the following. 1. A comment was provided for the 8/2012 draft requesting a discussion that supports the use of the 2010 UWMP GPCD of 259. This request was made because the 2010 actual was 208. This is an important issue because the 2010 actual is below the 2020 target and the starting point is used to direct where resources are allocated. 2. Economy and drought The 9/2012 plan has several statements that claim that water use is down because of the economy and drought; however, there is no analysis that support the statements.	• The reduction goal of the 33 gpcd was discussed at the August 1st SWCAG meeting and a more detailed description of the goal is discussed in Section 2.1 and Section 3.3 of Plan. The demand projection is based on average annual demands and is aligned with the approved UWMP demand projection (see Section 3.3, Figure 3-3). Based on past experience and review of data, demands rebound after droughts and economic recessions. The actual current demand in 2010 of 208 gpcd is not representative of "normal" demands and is anticipated to rebound (this has already been documented by other water utilities in the Sacramento region). As discussed in Section 8 of the

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	Roberson (continued)	Drought – The City did not suffer water scarcity during the recent drought period. Given the lack of water scarcity to the City, an analysis to determine if there were affects from the drought would be challenging. Economy- During the time period of the economic downturn the vast majority of the single-family homes were on a flat rate (with or without a meter) so there was no incentive to use less. I note the following on the figures on pages 30- 33. All figures •Why does the moving average begin in late 2007? •Shouldn't the data be the same as the baseline period used for GPCD analysis? I think this was 1996-2007. •I'd suggest that for each customer type figure that the % of total metered demand be included. Otherwise to get a sense of how much of total demand is being considered you need to refer to Figure 2.1. Single-family – I think this should be based on those that are billed by volume otherwise it is just a review of what flat raters, with no price signal are doing. Also, a few notes on the figure. •it should be made clear that this is metered accounts only •draw a line when billing began (not counting the few hundred that were billed before 2010) •data stops in 10/2010, all other customer types go through 10/2011? Multi-family – this is a huge (not a slight as stated in the plan) drop from an average of over 10,000 gal/account prior to 2010 to around 4,000 gal/account after. This is 2.5X reduction in use. Was there any review of administrative changes such as metering, account reclassification? My understanding is that the rental market was fairly consistent during the economic downturn. An analysis to determine if there were economic affects could be based on a review of active and inactive accounts or whether there was an increase in delinquency. Just making the statement and not providing any supports seems tenuous. 3. Selected measures for implementation The City's current avoidable cost for water including an	Plan , the recommendation is to track gpcd carefully, ramp up or modify implementation of conservation measures as an adaptive management approach to achieving SB X7-7 • The historical demands for each costumer category were reviewed and documented in the Plan. Pre-drought and pre-recession averages were documented and reviewed as part of the analysis using data from 2008 (not historic peak demands in 2005-07) as a conservative assumption. • Drought messaging was occurring throughout the region. The drought and beginning of the recession were overlapping effects on demand. This is not a drought planning study and as a result, we are not looking at short duration trends, longer range trends are used and recent years were not included. • All data shown is based on available metered data from the City's billing system as mentioned in the opening paragraph for Section 2. All the data is presented based on actual metered billing data provided. Moving average is a 12-month duration. Data goes back as long as reliable in the billing system; there was not enough data by customer category in prior years. The percent of total metered demand would be useful metric, however, given the system is still not fully metered, this analysis would be of academic value to analyze further. The general seasonal trends in gpd/acct were reviewed when creating the water balance for the DSS Model. With checks and balances available for reviewing the end use breakdown by customer category (e.g., single

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9/19/2012	Mark Roberson (continued)	environmental benefit is about $175/AF for chemicals, energy, and a $75/AF environmental benefit. The Master Plan group states that their current analysis indicates that new infrastructure will not be needed until 2030 or 18 years off. They also note that if the demand for water picks up that this date could be sooner. Using the current value of the avoided cost of water ($175) and the toilet rebate measure prepared by MWM (3,713 rebates at a total cost of $260/rebate) an analysis using the CUWCC cost-benefit spreadsheet shows that the City will need to find an additional $604,666 over time to support the proposed measure. This additional amount will be required for each year (fewer years if new infrastructure is needed sooner) that toilets he rebates are provided.. Given that there is uncertainty on where the actual GPCD value is or when new infrastructure will be required it is suggested that the measures that are selected for implementation be limited to ones that are low cost such as landscape water budgets for large properties and residential outdoor measures. Also, I'd suggest that because there is very little information on the benefit of smart controllers or cash for grass programs that these are limited to pilot programs or the existing grant funded effort. 4. Comparison of the City of Sacramento to other entities I would be very careful comparing the City to other suppliers. Consider; •Exporters pay an order of magnitude more for water •Exporters suffer scarcity on a frequent basis •Based on the UWMP the City's water supply is not impacted by droughts •Other utilities currently need additional infrastructure capacity •Residential metering in the City is behind almost all other areas •Larger agencies may benefit from an economy of scale and the opposite may be true of smaller agencies 5. Additional scenario (this request was made for the August version of the plan). Prepare a Program scenario (E) that meets the 33 GPCD target using the existing program costs ($1.9M, excluding meters and water loss control BMPs) by increasing the participation level of low cost - high savings measures and decreasing the participation level of high cost – low savings measures.	family residential indoor use), it was clear that this data was not fully representative of the overall customer category use. Multifamily data is presumably shifting as more accounts and smaller size accounts are added to the City's billing system. This data is simply a snapshot of the best available information from the billing system, it will undoubtedly continue to shift as more accounts are metered and added to the billing system. As was stated previously, this data was charted and reviewed but not used directly as DSS model inputs due to questions surrounding the data. If you feel stronger caveats need to be added, please offer concrete examples. Much of the additional analysis/information requested was out of scope and not central to the modeling analysis at this time. It is a living plan and model and will be updated and refined as more data becomes available. • Net present value is the industry standard and appropriate basis for comparison for avoided cost for future capital and O&M costs combined compared to current and planned investments in conservation programs. Therefore, the appropriate comparison is $ 146 AF for all benefits from measures in Program C (AMI, Water Loss and all other recommended measures) and not $175/AF. The current avoided O&M costs provided by the City does match closely where the modeled value is $545/MG or $177/AF. • Residential outdoor measures were some of the highest cost of water saved but were included given the City's goal to address where the highest perceived conservation potential exists for the City. The desktop landscape

