



Cambria Community Services District



DRAFT FINAL Water Use Efficiency Plan

February 21, 2013





MADDAUS WATER MANAGEMENT INC.

February 21, 2013

Mr. Robert C. Gresens, P.E.
District Engineer
Cambria Community Services District
300 N. Coast Highway
Cambria CSD, CA 92054

Subject: DRAFT FINAL WATER USE EFFICIENCY PLAN

Dear Mr. Gresens,

Enclosed for Board adoption is the Draft Final Water Use Efficiency Plan for the Cambria Community Services District. We have incorporated all your requested conservation measures and evaluated packages of measures. The plan includes recommended Program B for implementation as directed by the CCSD Board on January 17, 2013.

Thank you for your time and dedication to this project. We have enjoyed working with you.

Sincerely,

Lisa Maddaus, Project Manager

Bill Maddaus, Principal

Maddaus Water Management

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY.....	5
2. INTRODUCTION	8
2.1 Overview of Cambria CSD Water System	8
2.2 Purpose and Scope of Plan	8
2.3 Plan Development.....	9
3. ANALYSIS OF HISTORICAL WATER DEMAND	11
3.1 Production versus Consumption.....	11
3.2 Consumption by User Category	11
3.3 Analysis of Single Family Home Users	17
3.4 Analysis of Commercial Users.....	18
4. WATER DEMANDS WITH AND WITHOUT PLUMBING CODE	19
4.1 Future Population Projections	19
4.2 Key Assumptions for the DSS Model	21
4.3 Water Demand Projections With and Without the Plumbing Code.....	22
5. CURRENT WATER CONSERVATION PROGRAM.....	26
5.1 Description of Current Programs.....	26
5.2 Cambria Community Services District Water Billing Structure.....	29
6. ALTERNATIVE WATER CONSERVATION MEASURES	31
6.1 Water Use Efficiency Planning Goals and Approach.....	31
6.2 Potential New Conservation Measures	31
6.3 Screening of Conservation Measures	32
7. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES.....	34
7.1 Conservation Measures Evaluated	34
7.2 Perspectives on Benefits and Costs	38
7.3 Present Value Parameters	38
7.4 Assumptions about Measure Costs	39
7.5 Assumptions about Measure Savings	39
7.6 Assumptions about Avoided Costs	39
7.7 Measure Assumptions including Unit Costs, Water Savings, and Market Penetrations	39
7.8 Comparison of Individual Measures	40
8. RESULTS OF CONSERVATION PROGRAM EVALUATION	43
8.1 Selection of Measures for Programs.....	43
8.2 Menu of Water Use Efficiency Alternative Programs (Programs A to C).....	43
9. RECOMMENDED PLAN	49
9.1 Selection Criteria and Process	49
9.2 Description of Recommended Plan	49
9.3 Projected Water Savings of Plan.....	50

9.6 Estimated Implementation Budget.....	50
9.7 Monitoring Progress	50
9.8 Challenges Ahead and Recommended Next Steps.....	50
10. REFERENCES	52

FIGURES:

<i>Figure 3-1: Water Production and Consumption</i>	<i>12</i>
<i>Figure 3-2: Annual Consumption by User Category</i>	<i>12</i>
<i>Figure 3-3: Single Family Residential Water Use: Indoor vs. Outdoor</i>	<i>13</i>
<i>Figure 3-4: Single Family Consumption per Account per Day</i>	<i>14</i>
<i>Figure 3-5: Multifamily (2 or more units) Consumption per Account per Day.....</i>	<i>15</i>
<i>Figure 3-6: Commercial Consumption per Account per Day</i>	<i>15</i>
<i>Figure 3-7: Other Consumption per Account per Day</i>	<i>16</i>
<i>Figure 4-1: Assumed Population Projections</i>	<i>20</i>
<i>Figure 4-2: DSS Model Overview Used to make Potable Water Demand Projections</i>	<i>24</i>
<i>Figure 4-3: Water Demand Projections.....</i>	<i>25</i>
<i>Figure 8-1: Water Demand Projections with Water Use Efficiency Program Savings</i>	<i>45</i>
<i>Figure 8-2: Projected Per Capita Residential Indoor Use Reduction with Estimated Conservation Savings46</i>	
<i>Figure 8-3: Present Value of Utility Costs vs. Water Saved in 2020</i>	<i>47</i>

TABLES:

<i>Table 1-1: Elements of Selected Water Use Efficiency Program</i>	<i>5</i>
<i>Table 3-1: Age of Housing from Census for the Cambria Region.....</i>	<i>17</i>
<i>Table 4-1: Planned Growth</i>	<i>20</i>
<i>Table 4-2: List of Key Assumptions.....</i>	<i>21</i>
<i>Table 4-3: Cal Green Plumbing Code Requirements</i>	<i>23</i>
<i>Table 4-4: Water Demand Projections.....</i>	<i>25</i>
<i>Table 7-1: Measure Descriptions</i>	<i>35</i>
<i>Table 7-2: Estimated Conservation Measure Costs and Savings</i>	<i>42</i>
<i>Table 8-1: Long Term Conservation Program Projected Water Savings.....</i>	<i>45</i>
<i>Table 8-2: Projected Per Capita Residential Indoor Use Reduction with Estimated Conservation Savings 46</i>	
<i>Table 8-3: Comparison of Program Estimated Costs and Water Savings in 2020</i>	<i>48</i>

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1. EXECUTIVE SUMMARY

The purpose of the Executive Summary is to briefly describe the Cambria Community Services District Water Use Efficiency Plan (Plan). The evaluation process and assumptions used to develop this Plan and recommendations for future implementation are included in the full report.

The Cambria Community Services District (Cambria CSD) has a current water conservation program. This report illustrates that expanding existing efforts in the most feasible and more cost-effective way will help meet future water needs and meet state mandated per capita reduction targets according to the 2009 Water Conservation Act (SBx7-7 law).

The process used to develop the plan included analyzing conservation measures and programs using the Least Cost Planning Water Demand Management Decision Support System Model (DSS Model). The evaluation includes measures directed at existing accounts as well as new development measures to help ensure new residential and business customers are more water efficient. Three programs were developed to evaluate the net effect of running multiple measures together over time. From this analysis, a recommended conservation program was selected by the Cambria CSD Board of Directors in January 2013 to be in concert with the Cambria CSD's goals.

The Cambria CSD selected a plan comprised of aggressive water conservation. The elements of the plan are highlighted in Table 1-1.

Table 1-1: Elements of Selected Water Use Efficiency Program

Elements of Conservation Program B (The Recommended Plan)		
Cambria CSD		
General Measures	Residential Measures	Commercial Measures
Public Information	High Efficiency Toilets Rebates*	Large Meter Replacement and Leak Monitoring*
Water Loss (NRW) Control Program	Clothes Washer Rebates	Clothes Washer Rebates
Automated Meter Reading Conservation Benefits (AMR)*	Water Use Efficiency Surveys	Water Use Efficiency Surveys
Conservation Pricing Update*	Showerhead Giveaway*	High Efficiency Urinal Rebates
Prohibit Water Waste and Practices (Ordinance)*	Require Fixture Replacement by a Deadline*	Require Fixture Replacement by a Deadline*
	Require Irrigation and Landscape Upgrades	Require Irrigation and Landscape Upgrades
	Distribute Hot Water Recirculation Pumps*	

* Denotes Continue and/or Expand Current Measure

The benefits of the Plan are as follows:

- Further the Cambria CSD UWMP-adopted 2020 goal of reducing per capita water use by 5 percent, which is also a State mandated requirement.
- Helps the Cambria CSD become more sustainable within its existing water supply.
- Is environmentally beneficial.

- Provides water to potentially serve a limited number of new connections while the Cambria CSD pursues a long-term supply project.
- Certain program costs could be offset by proposed development purchases of retrofit points, which would help fund demand offset measures without impacting existing rate payers.
- Based on the implementation of conservation Program B, approximately 70 acre-feet of water per year could be saved by 2020, surpassing the Cambria CSD's existing five-percent reduction goal by an additional five percent
- Meets the intent of the North Coast Area Plan, Cambria communitywide condition (4.B), which essentially requires the demand from all future water connections to be offset by conservation, absent of a new water supply project.
- May facilitate future discussions regarding Cambria's water supply Level of Severity ranking within the County's Biennial Resource Management System report, which is used to support the County's growth management decision making process.