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	Mark Roberson (continued)		water budgets were one of the least expensive measures and included in the program. Grants funds are envisioned to support the program to the extent the City is successful in obtaining the grants. • The recommended Program C is an optimized program to meet the 33 gpcd using increased labeled "intensive" measures that seek increase participation in the lower cost, higher water savings measures. Lowering the budget investment to $1.9 million (without water loss/AMI investments) would presumably result in less than 33 gpcd being saved. Further analysis may be performed in the future as additional scenarios are reviewed when each fiscal year an annual work plan is prepared and additional tracking of changes in gpcd becomes available.
9/24/2012	Mike Huot	Referring to page 83 - Table 8-3. Last row titled Conservation Measure - Meter Conversion - Mixed Use to Dedicated Irrigation Meter. Comment refers to column titled "Overall Benefits" which states that "...customers may be incentivized to convert to save on sewer bills...". SRCSD Comment: Please clarify that the sewer bills refer to the 'sewer collection managed by City of Sacramento DOU' and not our sewer districts.	Edited as requested.
9/24/2012	Lysa Voigt	**Page 62 - Table 6-1**. Measure Description and Selection. DSS Model Measure Numbers 11 and 12. Currently, SRCSD supports measures 11 and 12, but is not an active participant/partner in the "CII Surveys and Top 100 Users Program" or "CII Rebates to Replace Inefficient Equipment Intensive" measure. **Page 99 - Section 8.8**. Below were Lysa Voight's previous comments. These could be mentioned in section 8.8 for further/future evaluation and in consideration of water conservation measure costs. Item 1 - Comments to the Water Conservation Model Results and proposed packages of measures The model results and proposed measures look to be well thought out. It's obvious that the City has put a lot of effort into this model and development and prioritization of the recommended measures. I appreciate the opportunity to review and comment on the documents you provided and hope that the City shares the completed documents with others who might	

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9/24/2012	Lysa Voigt (continued)	benefit from the results. Since landscape irrigation is such a large component of the urban water use in the City, I recommend that you evaluate environmental benefits in addition to the cost savings for the measures that encourage river friendly landscape practices. These types of practices can reduce landscape irrigation flow and the application of products that might contribute to contaminant loads regulated by TMDLs or to chemicals / constituents that affect the area surface waters. The City is regulated for its urban runoff through an NPDES permit, and a portion of the City's storm water flows into a combined storm water/sewer system. River friendly landscape practices would benefit both of these systems and the environment in addition to conserving water. A reduction in landscape irrigation flows for recommendations (measures) such as 6a, 6b, 6e, 21, 29, 30a, 30b, 77 and 79 would likely also result in a cost savings to the City in other areas. For instance, if a significant amount of landscape in the City was converted to river friendly landscape, there could be a corresponding reduction in costs for BMPs and other operational costs associated with the storm water / urban runoff systems and permit compliance resulting in a cost savings in the City's Stormwater Management Program. Similar programs related to the City's NPDES permits should be examined and factored in as savings to offset the costs of the measures. I encourage the City to engage their storm water staff for input regarding potential savings and environmental benefits that would result from measures related to river friendly landscape practices. City staff participate in the ongoing Drinking Water Policy Work Group. Efforts of that workgroup resulted in development of a series of technical documents, one of which outlines costs associated with BMPs that might help with this assessment (attached for your use and reference). Sherrill Huun is one contact from the City for additional information on this issue. Item 2 – Follow up meeting and additional information request related to SRCSD sewer rates There were several questions from the SWCAG meeting held on August 1 during SRCSD's presentation of sewer rates and the Rate and Fee Study. It was suggested that we have a follow-up meeting with a sub-group of SWCAG members.	
	Lysa Voigt (continued)	**Table 8-5**. General comment about formatting. The 2nd and 9th columns should be formatted the same as the other columns, which are centered. Suggest formatting all tables the same. It makes it easier to read.	
9-24-12	Tim Horner	I have a couple of comments about the City of Sacramento Water Conservation plan. These are based on our Sept. 19 meeting of the Water Conservation Group, and my review of the	Water savings were analyzed due to rate structure changes for single family residential customers only

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	Tim Horner (continued)	document. 1) My biggest comment goes first: The Maddaus Water Management team has done a great job of predicting how different changes to infrastructure and hardware will produce water savings. This includes water fixture upgrades, more efficient appliances, and physical devices that will conserve water. The part that I see missing is the effect of changes in the rate structure, and how these changes will affect conservation. This is a little harder to predict or model, but it is probably the single largest factor in water conservation for the City of Sacramento. We need to change the behavior of our largest water users, and they are homeowners with excessive irrigation demand. I have identified several sections where a comment about rate structures would add to the conservation plan: - Statements about the effect of changes in the rate structure could be added in Section 4.4 (City of Sacramento Water Billing Structure, p. 52-54). This section covers existing billing policy, but I don't think it goes far enough. The heading titled "Water Conservation Pricing Study Next Steps" could address this issue. A more aggressive rate structure will yield more water conservation, and a less aggressive rate structure will yield less conservation. We need to state this directly, and have it on the table as a conservation option. This can be done without full implementation of the metering system, and without any additional infrastructure. - This concept (new rate structures) should also be included in section 5 (Alternative water conservation measures). The bullet list in Section 5.2 does not include rate structures, and this may be our best weapon in the conservation fight. - I would add statements about rate structure to sections 6.2 and 6.3, pp. 63-64. I think the section on "Perspective on Benefits and Costs" has missed the major point. We can change the behavior of our largest water users with a simple change to the rate structure. The benefits are huge, and the cost is minimal. The same comment applies to section 6.6, p. 65 Assumptions about measure savings. Data necessary to forecast water savings should also depend on the rate structure and its effects. - Section 6.6 p. 65 (Assumptions about avoided costs) needs a statement about rate structure. If we can avoid additional infrastructure or hardware by changing rates there will be a huge benefit. - Section 6.8 (Comparison of individual measures) does not even mention rate structure as a tool, nor does table 6.2 include rate structure. This is a major omission. - Because of these comments about rate structure, I do not agree with the conclusions of Fig. 7.1 (Comparison of different conservation measures). The effects of Program C (including the tiered rate structure) will be highly variable and will depend on	starting in 2016. Water savings are also carefully partitioned to account for some savings associated with the conversion from a flat to a metered rate in the results from the Automatic Meter Infrastructure (AMI) measure. These results are shown in the Conservation Pricing and AMI measures, Table 6-2, page 68. A future rate study is planned to refine this information. Information in Section 5 "Benefits and Costs" is related directly to the DSS model methodology and the DOU accounting perspective. This is not the appropriate section to infuse information related to the individual conservation measure benefits, such as rate structures. The information related to rate structure "conservation pricing" analysis is handled in Section 6-8 in terms of results. Page 61 presents the description of the conservation measures analyzed including measure 4 for Conservation Pricing. The measure is also selected for inclusion in the Plan. Section 8, Table 8-5 presents the recommended Program C that includes Conservation Pricing. Figure 7.1 does illustrate the change in price structure starting in 2016 for Programs C and D that include that measure. The magnitude of the change is largely driven by how conservation pricing was considered. This information will be updated in a future model