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

- Budget \$300,000 per year to cover the cost of implementing this plan.
- Recover the costs by modifying the existing retrofit points-bank system as needed, or increasing connection fees for new water meters to pay for the plan.
- Prioritize measures for implementation with those that contribute the most to meeting water saving targets given highest priority for implementation.
- Consider working with the largest water using customers to try to reduce water use as described in Section 3.
- Develop an Implementation Plan that describes exactly how the plan measures will be implemented.
- Prepare an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process).
- Update codes and ordinances, as necessary.
- Form partnerships and apply for grants where appropriate.
- Contract services if needed to gain enough staff support to administer or accelerate implementation of the new program.
- Maintain the Cambria CSD Staff Conservation Working Group to guide the implementation.
- Review and use tools to track water use by customer class and overall water use reductions adjusted for the weather and external factors.
- Set up a database to store and manage measure participation, cost and other data to gauge successes and failures.

- Use the tools annually to help decide on priorities for the next plan year.
- Use the DSS Model to annually update the 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.
- Use the input from the Cambria CSD Staff Working Group and annual work planning process as the forum to amend the plan, budgets, staffing, contracting, schedule, etc. to stay on track.

2. INTRODUCTION

This section provides an overview of the issues facing the Cambria Community Services District water system, describes the purpose and scope of the Plan, and provides a project history of the steps used to complete the plan.

2.1 Overview of Cambria CSD Water System

The town of Cambria resides on the beautiful central coast region of California, north of Morro Bay and south of San Simeon and Big Sur. Like many coastal communities, Cambria has limited water supplies and relies on local groundwater aquifers of the San Simeon and Santa Rosa Creek basins. The Cambria Community Services District (Cambria CSD) serves an area of four square miles divided into eight pressure zones. Cambria CSD operates and maintains four groundwater production wells, three distribution system pumping stations and four water tanks that served 4,168 service connections in 2012.

2.2 Purpose and Scope of Plan

The purpose of this project is to evaluate water conservation demand management alternatives, general and type of customer (single family, multifamily, commercial, etc.) specific conservation programs, and other water efficiency measures suggested by the Cambria Community Services District, and Maddaus Water Management (MWM). These conservation measures were evaluated in terms of their potential water savings, estimated costs, and cost-effectiveness from various perspectives, their acceptability, and their feasibility to be implemented. Working with the Cambria CSD staff, the best measures have been incorporated into a Plan designed to cover the period through 2020.

Objective of Plan

Cambria CSD's stated objective is to develop a Water Use Efficiency Plan to attain the water efficiency goals in a cost-effective manner that is feasible to implement by Cambria CSD staff. Key components of the plan include:

- Reduce water production (or create new water supply) by 10 percent by 2020, (predicated on the adoption of conservation Program B, which is further described in Section 8).
- Identify the best method of achieving those savings and the timing of achieving those savings; and
- Further augment the Cambria CSD's adopted long-term conservation goal for complying with Water Conservation Act of 2009, Senate Bill (SB) X7-7 and meeting per capita use targets by 2020.

Conservation Savings Goals

The Cambria CSD is committed to expanding upon its water demand reduction program as feasible measures are identified and funded. . Based on the adoption of conservation Program B (see Section 8), the future goal would be to reduce water demand by 70 acre-feet per year by 2020.

Structure and Basis of Existing Cambria CSD Water Use Efficiency Program

The Cambria CSD has been a member of the California Urban Water Conservation Program (CUWCC) since 2005. Cambria CSD continues to offer conservation programs, such as rebates and plumbing retrofit kits. An emphasis on residential indoor water use is important given 77% percent of **residential** water demand goes to indoor uses. With the mild coastal climate, minimal water use goes to irrigating landscapes.

Over the past 20 years, a retrofit points-based rebate program has evolved, which has since been made part of the CCSO Municipal Code. This system essentially applies points to various rebates, which have been offered to the Cambria CSD's customers, including such measures as water efficient toilets, water efficient showerheads, high efficiency clothes washers, and hot water circulating pumps. Other related Cambria CSD Code sections include requiring the installation of water efficient fixtures upon resale, changes in use and during certain remodels. New connections are required to either pay for conservation retrofit points that offset new project demands, or conduct an equivalent level of conservation measures within the service area.

Besides the existing rebates, the Cambria CSD also replaced all of its residential meters during 2005-2006. The actual voluntary and required measures (e.g., resale) adopted by Cambria CSD customers determines how much water is being saved by the current program. Expanding the conservation efforts will require that the Cambria CSD be more proactive in marketing and educating customers as to the benefits of installing water efficient devices and changing water use habits. Given the current recommended Plan is more comprehensive and aggressive than the existing program, Cambria CSD will need to step up and provide additional funding and staffing support to administer and fund these programs.

2.3 Plan Development

The Cambria CSD Water Use Efficiency Plan Project was conducted over a 7 month period. Below is an outline of the Plan Development process used to arrive at the most appropriate plan for the Cambria CSD, as highlighted below in the following project timeline:

Project Timeline:

June 29, 2012

- Maddaus Water Management (MWM) selected to prepare Conservation Plan.

July-August 2012

- Data Collection and Analysis

October 9, 2012

- Held a public workshop for input into the planning effort including request input for additional ideas for new and innovative conservation measures.

October-December 2012

- Prepare Conservation Decision Support System Least Cost Planning Model (DSS Model) and Draft Plan

January 17, 2013

- Held a CSD Board Meeting to review modeling results and select recommended program.

February 12, 2013

- Held a Public Workshop on the Draft Plan

February 28, 2013

- Complete Draft Plan for Adoption by CSD Board

In summary, the Water Use Efficiency Plan has been a thorough process that adapted to the Cambria CSD's requests based on the direction of the Board's Water Conservation Ad-Hoc Committee, Cambria CSD General Manager and staff, state laws, rates, rebate funding available from Cambria CSD, and to allow the plan to be well coordinated with the San Luis Obispo County "Cambria and San Simeon Community Plans of the North Coast," 2006 (since incorporated into the San Luis Obispo County Local Coastal Program, also known as the North Coast Area Plan).

3. ANALYSIS OF HISTORICAL WATER DEMAND

The Cambria CSD's water use patterns were analyzed based on water production and consumption data provided by Cambria CSD staff. Total system water loss was examined. Twelve years of monthly water use data was analyzed (years 1999 to 2011) to derive average per account per day water use. Data from each customer category was analyzed separately. Based on the Cambria CSD's water billing system data, 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. These values were compared with other sources of municipal water use data applicable to the area. Other non-residential categories of use were analyzed separately, such as commercial lodging and more general commercial customer use. Average daily commercial/industrial and public water use was expressed on a gallons per account or gallons per employee basis.

3.1 Production versus Consumption

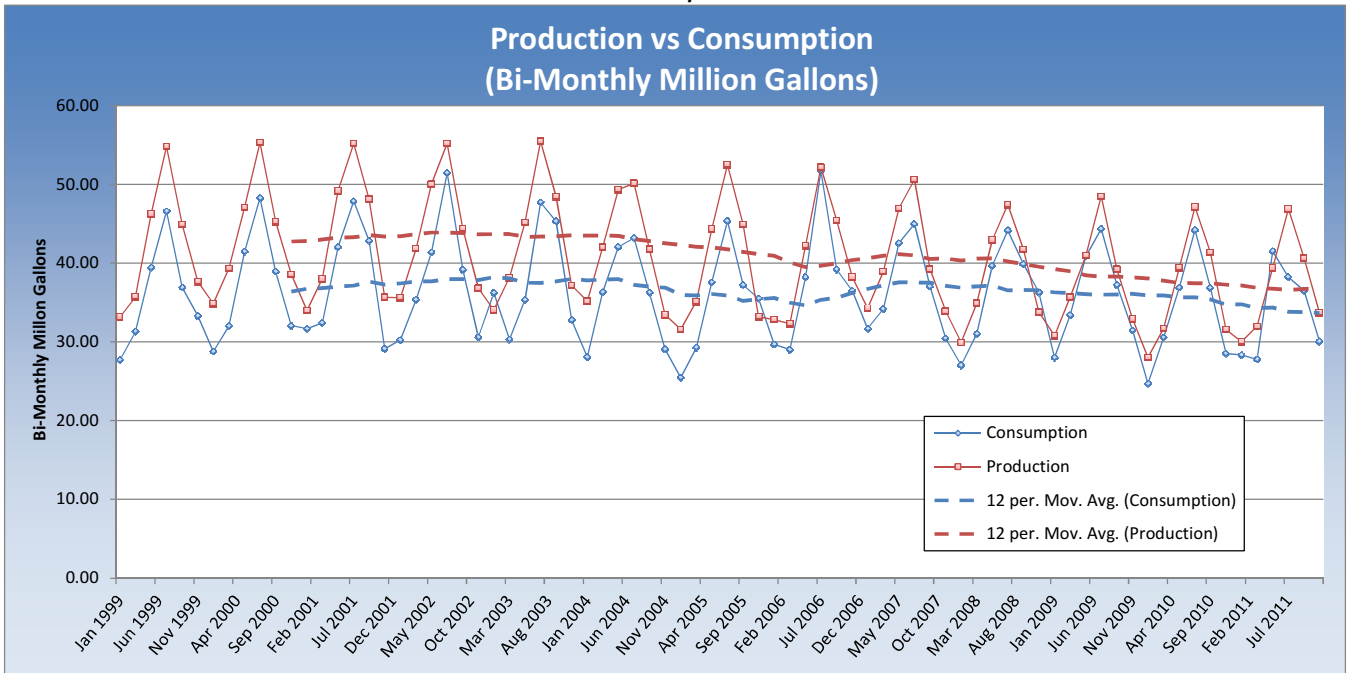
Water production data for the Cambria CSD was analyzed on a monthly basis for the period January 1999 to December 2011. Shown in Figure 3-1 is the total production versus total consumption for the Cambria CSD. Well production data was measured using wellhead meters. Water consumption data was measured at the customer meters. Both series display values for two months. Monthly values would be half those shown. As shown in the figure, the Cambria CSD does not experience significant losses of water in its system between the sources and the customer.

The difference between the amount of water produced and the amount of water billed is termed the non-revenue water. The Cambria CSD reports that the percentage of water losses of system input volume is currently less than 8 percent. This is lower than common goals for typical pressurized potable water systems to have total water losses less than 10 percent of system input volume.

3.2 Consumption by User Category

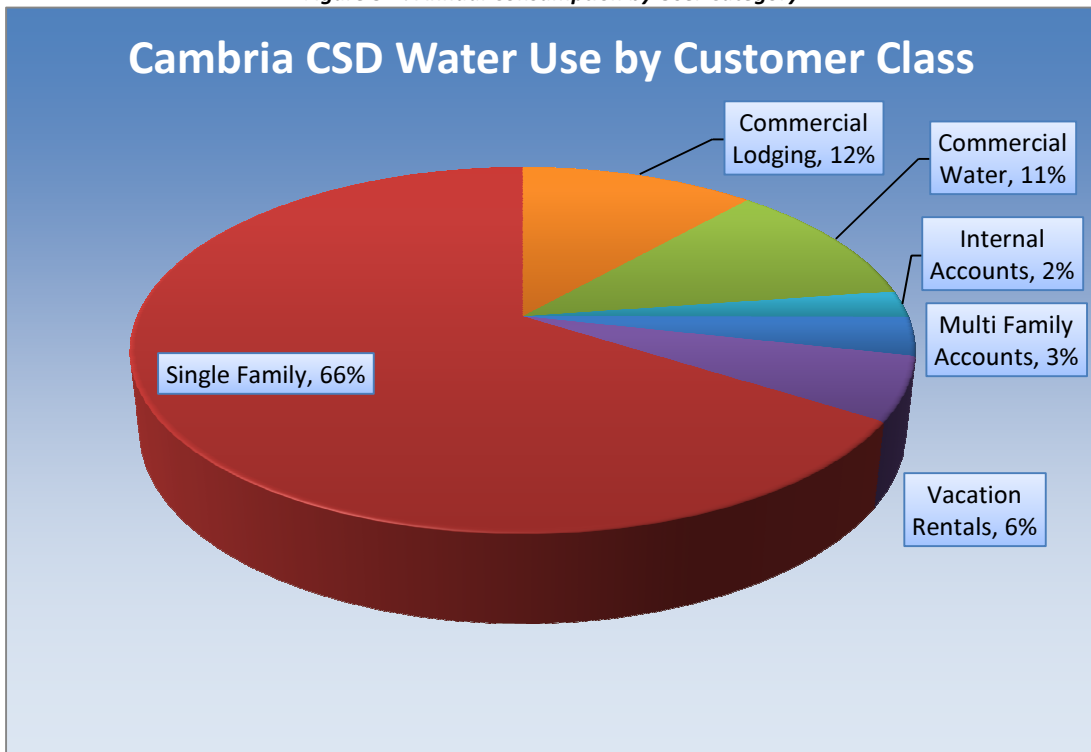
The Cambria CSD has several different types of water users identified within its billing system. The various user categories in the Cambria CSD may be generally classified as single family residential, vacation rentals, multifamily residential, commercial lodging, commercial (including schools and the State Parks campground), and other internal CSD accounts. The Cambria CSD is a mostly residential community, with some light commercial uses. Therefore, the largest category of users of water in the Cambria CSD is the single family residential users that consume more than 66% of the water sold. Shown in Figure 3-2 is the annual consumption of the various user categories, based on the calendar year the average of 2006-2008 water use data from the Cambria CSD. Total average consumption was approximately 0.61 Million Gallons per Day (MGD) over the period (pre-recession). The Coastal Commission has mandated that at least 20% of Cambria's water service has to go to visitor serving uses. From Figure 3-2 Commercial and Commercial Lodging comprise 23% of billed consumption, not including the 6% shown for registered vacation rental homes.

Figure 3-1: Water Production and Consumption



Note: Moving average shown in the above graph are from the proceeding 12 bi-monthly billing periods.

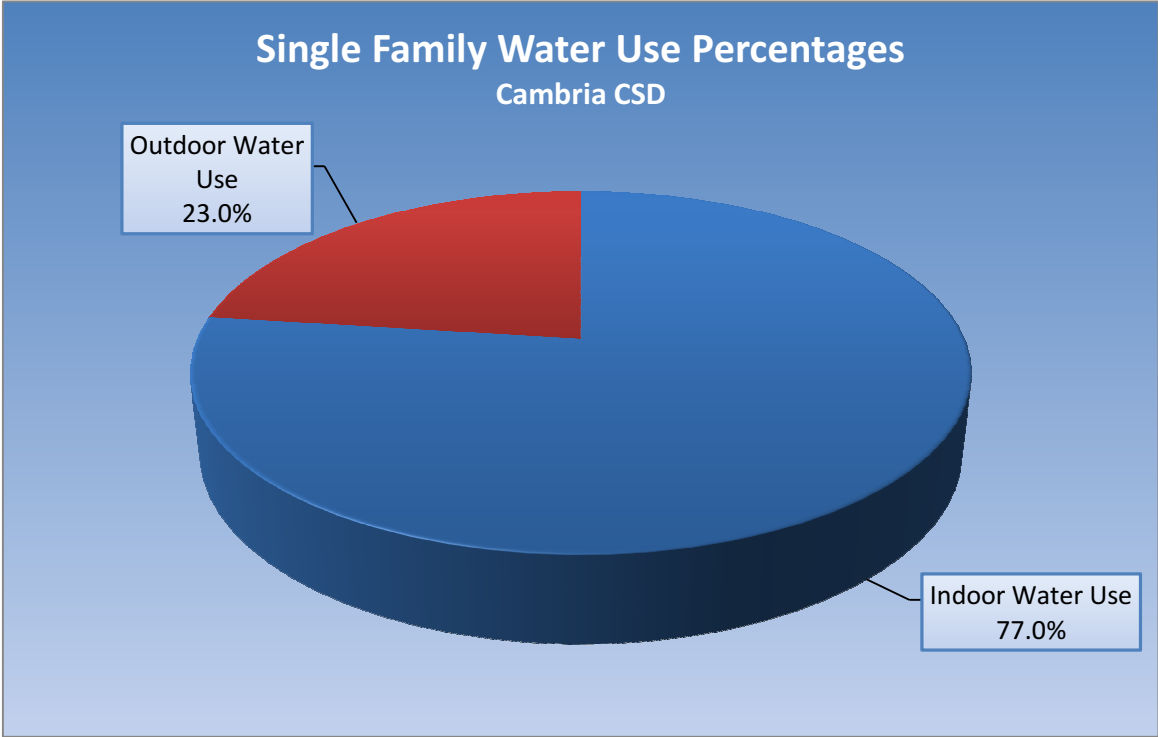
Figure 3-2: Annual Consumption by User Category