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	Tim Horner (continued)	the rate structure selected. We could get much more or much less conservation with Program C as the rate structure is changed, and this is not reflected in Fig. 7.1. In summary, we need to have variable rate structure (conservation rate structure) on the table as a tool for water conservation. If we don't include this, most of our solutions start to look like hardware upgrades. There is an old saying that "If your only tool is a hammer, everything starts to look like a nail." If we don't include enough about variable rate structure as a tool in this report, our elected officials will be missing a major part of the conservation plan. 2) on P. 35, section 2.4 Local Climate Effects on Irrigation I think we should add a brief statement or two about drought in this section. As a geologist I take a long-term view of the environment, and we shouldn't forget that we have seen major dry periods in our long-term climate record. These droughts have lasted 20-40 years in some cases, and we will be faced with this problem again. When an extended drought hits northern California, the City of Sacramento will need a management plan that accounts for a dramatic drop in surface water use, and careful use of our limited groundwater resource. The bad news is that we allocated much of our water in the post-dam era, from 1950 to present. This was one of the wettest periods on record, and we assumed that the wet years would continue. We are now much more in tune with longer climate records and variations in rainfall, and our original assumptions about water supply were not correct. An "average" water year in this era of climate change may be much drier than we expect, and a dry year (or thirty dry years!) could change some of our basic assumptions about how we allocate water. 3) Table 3.2, p. 38: The review team commented on this table at our meeting, and my input is similar. The parameter labeled Indoor water use by category should either have a corresponding category of Outdoor water use by category, or it should be explained clearly that the numbers given are the % of total water use for each category. This will prevent the reader from trying to make the totals add up to 100%. I appreciate the work of everyone on the committee. My comments about rate structure aren't meant to sway the process, but simply to inform City Council about available options. Our elected officials and City Staff will need to make the tough decisions about which conservation measures to include and which to exclude. The report would be more balanced if there was more reference to tiered rate structures as a conservation tool.	once the rate study is completed. Conservation pricing is considered as one of many tools. The DSS model is an end use model and considers customer actions by device change-out without determining the motivation for making the change beyond natural replacement for measures (which is accounted for in the Plumbing code analysis). One key motivating factor is presumed to be future changes in conversion to metered rates and those prices going up over time as the cost of service increases. Drought is a very worthwhile topic to discuss and considered within the scope of the UWMP and Water Shortage Contingency Plan. Drought response actions are not the same as the everyday conservation activities that are the subject of this plan which is scoped to address long range changes in demand (tracked as changes in gpcd). Made edits as requested.
9-24-12	Erik DeKok	Overall comment on Executive Summary: needs to be more graphic, visual, most readers of plan won't make it past Executive	

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	Erik Dekok (continued)	Summary. Use graphics to explain what 20% by 2020 goal is, and how key elements of plan will get us there. This is where you get the chance to sell the strategy to public and decision-makers. Also, consider a separate, stand-alone graphics-rich strategic summary based on the WCP that connects non-engineers with the basic strategies being put forth in a non-technical way. Page 1 - The City's Climate Action Plan included a discussion of impacts to water supply under due to climate change. Longer-term impacts of climate change on water supply should be mentioned here. Page 4 - Should outline the four programs analyzed first, give context, and then explain why Program C was recommended and the implementation approach. Page 4 - It seems like a brief description and summary of the 4 program should be given first, and then the recommended Program C should follow (i.e. switch Table 0-2 and accompanying text with 0-1). Also, it might be helpful to give a few sentences to provide more context about what A, B, C, and D programs mean. Page 19 - Most people don't know what "pre-1914" means or why 1914 is important. Suggest you provide a footnote with brief explanation, and/or hyperlink to more background info/resources to help people understand what you're talking about. Page 20 - Most people don't know what "Hodge Flow" is. I would suggest a footnote with a brief explanation and/or a hyperlink to further background information. Page 55 – "From the analysis of water consumption data, it is clear that the primary focus of the City's efforts should be on reducing overwatering of irrigated landscape." - What specific data points led you to this conclusion? I only saw one pie chart that clearly showed outdoor use vs. indoor in single-family residential. Page 57 - It should be noted that effective 7/1/12, CALGreen mandatory measures for Nonresidential buildings apply not only to new construction, but to any addition of 2,000 sq ft or more, or to any alteration valued at $500,000 or more. Previously, CALGreen was only applicable to new construction for Nonresidential. For Residential Buidlings, CALGreen is still only applicable to new construction. This could change in 2014 with the next code update cycle. See http://www.cityofsacramento.org/dsd/forms/green-building-	

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	Erik DeKok (continued)	forms.cfm for the official City checklists based on the most recent CALGreen amendments. Page 81 and on WCP in general - How does it compare to costs of building new intake/treatment plants (e.g. North River WTP?) Is it more cost-effective to rely on existing infrastructure and/or upgrades to existing WTPs, combined with water conservation, to meet BOTH projected future demand and meet sustainability objectives? These questions will be asked, and the answers need to be as clear as possible for decision-makers and the public. It should be noted that there are community and environmental benefits that are difficult to quantify and/or were not considered in the scope of the analysis, (e.g. additional water quality benefits from reduced runoff due to reducing outdoor irrigation and overwatering of landscaping across sectors). While it may be difficult to quantify, the benefits of improved habitat and the avoided costs of state or federal regulatory action due to improved water quality could be very signficant. Also, longer-term impacts to water supply due to increasing drought conditions and increasing climate change related impacts make water conservation and its gradual increase over time a priority, for the sake of future generations. In other words, water conservation is probably very cost effective from the standpoint of building in the habits and program infrastructure to change behavior and expectations of ratepayers long-term. Page 89 - Another potential challenge: enforcement at both plan check and inspection is labor intensive. Currently, Parks Dept landscape architect is only enforcement staff City has, and fees are not adequate to cover costs. Increased permit fees likely needed to support enforcement, which may not be supported by development/building sector.	
	Jim Peifer	"The WCP provides easy-to-understand results and quantifies the benefits for meeting the City's future water demands through conservation in lieu of adding more costly infrastructure" - I understand that conservation is more expensive than new water production infrastructure. If this is true, than this statement is incorrect. Or are the programs cost effective when sunk cost (like the meter program) are not analyzed. It would be good to be clear on this. Program A's description is still lost. I strongly recommend that it is clearly identified as our existing level of effort. A new reader	