Residential use is 75 percent of the total (including vacation rentals), which is typical of a community without significant commercial, governmental or industrial uses. Since single family residential uses formed the major portion of the Cambria CSD's water use (66%), it was analyzed further. Shown in Figure 3-3 is 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 average of the years 1999-2008 was selected for this profile.

The goal of the analysis by customer sector, shown in Figures 3-2, and the breakdown of indoor and outdoor water use, shown in Figure 3-3, was provided to help the water conservation planning staff to design conservation programs and community outreach messages to obtain the highest water savings. As seen in Figure 3-3, 77 percent of the average single family water use is indoors.

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



The four charts that follow show the average monthly usage per account per day for the four primary types of customers. All categories exhibit a modest seasonal pattern where water use is higher in the summer.

Several observations can be made when looking at Figures 3-4 through 3-7 as follows:

- Drought restrictions were in effect in 2004. Therefore, some of the decrease in water use is not actually a true long term reduction in water use, but only a reflection of the drought restrictions.
- Residential growth has essentially stopped due to the moratorium. During the moratorium, single family per account water use had a slight decline in average daily water use per account. This indicates

that existing homes are upgrading their appliance and plumbing fixtures, the new meters installed in 2005-06 may be incentivizing faster change-outs and/or behavioral changes in usage patterns. The vacancy rate of homes has been relatively stable at approximately 25% for the several past decades based on past US Census data, except for a rise to approximately 32% during 2010, which may reflect impacts from the recession.

- Multi-family water uses has a slight downward trend that suggests that accounts have become more efficient over time and/or conservation programs are driving lower per account use. This assumes occupancy rates have been relatively stable.
- Commercial water use has a downward trend also suggesting improvements in efficiency and also recent effects of the economic recession (e.g., lower occupancy rates equate to lower commercial demand from restaurants, etc.)
- Demand reductions in the most recent years (2009-2011) are also due to the current economic conditions.

Figure 3-4: Single Family Consumption per Account per Day

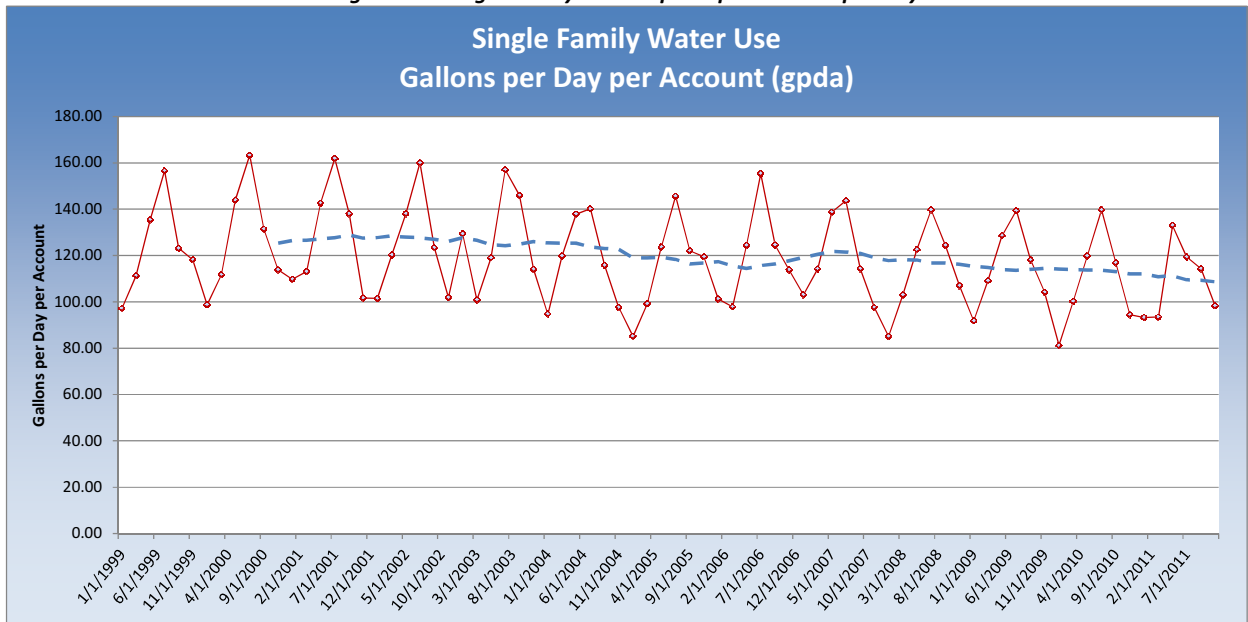
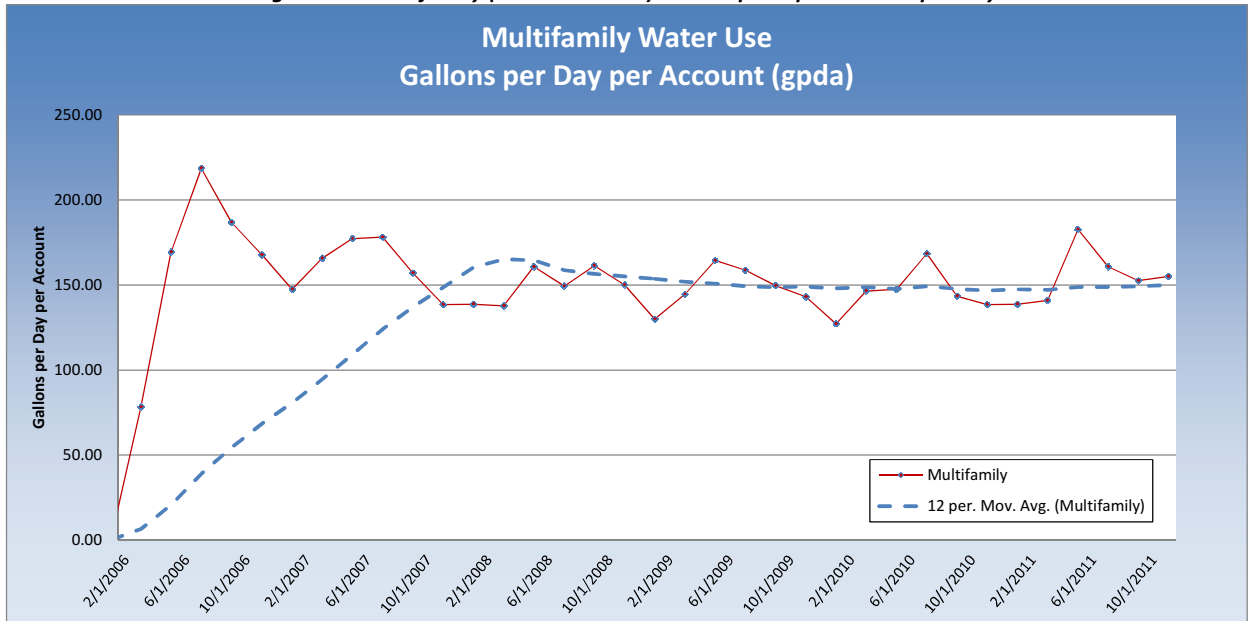


Figure 3-5: Multifamily (2 or more units) Consumption per Account per Day



Note: Multi-family was a new billing system category as of 2006.