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		would still find this confusing Please include graph of water consumed since 1997. I would like to let people know that water demands have been going down over the last decade. For figure3-1, please change "Landscape Irrigation" to "Large Landscape Irrigation."	
	Peter Brostrom Peter Brostrom (continued)	I had commented on the first draft that the City should invest in landscape area calculations and the response was that it was too expensive and difficult with the number of trees in Sacramento. I contacted Tom Ash who has helped set up the water budget rate structures for Irvine Ranch WD and just recently for Eastern and Western Municipal Water Districts near Riverside, CA. He said the cost is between $1.10 and $1.50 per connection for the landscape area analysis. His email is below that has a link to the company and a few slides are attached. I have not worked with this company yet and am forwarding the information only to point out that the costs might not be as high as thought. Landscape area measurement per connection would allow the city to better define who is using water efficiently and who is using too much. The city's water conservation programs can be targeted at the inefficient users which will increase water savings.	Response from Jim Peifer I recommend that more consideration be given to Peter Brostrom's idea. It sounds like his idea may have been rejected, particularly by Terrance, but we never had data to reject it, and he has submitted data that suggest it's not too terribly expensive. I understand Peter's comment to be that the City of Sacramento should consider (or perhaps implement) water budgets for properties when billing them. The way to do this is to make the recommendation that water budgets be considered in the development of conservation rates, and make it explicit in the conservation plan that it will be considered. After all, it is really the City Council that should make this determination – based on input from staff and from a public process. At 137,000 services, the cost would be $150,000 to $206,000 to develop the landscape analysis. There may be other cost including modifications to the billing system, and perhaps additional staff cost, but this would be explored in the development of a conservation billing rate. In the end, water budgets may or may not be adopted, but it should be considered objectively, rather than being screened out prematurely through City staff

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			biases or prejudices.
9-21-12	Phil Smith	I finally found my magnifying glass and was able to look at the charts on pages 108-120. I think they should be landscape and enlarged. They also need an explanation of symbols at the bottom of each chart. If I can be of any help with these changes give me a call. I'm only tied up on Thursdays and then only in the morning. Cheer up. You are nearly at the point where the City has the ball. Foundational BMPs Spell it out. There's space. I may not have the time to look it up. Pages 78-97. These pages are the most important to decision makers. Many executives read this first. After all, if they don't like the recommended plan, why waste time reading all those charts and explanations? Therefore, this part needs to be easy to read and simple to understand. I would go through this section and spell out all acronyms. I promise, I will stop reading the report looking for things I would do Besides, my garden needs attention for fall cleanup and the planting of winter crops.	Edited tables.
	Phil Smith (continued)	I've read every word and scanned the charts more than once trying to look at it from the point of view of busy politicians unfamiliar with all the jargon. Of course, if they are already up to speed on all the acronyms then maybe I'm wrong. I have written many plans for companies and have been astounded how many executives do not have the big picture. They spend their time concentrating on their own priorities and ignore other areas. When you give them an overall business plan, each one has to feel comfortable or they will find fault with it and vote no or for further study. I hope that I have been helpful in my critique. With all the energy spent by so many people, I want to see the Mayor and Council enthusiastic about this plan. Yes, I work weekends on things like this. I spent all day yesterday on the report. Wow!! Will that ever put you to sleep. I think that it would become readable to the average person (not in the water business) if you copied and pasted the acronyms from the bottom of the charts 6-1,8-3 and 8-4 to the bottom of the pages that contain segments of these charts. Yes, You probably will need to move some rows from the bottom of the pages to the top of the next pages. This will probably add 3 more pages to a mind numbing report, but hopefully, will keep the reader moving onward. Page 16 spell check says acronyms is spelt wrong. Is the last	

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		entry supposed to be year or just hurray I'm finished? There is an entry HOA in the list. I can't find it in the text of the report. Since it is a subject that interests, me can you give me a clue where I can find this item?	
	Wally Cole	To my knowledge, tiered pricing and water budget based pricing are not the only types of conservation rate designs. It would be better to not specify the rate design at this time since we won't decide on the structure until after the comprehensive study is done.	

Comments received after circulation of an earlier draft of the WCP to the Sacramento Water Conservation Advisory Group in July, 2012

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8/1/2012	Dave Todd	I concur with the recommendation that the Program C Program Scenario should be adopted. I strongly recommend that it should include tiered water rates. Please call me at (916) 651-7027 if you would like additional information.	Supports the Program C including tiered water rates.
8/2/2012	Tim Horner	First- I need to commend you and the rest of City Staff for pulling together a great team and making this a transparent process. Bill and Lisa Maddaus are skilled professionals, and I don't want my comments to be taken as criticism of them or their work. The model that they propose for achieving the City's Water Conservation goals will move us toward those goals, although I have a few comments. My comments are mostly based on the sixth slide of their presentation, a slide that shows a pie chart of water users in Sacramento. A quick look at this chart shows the major water users in Sacramento, and I think we can use this to guide our conservation efforts. Here is my thinking: - Single and multi-family dwellings account for about 70% of water use in Sacramento - 10% of this group is responsible for a large part of the water waste and excess water use (others at the meeting had numbers to back this up) - If we can change the behavior of homeowners, we will get the most effect from the conservation efforts. - The largest water use by homeowners is outdoors	Comment relates to how City DOU implements the programs and relays the need to conserve and where the potential is; DOU's recommended program C is in line with the comments.

Comment Received	Submitted By	Comment	DOU Comment
8/2/2012	Tim Horner (continued)	(landscaping). Leaks are another major problem, especially for the high use group. With this in mind, our conservation efforts should target private homeowners and their landscaping and irrigation practices. We also need to think about what motivates this group, and how to change their behavior. Here are my suggestions, in order of importance: 1) Adopt an aggressive, tiered rate structure. When high use customers feel the economic pinch, they will change their behavior. This will not prevent a citizen from watering the lawn more, so it is not a regulation. People who water more will simply pay more. In many cases the tiered structure will get the attention of homeowners who are wasting water, and will change their behavior. If the City wants to soften this blow, they could offer a one or two month grace period for the top 10% of water users before implementing the new rate structure. I know there is already a program in place where people see their bill ahead of time as the new water meters are installed. The City could couple an extra month of flat-rate structure with a required water-wise audit, and help these customers get back to normal water use rates before they pay that new bill. 2) Adopt stronger enforcement of existing water regulations. When you can stand in line at Starbucks and hear someone talking about the water ticket they got, the City will have won this war. If the public is not aware of enforcement efforts, there is no effective penalty for ignoring the regulations. I understand that City government is reluctant to irritate the voting public, but we have a serious problem here. It will be much more expensive to find new water sources than to change behaviors and conserve water. I would also remind the group that Sacramento uses more water per person per day than most other cities in the nation. Our goal is to change the behavior of the largest water users, and they are homeowners with leaks or landscaping problems. It is O.K. to irritate a few of them if we meet our conservation goals. I think several other approaches could continue, but they are not as effective for reasons I note below: 3) Continue to offer water-wise home audits. This will soften the blow to high rate users as they ease into the new tiered rate structure. This is a great program, but it does not produce much in the way of water conservation for the City. People who apply for a water audit tend to be water-savvy already, and a very low percentage of homeowners have asked for a water audit. I think this	

Comment Received	Submitted By	Comment	DOU Comment
8/2/2012	Tim Horner (continued)	program is important for outreach and communication, but I would rank it as less effective for achieving the goal of 223 GPCD by 2020. The communication and outreach value alone makes it worthwhile to continue this program, because it softens the blow of the tiered rate structure. 4) Continue to offer incentives and rebates for homeowners- low flow toilets, shower heads, or new outdoor sprinkler heads. Once again, these programs are expensive and under-utilized. It makes sense to continue them so that low-income homeowners are not burdened with the new higher water rates, but this approach will not get us to our 2020 conservation goals. My impression is that gains have been small in this category. Note- It will be important to do some simple modeling (predict demand) and make sure we can fund these programs when the new tiered rate structure kicks in. There may be increased demand for rebates and incentives when people start paying more with the tiered water bills. 5) Continue to encourage commercial and government conservation measures. This includes pre-rinse nozzles and clothes washer rebates. These programs are effective and necessary, but they affect a very small group of water users. Based on Wednesday's presentation, commercial use is 16% of total water use in Sacramento. An incremental gain here will help, but this won't be the mechanism to reach our goal of 223 GPCD by 2020. I hope my comments aren't too blunt- I enjoy working with this group, and recognize that there are other approaches and concerns at the table. My basic strategy for conservation would be to hit your largest water users the hardest, and change their behavior. Let me know if you have any questions, and please feel free to forward this to anyone that is interested.	
8/2/2012	Lysa Voight	Item 1 - Comments to the Water Conservation Model Results and proposed packages of measures: The model results and proposed measures look to be well thought out. It's obvious that the City has put a lot of effort into this model and development and prioritization of the recommended measures. I appreciate the opportunity to review and comment on the documents you provided and hope that the City shares the completed documents with others who might benefit from the results. Since landscape irrigation is such a large component of the urban water use in the City, I recommend that you evaluate environmental benefits in addition to the cost savings for the measures that encourage river friendly	Item 1 - Commenter would like to see a connection made to more landscape management to reduce (contaminated) excess irrigation runoff getting back into the river. City staff needs to connect with others working on this "issue" and what Best Management Practices (BMPs) they are considering and what the City may eventually need to do if significant excess irrigation runoff continues. If they have identified projects and costs, DOU will include in the Water Conservation Plan pertaining to avoided costs. Additional research is

Comment Received	Submitted By	Comment	DOU Comment
8/2/2012	Lysa Voight (continued)	landscape practices. These types of practices can reduce landscape irrigation flow and the application of products that might contribute to contaminant loads regulated by TMDLs or to chemicals / constituents that affect the area surface waters. The City is regulated for its urban runoff through an NPDES permit, and a portion of the City's storm water flows into a combined storm water/sewer system. River friendly landscape practices would benefit both of these systems and the environment in addition to conserving water. A reduction in landscape irrigation flows for recommendations (measures) such as 6a, 6b, 6e, 21, 29, 30a, 30b, 77 and 79 would likely also result in a cost savings to the City in other areas. For instance, if a significant amount of landscape in the City was converted to river friendly landscape, there could be a corresponding reduction in costs for BMPs and other operational costs associated with the storm water / urban runoff systems and permit compliance resulting in a cost savings in the City's Stormwater Management Program. Similar programs related to the City's NPDES permits should be examined and factored in as savings to offset the costs of the measures. I encourage the City to engage their storm water staff for input regarding potential savings and environmental benefits that would result from measures related to river friendly landscape practices. City staff participates in the ongoing Drinking Water Policy Work Group. Efforts of that workgroup resulted in development of a series of technical documents, one of which outlines costs associated with BMPs that might help with this assessment (attached for your use and reference). Sherrill Huun is one contact from the City for additional information on this issue. Item 2 – Follow up meeting and additional information request related to SRCSD sewer rates: There were several questions from the SWCAG meeting held on August 1 during SRCSD's presentation of sewer rates and the Rate and Fee Study. It was suggested that we have a follow-up meeting with a sub-group of SWCAG members. We would be happy to set up this meeting. For this effort, could the City please provide: A time frame for the meeting, a list of attendees, and questions in advance.	needed. Additionally, the City adopted an Outdoor Landscape Ordinance and the State Model Water Efficient Landscape Ordinance in 2009 that encourage river friendly landscape practices; with City Council's direction City staff will review the ordinances to ensure that they do not need further code update. Item 2 – Commenter would like to respond to Sacramento Water Conservation Advisory Group (SWCAG) meeting for additional sub-group of SWCAG to follow-up on discussions on SRCSD's presentation of sewer rates and the Rate and Fee Study. City DOU is working with SRCSD to coordinate a meeting of sub-group of SWCAG members to follow-up.
8/3/2012	Peter Brostrom	As Tim Horner pointed out the SF Res is the city's largest water use and outdoor irrigation accounts for roughly 60 to 75% of that use. The California Single Family End use study after looking at water use at 700 homes in 9 water utilities across the	Commenter is advocating developing water budgets for each property. It is very time consuming to do this and can't simply be done using aerial photos in Sacramento due to the many trees. The DOU will be looking into this and include