Figure 3-6: Commercial Consumption per Account per Day

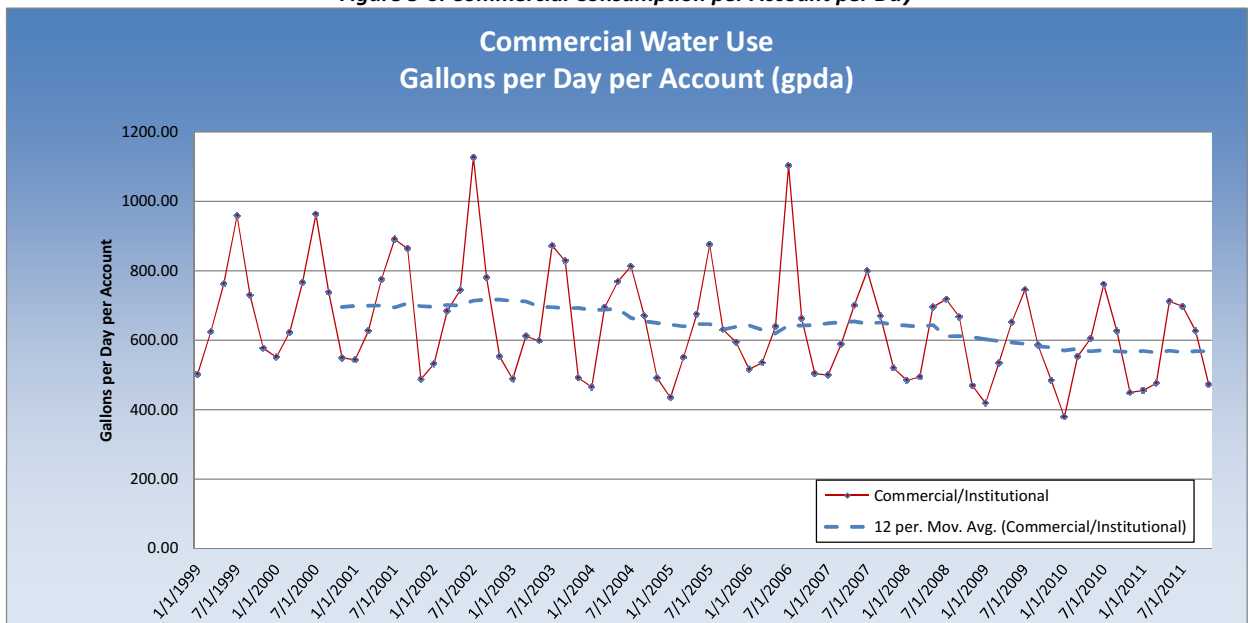
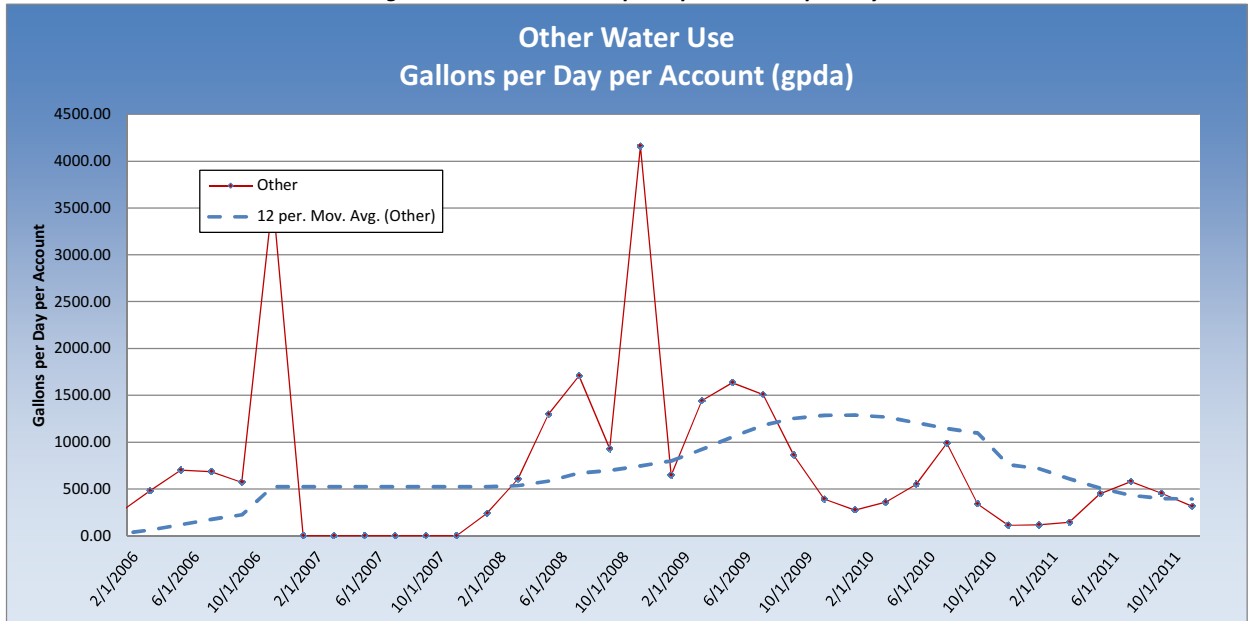


Figure 3-7: Other Consumption per Account per Day



As described below, additional analysis was performed related to the usage patterns for single family, multi-family and commercial customer categories to better understand the influence on customer demands (e.g., the size of homes, lot size, and number of bathrooms).

3.3 Analysis of Single Family Home Users

Water use of single family customers was further analyzed to better understand the usage patterns based on housing age and lot size.

The age of housing was estimated for the Cambria region, an area larger than the CSD service area, from the 2010 census data and from the American Community Survey¹ and provided in Table 3-1. The table shows that the age of the Cambria CSD homes is likely to be mostly older with about 70 percent of the homes built before 1990 and about 40% built before 1980. Typically, older homes have older fixtures and more leaks and therefore have higher indoor usage. We would expect commercial buildings to be of a similar age. 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 (US Energy Policy Act) took effect nationally in 1992. Since that time only about 10-20 percent of the buildings in Cambria CSD would have been built with these newer fixtures. Prior to 1977 toilets flushed with 4.5-7 gallons and there was no requirement on shower heads and faucets. Due to natural replacement (typically 3-5 percent per year) and Cambria’s ordinances and rebate programs it is estimated that approximately 85 percent of toilets and showers meet the 1992 requirements.

Table 3-1: Age of Housing from Census for the Cambria Region (not CCSD service area boundary)

Age of Housing from Census Data Cambria, California			
YEAR STRUCTURE BUILT	# of Structures	Percentage of Structures	Cumulative Percentage of Structures Built
Built 2005 or later	45	1.11%	100.00%
Built 2000 to 2004	415	10.24%	98.89%
Built 1990 to 1999	781	19.27%	88.65%
Built 1980 to 1989	1,249	30.82%	69.37%
Built 1970 to 1979	865	21.35%	38.55%
Built 1960 to 1969	294	7.26%	17.20%
Built 1950 to 1959	121	2.99%	9.95%
Built 1940 to 1949	67	1.65%	6.96%
Built 1939 or earlier	215	5.31%	5.31%
Total	4,052	100.00%	

Source: US Census, 2010, American Community Survey; data represents the Cambria region.

The breakdown of indoor versus outdoor use taken into account along with the age of buildings indicates that further conservation efforts of Cambria CSD staff focused towards the indoor uses of water may be warranted, however further research is needed to determine saturation of water efficient fixtures due to rebates, replacements and remodels.

Additional analysis was performed to correlate single family account water usage to a number of known property and/or building characteristics. A match of Cambria CSD water account billing history was made to San

¹ U.S. Census, American Community Survey (<http://www.census.gov/acs/www/>) provides data on community-wide statistics for planning purposes. Community Survey study boundaries are similar but do not exactly match CCSD service area boundaries.