Comment Received	Submitted By	Comment	DOU Comment
		state showed that 18% of the homes accounted for 62% of the excess irrigation (pg. 161) Residential leaks showed a similar trend with 7% leaking more than 100 gpd and accounting for more than 44% of the leaked volume (pg. 147). As I commented on at the meeting, my suggestion is that city invests the money to calculate the irrigated landscape area for every connection and develop water budgets for each connection based on the irrigated area and assumptions of indoor use. A tiered rates system should be established that penalizes customers that are significantly over budget. Customers who are at budget should pay a similar amount as the flat rate payers to avoid too much discrepancy between the flat rate bill and a metered bill. I'd don't think anyone but the customer being charged will object to penalizing customers who are significantly over their water budget.	as part of the comprehensive water conservation pricing study to be completed by 2014.
8/7/2012 8/7/2012	Mark Roberson Mark Roberson (continued)	1. Without the following information (per measure); unit cost, unit savings, life and decay, and the total potential to implement in the City, it is not possible to give an adequate review of the 36 conservation measures that were modeled to prepare the Program scenarios. The recommendation is to augment the list of 36 measures with the above information. 2. Provide the definition, amount ($/AF), schedule, and rationale for each of the avoided cost components used in the analysis. 3. For Program A, provide a list of the inputs (conservation measures being implemented) along with the level of participation, the unit cost and unit savings, and life and decay of each measure. 4. The 2020 savings goal of 33 GPCD is based on the UWMP's 2010 starting GPCD of 259 and a 2020 GPCD of 223. The City's actual 2010 GPCD was 208. Provide a discussion that supports the use of the UWMP GPCD as the starting point. 5. Prepare a Program scenario (E) that meets the 33 GPCD target using the existing program costs ($1.9M, excluding meters and water loss control BMPs) by increasing the participation level of low cost - high savings measures and decreasing the participation level of high cost – low savings measures. 6. The CUWCC MOU requires that if either the GPCD or flex-track option is chosen that the water savings achieved under these tracks must be equal to or greater than the savings achieved under the BMP approach.	Commenter's first four bullet points ask for information that will be in the report and can be referenced. In his fifth bullet point he wants a new program E that consists of a new rendition of the existing measures. This would require a lot of time for City staff to debate what could be done to each measure to ramp up or ramp down savings. City staff and technical consultant did that to a certain extent with the suite of "Intensive" measures. But the rest of the advisory group pressed staff in a different direction moving to Program B, then to Program C by adding mostly new measures and ramping up a few of the existing measures. City DOU might need to add half dozen new measures to ramp down existing measures, while keeping the old ones so the other programs remain intact. Once again this is the type of optimization that could be done in coming years, with a goal of achieving the targets with minimum cost. To do it now would take much more time and money than is planned for this project. His sixth bullet raises another point about MOU compliance. This is a detail DOU staff will need to take care of if and when the Plan is adopted. It's part of the implementation phase. City DOU is planning for GPCD approach reporting.

Comment Received	Submitted By	Comment	DOU Comment
		Because the City has stated that it will switch to the GPCD track it is recommended that an analysis be prepared that compares the savings achieved through the recommended Program with the full implementation of the BMPs.	

APPENDIX D – Sacramento Water Ad HOC Committee Comments on Draft Analysis Results

Water Ad Hoc Committee Comments on Water Conservation Plan Results, August 28, 2012

Comment Received	Submitted By	Comment	DOU Comment
8/28/2012	John Shirey, City Manager	The piechart on page three of the presentation is misleading. Should specify that "Landscape Irrigation" is commercial/city parks. Should look into having "single-family and multi-family" use show indoor and outdoor use. This could possibly be done with a small pie chart within that section or to the side showing the difference between indoor and outdoor use.	The input is helpful and DOU can provide these changes.
8/28/2012	General (Council members, City Manager and City DOU Managers)	Referring to slide four – and review of the analysis of four programs of measures; we may want to look into adding Recycling to our analyses; the graph with the Estimated Per Capita Average Daily Water Use could include an additional program that includes Recycling. *Note, the Water Ad Hoc meeting today had a presentation on Recycling from SRCSD, and comments from the Committee and John Shirey are that we will want to address recycling in the long-term.*	The DOU recommends following the process for this ongoing/living Plan, and adding this to the next round of measures that will be evaluated in the future.
8/28/2012	General	Referring to slide eight. The question was asked why the cities on the slide were chosen for comparison with the City of Sacramento; they are coastal communities and have significantly different (hydrogeologic) and climate/landscape conditions so their water use is not similar to ours.	The reason that the Cities were chosen is that Maddaus Water Management has information on those utilities, and not others and provided similar work so that we could compare. Other Cities information may not be available. It would be preferable, however, for the next presentation to show how we relate to cities in similar climates. We have started review of other Cities and will look into the feasibility of providing that information.
8/28/2012	John Shirey, City Manager	Slide five is too busy. It would be better to include more details on each measure and their inclusion or absence from plans A, B, C, or D.	Input is very helpful and DOU will provide more details on each measure.
8/28/2012	Councilmember Ashby	It is important to build in a plan to really sell this to each individual. Each community is different and every individual within those communities is different. We need to find a way to reach out to the "average Joe" and tell him why this conservation plan matters to him; what should s/he care about? Many of the details will go over	The message of the plan is that the City needs to reach a 20% per capita reduction goal by 2020 and that these programs can help get us there in a cost effective manner. It is suggested that the presentation to the Council and any presentations to the community be tailored

Comment Received	Submitted By	Comment	DOU Comment
		people's heads, the message needs to tell them what they really need to know.	to reflect the actions needed by various customer bases to achieve their targeted savings (i.e. using a hose nozzle will save 1 gallon of water per minute. So it isn't that they can't wash their cars, just that they use a hose nozzle to achieve their 30 gallon per day saving target).

APPENDIX E – Sacramento Water Conservation Advisory Group, Water Ad HOC and Department of Utilities Meeting Summaries

SWCAG Meeting Summaries

Meeting Time, Date, and Location	Agenda Items	Meeting Attendees
November 15th, 2010 – 9:00am to 11:00 am 1931 35th Avenue	**Introductions** - Laura Kaplan, Facilitator **Welcome** - Marty Hanneman, Director of Utilities **Member Expectations** - SWCAG Members **SWCAG Charge and Scope** - Laura Kaplan Review DRAFT to finalize purpose, ground rules, participation expectations, and meeting frequency. **Water Conservation Strategic Plan Summary** - City staff Review executive summary of Interim Plan to gain familiarity with existing conservation priorities and objectives. **Wrap Up and Next Steps** - Laura Kaplan	(SWCAG Members) Janet Baker, David Campbell, Erik DeKok, Jeff Goldman, Brian Holloway, Tim Horner, Cory Koehler, Clyde McDonald, Dave Roberts, Dennis Rodgers, JP Tindell, Phil Smith, Dave Todd, Rick Soehren (City Staff) Terrance Davis, Julie Friedman, Jim Peifer (Facilitator) Laura Kaplan
February 16th, 2011 – 9:00am to 11:30am 2260 Glen Ellen Circle	**Introductions and Agenda Review** - Laura Kaplan, Facilitator **Welcome New SWCAG Members and Review of Ground Rules** - SWCAG Members **Staff Responses to Member Input from Last SWCAG Meeting** - City staff **Water Conservation Strategic Plan Presentation** - City staff Staff overview of key water conservation programs and objectives, discussion of priorities for subsequent in-depth review **15 minute Networking Break** **Water Conservation Strategic Plan Presentation (CONTD)** - City Staff Staff presentation and discussion of demand estimation and targets **Open Announcements and Updates on Relevant Current Events** - SWCAG Members and City Staff **Wrap Up and Next Steps** - Laura Kaplan	(SWCAG Members) Steve Archibald, Janet Baker, Shannon Brown, David Campbell, Erik DeKok, Joe Devlin, Sarah Foley, Tom Gohring, Jeff Goldman, Jim Hicks, Brian Holloway, Tim Horner, Cory Koehler, Clyde McDonald, Mark Roberson, Dave Roberts, Dennis Rodgers, Phil Smith, Rick Soehren, JP Tindell, Dave Todd (City Staff) Terrance Davis, Julie Friedman, Jim Peifer (Facilitator) Laura Kaplan.
April 20th, 2011 – 9:00am to 11:30am 2812 Meadowview Road	**Introductions and Agenda Review** - Laura Kaplan, Facilitator **Welcome New SWCAG Members and Review of Ground Rules** - SWCAG Members **Staff Responses to Member Input from Last SWCAG Meeting** - City staff **City BMP Presentation** - City staff Staff overview of existing CUWCC BMP implementation status,	(SWCAG Members) Steve Archibald, Janet Baker, Shannon Brown, David Campbell, Erik DeKok, Joe Devlin, Sarah Foley, Tom Gohring, Jeff Goldman, Jim Hicks, Brian Holloway, Tim Horner, Cory Koehler, Clyde McDonald, Terrie Mitchell, Mark Roberson, Dave Roberts, Dennis Rodgers, Phil Smith, Rick Soehren, JP Tindell, Dave Todd, Lysa Voight

Meeting Time, Date, and Location	Agenda Items	Meeting Attendees
	including staffing and funding levels **15 minute Networking Break** **Work Plan Responses and Prioritization Results** - SWCAG Members Review results of member input and discuss components of a Draft Work Plan **Open Announcements and Updates on Relevant Current Events** - SWCAG Members and City Staff **Wrap Up and Next Steps** - Laura Kaplan	(City Staff) Dave Brent, Terrance Davis, Julie Friedman, Hervey Lee, Mike Malone, Jim Peifer, Carol Tao (Facilitator) Laura Kaplan
May 18th, 2011 – 9:00am to 11:30am 2812 Meadowview Road May 18th, 2011 – 9:00am to 11:30am 2812 Meadowview Road (continued)	**Introductions and Agenda Review** - Laura Kaplan, Facilitator **Staff Responses to Member Input from Last SWCAG** Meeting - City staff **Online Collaboration Site** - City staff **SWCAG DRAFT Work Plan** - SWCAG Members Review DRAFT Work Plan, inclusive of the member prioritization results from previous meetings. **15 Minute Networking Break** **Water Shortage Contingency Plan** - SWCAG Members and City Staff Presentation and discussion of a planned section of the Urban Water Management Plan. **Conservation Mission, Purpose and Outreach** - SWCAG Members and City Staff Discussion of the rationale and motivations driving City conservation efforts. **Wrap Up and Next Steps** - Laura Kaplan	(SWCAG Members) Steve Archibald, Janet Baker, Shannon Brown, David Campbell, Erik DeKok, Joe Devlin, Sarah Foley, Tom Gohring, Jeff Goldman, Jim Hicks, Brian Holloway, Tim Horner, Cory Koehler, Clyde McDonald, Terrie Mitchell, Mark Roberson, Dave Roberts, Dennis Rodgers, Phil Smith, Rick Soehren, JP Tindell, Dave Todd, Lysa Voight (City Staff) Dave Brent, Terrance Davis, Julie Friedman, Hervey Lee, Mike Malone, Jim Peifer, Carol Tao (Facilitator) Laura Kaplan
July 20th, 2011 – 9:00am to 11:30am 2812 Meadowview Road	**Introductions and Agenda Review** - Laura Kaplan, Facilitator **Staff Responses to Member Input from Last SWCAG Meeting** - City staff **Automated Meter Infrastructure Timeline** - City staff **Urban Water Management Plan Update** - City Staff Review DRAFT Plan, inclusive of the member feedback to date. **15 Minute Networking Break** **Outdoor Landscape** - SWCAG Members and City Staff Discussion of current performance, recommended focus areas, and future policy and program strategies (as prioritized by SWCAG members). **Announcements, Wrap Up and Next Steps** - Laura Kaplan	(SWCAG Members) Steve Archibald, Janet Baker, Shannon Brown, David Campbell, Erik DeKok, Joe Devlin, Sarah Foley, Tom Gohring, Jeff Goldman, Jim Hicks, Brian Holloway, Tim Horner, Cory Koehler, Clyde MacDonald, Terrie Mitchell, Mark Roberson, Dave Roberts, Dennis Rodgers, Phil Smith, Rick Soehren, JP Tindell, Dave Todd, Lysa Voight (City Staff) Dave Brent, Terrance Davis, Julie Friedman, Hervey Lee, Mike Malone, Elizabeth McAllister, Jim Peifer, Carol Tao (Facilitator) Laura Kaplan

Meeting Time, Date, and Location	Agenda Items	Meeting Attendees
September 21st, 2011 – 9:00am to 11:30am 1395 35th Avenue September 21st, 2011 – 9:00am to 11:30am 1395 35th Avenue (continued)	**Introductions and Agenda Review** - Laura Kaplan, Facilitator **Staff Responses to Member Input from Prior SWCAG Meeting** - City staff **Outreach and Education: Overview of Current Strategies and Challenges** - Jessica Hess **15 Minute Networking Break** **Outreach and Education (Continued): Focus on Residential Landscaping Messaging** - Jessica Hess and SWCAG members **Announcement, Wrap Up and Next Steps** - Laura Kaplan	(SWCAG Members) Steve Archibald, Shannon Brown, David Campbell, Erik DeKok, Joe Devlin, Sarah Foley, Tom Gohring, Jeff Goldman, Jim Hicks, Brian Holloway, Tim Horner, Cory Koehler, Clyde McDonald, Terrie Mitchell, Mark Roberson, Dave Roberts, Dennis Rodgers, Phil Smith, Rick Soehren, JP Tindell, Dave Todd, Lysa Voight (City Staff) Terrance Davis, Julie Friedman, Jessica Hess, Hervey Lee, Mike Malone, Jim Peifer, Carol Tao. (Facilitators) Laura Kaplan, Jody Monaghan Additional Attendees: Councilmember Darrell Fong, District 7; Department of Utilities Interim Director, Dave Brent
March 21st, 2012 – 9:00am to 11:30am 1395 35th Avenue	**Welcome** - Jodie Monaghan, Center for Collaborative Policy (CCP) **Opening Remarks** - Terrance Davis, Field Services Program Manager, Department of Utilities (DOU), Dave Brent, Interim Director, DOU, Councilmember Darrel Fong. **Water Conservation Plan** – Terrance Davis, Julie Friedman, Environmental Services Manager, DOU Introduction to the Decision Support System (DSS) model. Discussion of Plan schedule **Water Conservation Measures** – Julie Friedman Discussion of potential measures, a look at initial list **Next Steps** – Jodie Monaghan	(SWCAG) Shannon Brown, City of Sacramento Parks & Recreation Erik deKok, City of Sacramento Long Range Planning Sarah Foley, Water Form Brian Holloway, Sacramento Association of Realtors Clyde MacDonald, Save the American River Association Phil Smith, Council District 4 Mark Roberson, Water Forum Rick Soehren, CA State Department of Water Resources, Retired Dave Todd, CA State, Department of Water Resources Lysa Voight, Sacramento Regional County Sanitation District (City Staff) Dave Brent, Interim Director, Department of Utilities Terrance Davis, Program Manager Brett Ewart, Associate Civil Engineer Julie Friedman, Program Specialist – Environmental Services Manager Jessica Hess, Media and Communications Specialist