Luis Obispo County parcel information database using APN numbers. Over 80% or a total of 2,656 accounts had sufficient data to be included in the analysis and only 658 accounts were removed due to missing parcel or housing size data, too low water use, or considered an outlier in terms of size of parcel or dwelling.

A series of graphical charts are presented in Appendix C related to historical single family water use compared to lot size, home square footage and number of bathrooms or bedrooms, respectively. In all cases, an increase in water use is illustrated with increasing property or dwelling characteristic. In other words, there was a positive trend observed where larger properties or dwellings typically result in higher total annual water demands.

3.4 Analysis of Commercial Users

An analysis was conducted of the Cambria CSD's highest water using commercial lodging establishments. The top 25 accounts have an average use of more than 4,300 gallons per day. The average daily use falls off dramatically moving down the list, so that the user that is ranked No. 25 uses about 1,300 gallons per day. Since there will be more opportunities to save a significant amount of water with the higher use per day establishments, their conservation efforts would be more productive. The major top users fall into the following categories:

- Commercial Lodging
- State Parks
- Cambria Community Services District (Parks and Cambria CSD Buildings)
- Multi-family accounts
- Commercial Businesses (restaurants, laundry, etc.)

The average use for all 221 commercial customers is approximately 630 gallons per day. This is about five times the use of a typical single family home. Many of the commercial small accounts 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 Cambria CSD set a goal to save 10 percent of Commercial and Commercial Lodging water use that would amount to 10 percent of 139,400 gallons per day (or 14,000 gallons per day). This goal could be achieved by working with the top 25 high-water customers and attempting to average approximately 15 percent for all top 25 accounts as a group. Identifying these additional opportunities for conservation may require special surveying techniques to determine customer specific opportunities for water savings.

Additional analysis was also performed to correlate commercial water usage to a number of known property and/or building characteristics. Similar to other customer categories, a match of Cambria CSD water account billing history was made to San Luis Obispo County parcel information database using APN numbers. Nearly all accounts matched up and only 4 accounts were missing parcel data.

Two graphical charts, Figure C-7 and C-8, are presented in Appendix C related to historical commercial property water use compared to parcel size and building size, respectively. In both cases, an increase in water use is illustrated with increasing parcel or building size. In other words, there was a positive trend observed where larger properties or buildings typically result in higher total annual water demands.

4. WATER DEMANDS WITH AND WITHOUT PLUMBING CODE

4.1 Future Population Projections

Description of Population Forecasts

The two main sources of population projections used to generate future water demands for this Conservation Plan included the Local General Plan and the Cambria CSD 2010 Urban Water Management Plan. In addition, the County of San Luis Obispo has a growth management ordinance, which includes a process where the Board of Supervisors approves county-wide and locality-specific maximum allowable growth rates. Prior to the CCSD's declaration of a water connection moratorium during 2001, the County had reduced its growth rate for Cambria to 1 percent, from the countywide rate of 2.3 percent.

Available Demographic Projections

- *Local General Plan (population)* – Typically these plans, depending upon when they were published, have a population and jobs forecast for 2030 and build out. For Cambria the relevant plan is the San Luis Obispo County “Cambria and San Simeon Community Plans of the North Coast,” developed in 2006 and last adopted in August 28, 2008. This shows a build-out population of 7,720.
- *2010 Urban Water Management Plan.* Section 2 of this plan for CCSD provides an overview of different projection scenarios in Table 2-2.

Assumed Population Projection for Water Use Efficiency Plan Development

For purposes of this study and in accordance with the Cambria CSD's direction, the population projections were based an assumed annual growth rate of 1% between 2013 and 2020 resulting in an increase in population of 515 people. This amount of growth was assumed to be permitted by offsetting the demand from future connections using the water savings from the conservation program such that a limited number of new connections could be built as shown in Figures4-1 and Table 4-1.

Figure 4-1: Assumed Population Projections

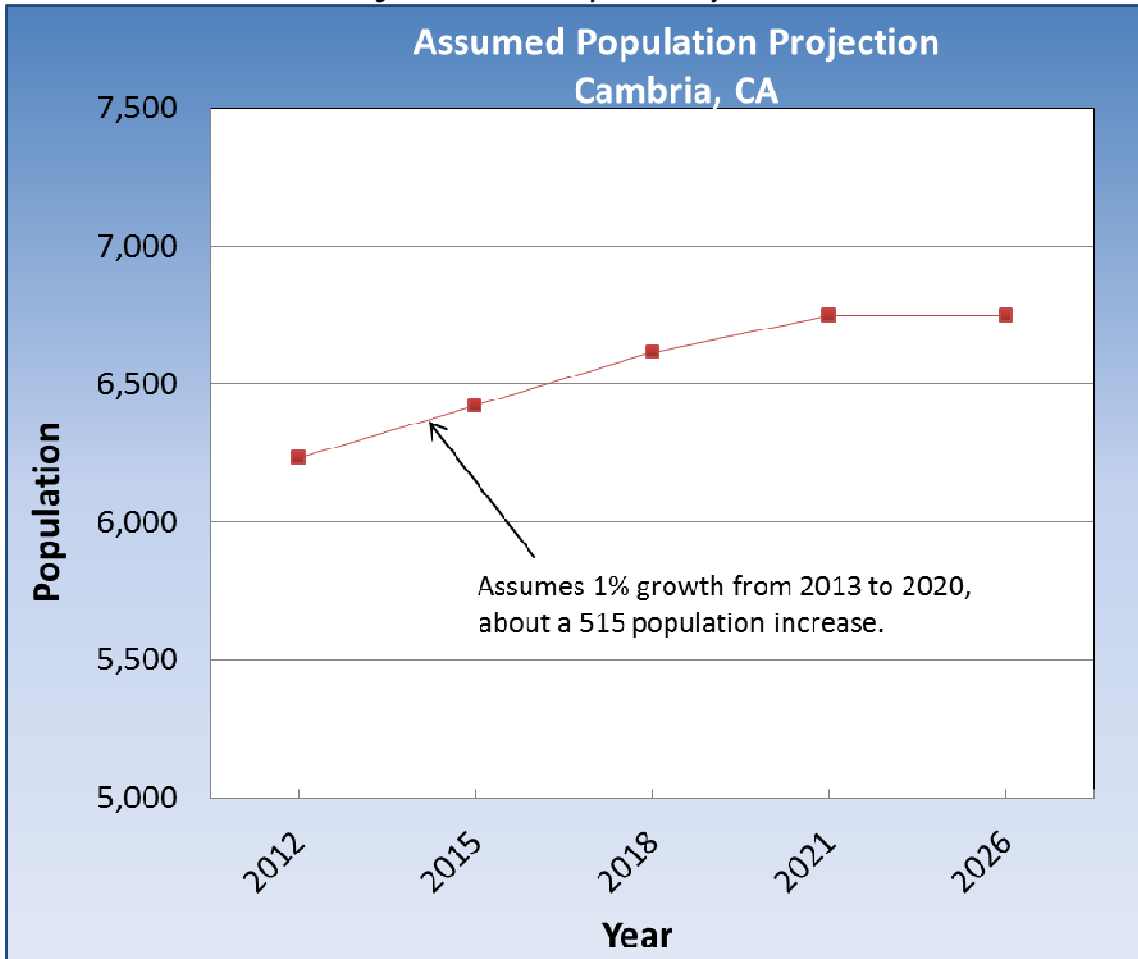


Table 4-1: Planned Growth

Population Projections Cambria, California	
Year	Population with Planned Growth
2012	6,232
2015	6,421
2018	6,615
2021	6,748
2026	6,748
2031	6,748
2036	6,748

Notes: Reference North Area Coast Plan, San Luis Obispo County. Population increase would not occur until any new connections were added to the CSD system.

4.2 Key Assumptions for the DSS Model

Table 4-2 shows the key assumptions used in the model. The assumptions having the most dramatic effect on future demands are the natural replacement rate of fixtures, how residential or commercial future use is projected, and finally the percent of estimated real water losses. Key to using the model is the baseline water use, which in this case is a 3-year average (2006-2008) prior to the recession.

Table 4-2: List of Key Assumptions

List of Baseline Demand Projection Assumptions for DSS Model	
Cambria, California	
Parameter	Model Input Value, Assumptions, and Key References
Model Start Year	2012
Water Demand Factor Years (Base Years)	Average of Years: 2006-2008
Peak Day Factor	1.60
Unaccounted for Water in the Start Year	7.6%
Population Projection Source	Assume 1% Growth to 2020, then 0%
Number of Water Accounts for Start Year	4,168
Avoided Cost of Water \$/AF	Current Variable Costs
Distribution of Water Use Among Categories	Single Family: 63%
	Multifamily: 3.1%
	Commercial: 23%
Indoor Water Use by Category	Single Family: 77.4%
	Multifamily: 90%
	Commercial: 72.5%
Residential End Uses	CA DWR Report "California Single Family Water Use Efficiency Study", 2011, AWWARF Report "Residential End Uses of Water" 1999, Agency supplied data on costs and savings, professional judgment where no published data available
Non-Residential End Uses, %	AWWARF Report "Commercial End Uses of Water" 1999
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, CA DWR Report "California Single Family Water Use Efficiency Study", 2011, Agency supplied data on costs and savings, professional judgment
Installation Rates	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), 4% (1.6 gpf and higher toilets) Residential Showers 4% Residential Clothes washers 6.7% A 3% replacement rate corresponds to 33 year life of a new fixture. A 6.67% replacement rate corresponds to 15 year washer life based on "Bern Clothes Washer Study, Final Report, Energy Division, Oak Ridge National Laboratory, for U.S. Department of Energy, March 1998, Internet address: www.energystar.gov
Future Residential Water Use	Increases Based on Population Growth
Future Non-Residential Water Use	Increases Based on Population Growth

4.3 Water Demand Projections With and Without the Plumbing Code

Development of the Water Demand Projections Table and Graph

Water demand projections were developed out to the year 2020 using the Demand Side Management Least Cost Planning Decision Support System (DSS) model. Water demand projections were developed for 10 years using the DSS Model. The DSS Model can be extended when appropriate for a longer planning time horizon. This model incorporates information from the:

- Cambria CSD selected population forecasts.
- Data provided by Cambria CSD District staff including historical water use, past conservation efforts, and water system account billing information.

National Plumbing Code

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

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

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

In addition to the plumbing code, the US Department of Energy regulates appliances such as residential clothes washers. Regulations to make these appliances more energy efficient has driven manufacturers to dramatically reduce the amount of water these efficient machines use. Generally horizontal axis washing machines use 30 to 50 percent less water than conventional models (which are still available). In the analysis for Cambria CSD, 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 last about 15 years or less eventually all machines in the Cambria CSD 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 be exclusively sold in the state by 2014.

In addition, California adopted a new plumbing code called “Cal Green” effective January 2011 that affects all new buildings and remodeling with a permit built after that date. This would impact all new buildings built in Cambria going forward. Table 4-3 summarizes these requirements.

Table 4-3: Cal Green Plumbing Code Requirements

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

[i] Effective date is 7/1/2011 for toilets

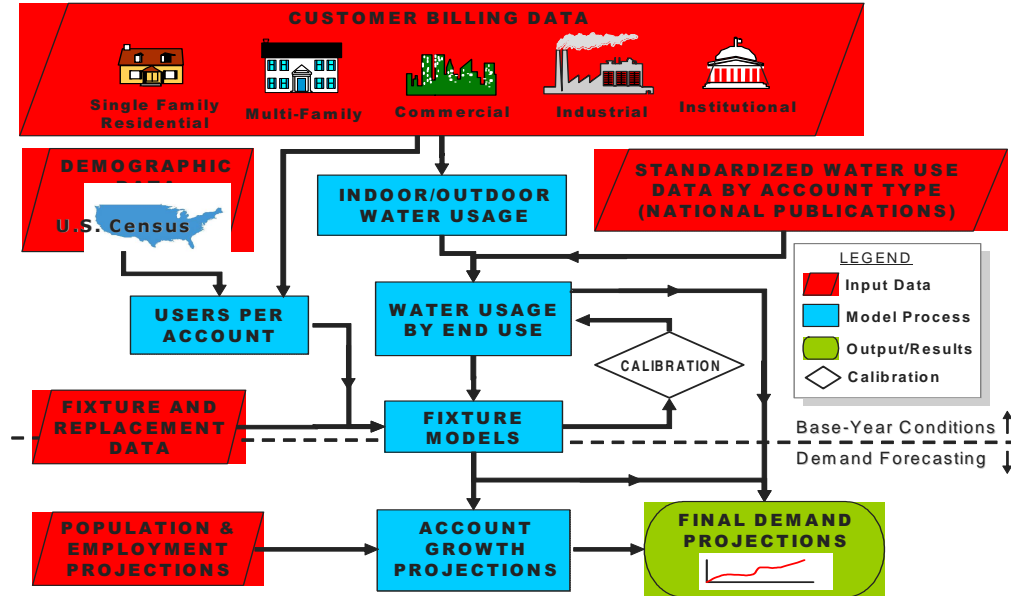
Cambria CSD Municipal Code

The Cambria CSD Municipal code also contains water efficiency criteria, which was recently modified to include mandatory Cal Green requirements as well as a few specific items which were considered non-mandatory within the Cal Green code. The most recent Cambria CSD Municipal Code requirements include:

- 1.28 gallon per flush maximum toilets
- 1/8 gallon per flush maximum urinals
- 1.5 gallon per minute showerheads
- 0.5 gallon per minute lavatory faucet aerators
- Hot water circulating pumps
- Clothes washers with water factors of no greater than 4.0

Figure 4-2 below describes conceptually how the above listed items are incorporated into the flow of information in the DSS Model.

Figure 4-2: DSS Model Overview Used to make Potable Water Demand Projections "With the Plumbing Code"



Graph of projected demands (Figure 4-3)

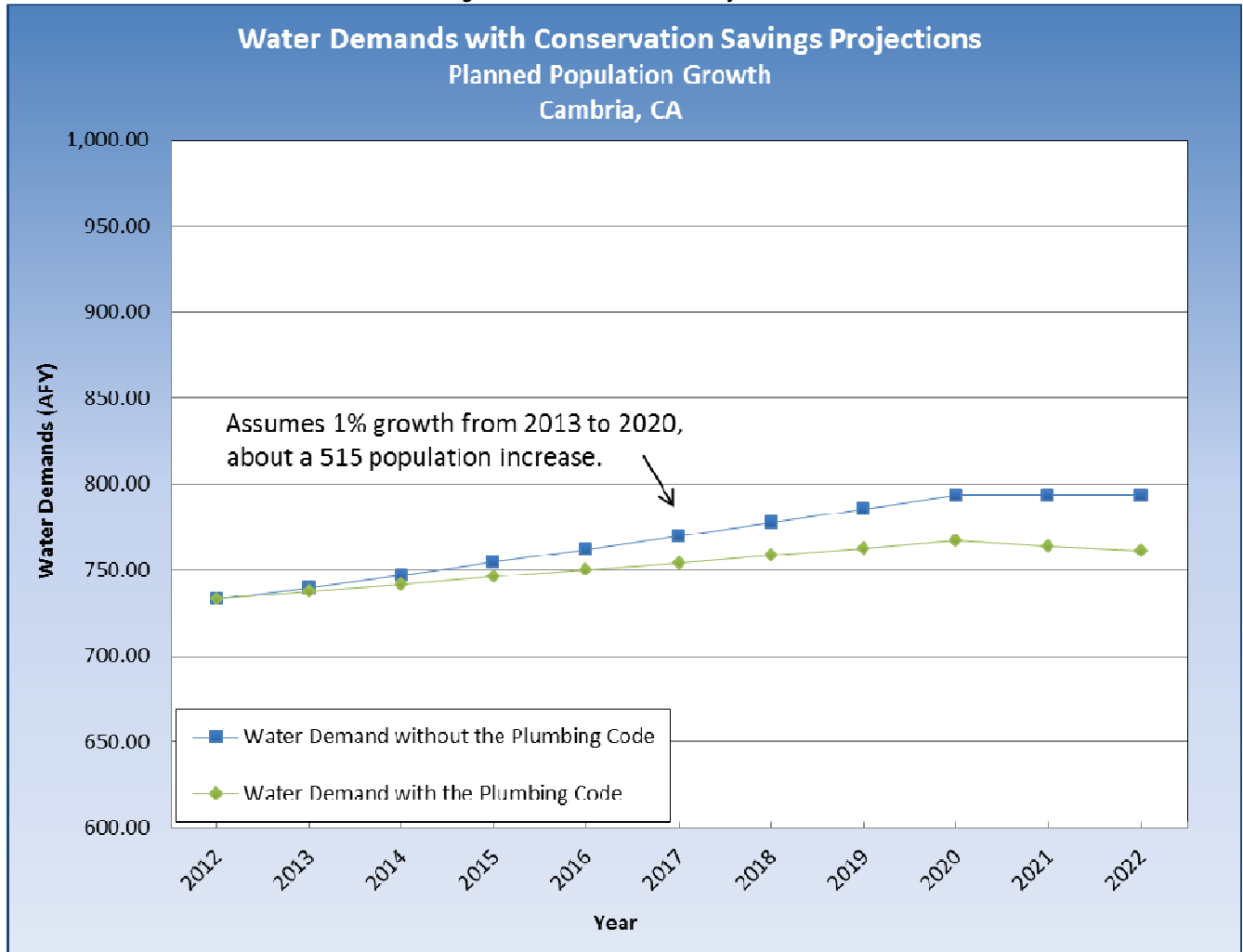
Figure 4-3 shows the potable water demand projection at five-year increments. The graph shows projections for demand with and without the plumbing code through 2022. The starting value of 733 AFY is the 2006-2008 average production. This period was relatively stable and after the billing system changed and new AMR meters were installed but before the recession. It is recognized that current (2012) demand is slightly lower at 724 AFY, but is expected to rebound as the economy improves. The starting value matters little in determining future water savings.