Meeting Time, Date, and Location	Agenda Items	Meeting Attendees
March 21st, 2012 – 9:00am to 11:30am 1395 35th Avenue (continued)		Hervey Lee, Water Conservation Intern Jim Peifer, Senior Engineer Tyler Stratton, Program Specialists – Water Conservation Administrator (Facilitator) Jodie Monaghan, Center for Collaborative Policy Additional Attendees: Councilmember Darrell Fong, District 7
April 24th, 2012	**SWCAG Economic Incentives Workgroup Meeting** **Discussion, rating, and ranking of 80 Water Conservation Measures -** All	Peter Brostrom, CA Department of Water Resources Brett Ewart, City of Sacramento Engineering Sarah Foley/Mark Roberson, Water Forum Brian Holloway, Sacramento Association of realtors Jim Lofgren, Rental Housing Association Jim Peifer, City of Sacramento Engineering Dave Todd, CA Department of Water Resources Tyler Stratton, City of Sacramento Water Conservation
April 27th, 2012	**SWCAG Outreach, Messaging and Partnering Workgroup Meeting** **Discussion, rating, and ranking of 80 Water Conservation Measures** – All	Sarah Foley/Mark Roberson, Water Forum Jessica Hess, City of Sacramento Media and Communications Tim Horner, California State University Sacramento Clyde MacDonald, Save the American River Association Jim Peifer, City of Sacramento Engineering Phil Smith, Citizen Advisory, Council District 4
May 2nd, 2012	**SWCAG Outdoor Landscape Workgroup Meeting** **Discussion, rating, and ranking of 80 Water Conservation Measures** - All	Shannon Brown, City of Sacramento Parks and Recreation David Campbell, Siegfried Engineering, Inc. Brett Ewart, City of Sacramento Engineering Sarah Foley/Mark Roberson, Water Forum Tim Horner, California State University of Sacramento Tyler Stratton, City of Sacramento Water Conservation
May 21st, 2012	**SWCAG Technical Advisory Workgroup Meeting** Met and answered questions that some had on costs and water savings. Following review and recommendations from all of the workgroups, a list of 30 measures were recommended to be	Terrance Davis, Field Services, DOU Julie Friedman, Field Services, DOU Jim Piefer, Engineering, DOU Mark Roberson, Water Forum Lisa Maddaus, Consultant, Maddaus Water management Bill Maddaus, Consultant, Maddaus Water

Meeting Time, Date, and Location	Agenda Items	Meeting Attendees
	reviewed and discussed with SWCAG at the June 6th meeting.	Management
June 6th, 2012 – 9:00am to 11:00am 1395 35th Avenue	**Welcome, Introductions, Agenda Review** - Jodie Monaghan, Center for Collaborative Policy, Facilitator **Opening Remarks** - Terrance Davis, Field Services Program Manager, Department of Utilities, Julie Friedman, Environmental Services Manager, Department of Utilities **Update on Water Conservation Plan Activity** – Terrance Davis, Julie Friedman **Discussion of Accelerated Schedule** - Terrance Davis, Julie Friedman **Overview of Analysis Process and DSS Model** - Bill and Lisa Maddaus, Maddaus Water Management **Review Recommended Water Conservation Measures** - All **Next Steps** – Julie Friedman Schedule, Future Meetings	(SWCAG) Brian Holloway, Sacramento Association of Realtors Clyde MacDonald, Save the American River Association Dave Todd, CA Department of Water Resources Peter Brostrom, CA, Department of Water Resources Nanette Bailey, Sacramento Regional County Sanitation District (City Staff) Terrance Davis, Program Manager Julie Friedman, Program Specialist – Environmental Services Manager Jessica Hess, Media and Communications Specialist Hervey Lee, Water Conservation Intern Tyler Stratton, Program Specialist – Water Conservation Administrator (Consultants) Bill Maddaus, Maddaus Water Management Lisa Maddaus, Maddaus Water Management Jodie Monaghan, Center for Collaborative Policy

Meetings in June, 2012 and also on July 16th, 2012	**DOU Management Team** **Discussion, rating, and ranking of 80 Water Conservation Measures** - All	Dave Brent, Director of Utilities Michael Malone, Field Services Jamille Moens, Business Services Bill Busath, Engineering Mark Lorenzi, Plant Services Jim Peifer, Engineering Terrance Davis, Field Services Julie Friedman, Field Services
August 1st, 2012 – 9:00am to 11:30am 1395 35th Avenue	**Welcome, Introductions, Agenda Review** – Jodie Monaghan, Center for Collaborative Policy, Facilitator **Opening Remarks** – Terrance Davis, Field Services Program Manager, DOU; Julie Friedman, Environmental Services manager, DOU **SRCSD Presentation** – Mike Huot, Senior Engineer, SRCSD Rates, Green incentive efforts, rate and fee study **Overview of Water Conservation Model Results** – Bill and Lisa Maddaus, Maddaus Water Management Inputs and key assumption, proposed packages **Discussion of Programs** – All Strengths of each group, possible improvements **Next Steps** – Julie Friedman Comments due date, project schedule, future meetings	(SWCAG) Mike Huot, Bill Maddaus, Lisa Maddaus, Dave Todd, Jodie Mongahan, Tim Horner, Phil Smith, Lysa Voight, Peter Brostrom, Brett Ewert, Mark Roberson (City Staff) Dave Brent, Mike Malone, Julie Friedman, Tyler Stratton, Jim Peifer, Terrance Davis, Darrell Fong, Taylor Chang, Jamille Moens, Jessica Hess, Rémy Moens, Hervey Lee

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