Table of water demand projections (Table 4-4)

The table of water demands projections includes:

- The water demand projections shown in Table 4-4 are based on the future population projections provided in Table 4-1.
- Projections were made *with and without* the plumbing codes.
- Projections are for potable water only.
- Demand projections reflect average weather conditions.

Figure 4-3: Water Demand Projections



Source: DSS Model January 2013. Increased demand is based on potential for new connections to the CSD system no earlier than 2013.

Table 4-4: Water Demand Projections

Water Demands with Conservation Savings Projections (AFY) Planned Population Growth Water Demands (AFY)			
Water Demand without the Plumbing Code	2012	2017	2022
Water Demand without the Plumbing Code	733	770	793
Water Demand with the Plumbing Code	733	754	761

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

5. CURRENT WATER CONSERVATION PROGRAM

The purpose of this section is to evaluate the Cambria CSD's existing water conservation program, and identify appropriate conservation opportunities that would further reduce the Cambria CSD's per capita water use.

Since July 1989, the Cambria CSD has had a water conservation program, and Cambria CSD has been a member of the California Urban Water Conservation Program (CUWCC) since 2005. The Cambria CSD's current water conservation program is a combination of the Cambria CSD's commitment to carrying out the CUWCC Best Management Practices (BMPs) and the Cambria CSD's desire to be water efficient. Compliance with 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. With the passage of Senate Bill (SB) X7-7, the Water Conservation Act of 2009, Cambria CSD now also must meet the mandate to maintain per capita demands (given current demand is within the state requirements).

5.1 Description of Current Programs

The following section provides a summary of the Cambria CSD's historical and current water conservation program.

Historical Conservation Programs

The following is a summary of prior efforts as described in the 2010 Urban Water Management Plan. The descriptions of the programs that have been or are being run are organized by Demand Management Measures or DMM's. It is clear that the Cambria CSD has, in the past, been very active in promoting conservation in its service area. The peak of the activity was from the period 1989 to 2003 when the District had a full-time water conservation coordinator. During the peak of the most recent recession, funding was more limited and conservation activities slowed.

DMM A - Survey Programs for Single-Family and Multi-family Residential Customers

Since starting DMM A in 1988, the District has completed water surveys on all of its multi-family customers and over 50-percent of its residential connections. With the exception of two apartment buildings where it was not reasonable to modify existing plumbing, all other existing multi-family complexes were converted from one single master meter to individual meters for each housing unit. The surveys continue to be offered free of charge upon customer request. The voluntary surveys typically include leak checking and noting whether water efficient fixtures and appliances have been installed. In addition to encouraging the installation of water efficient fixtures and appliances, the District also offers rebates for circulating hot water pumps to its residential customers.

DMM B – Residential Plumbing Retrofit

Since 1989, approximately 88-percent of the single-family residential connections within Cambria have had plumbing retrofits completed. Retrofitting of an existing house is a requirement upon resale or remodeling. The District uses a points system to develop equivalencies for any new home construction as well as remodels. Once the total points are determined, new construction and remodels are required to either retrofit a set number of retrofit points within the service area, or pay into a retrofit in-lieu fee. Collected fees from this program are used to support water conservation programs throughout the District. (The payment of retrofit in-lieu fees was

modified by the North Coast Area Plan update, which resulted in all new connections being documented with a demand offset letter showing where specific offsetting water conservation measures were implemented.)

DMM C – System Audits, Leak Detection, and Repair

Since approximately 1988, the District routinely compares its well production to billed totals every two months. The two-month interval is used because it also matches the District's two-month billing cycle. The District makes minor adjustments to account for non-metered use due to process equipment, such as flow through turbidity meters, and other non-metered District water use. System repairs are completed whenever water operations spot a leak or receive reports from citizens or other public services such as police and fire. Since the 2005 UWMP, the District replaced its entire inventory of water meters with remote-read units featuring electronic flags to alert the CCSD of potential leaks on the customer's side of the meter. The CCSD also offers household magnetic monitors with a leak warning light that can be readily attached to a refrigerator door.

The District previously placed an added emphasis on testing pressure-regulating valves on services in response to a distribution pipeline project coupled with a high failure rate discovered from residential home surveys. To facilitate testing, pressure gages are loaned to customers free of charge for testing incoming household pressures downstream from their pressure-regulating valve. The District's web site also contains information explaining pressure-regulating valve testing.

DMM D – Metering with Commodity Rates

All of the District's customers are metered. Bi-monthly meter billings are also based on an inclining block rate to encourage conservation.

DMM E – Large Landscape Conservation Programs and Incentives

Using funds obtained from its retrofit and in-lieu fee program, the District previously funded retrofitting of all the existing school sites within Cambria as well as the State Parks campground. The use of District funding for these programs provides a direct incentive for improving water use efficiency while also lowering future water bills. Outdoor irrigation improvements typically involve the use of drip irrigation as opposed to conventional spray irrigation methods. On certain larger commercial establishments, cisterns have been installed for purposes of collecting rainfall for irrigation. To continue use of the cisterns during the dry season, an independent contractor or private individuals may truck non-potable water to specific cistern locations.

DMM F – High Efficiency Washing Machine Rebate Programs

The District previously offered a \$150 rebate on every energy-star washing machine installed. However, this program was suspended due to a budget shortfall during FY2009/2010. Regardless of this interim setback, the CCSD remains committed to moving forward with DMM F as funding becomes available. Each energy-star washing machine saves on average approximately 4.8 units (3,580 gallons) of water per year. Since this program began in 2002, the District has funded the installation of energy-star rated washing machines. In developing the actual program costs, approximately \$25 was added to the rebate for staff processing time.

DMM G – Public Information Program

The Cambria CSD's Public Information Program is mainly conducted using the CSD's web site. http://www.cambriacsd.org/cm/water_wastewater/conservation/home.html

Topics covered include:

- Water Conservation Rules and Tips
- Landscaping Basics that Save Water

- Checking for Leaks and Reading Your Meter
- Water Saving Rebate Program

The CSD also makes water conservation devices available to customers at their office and Board meetings are regularly attended by [persons interested in water conservation and water issues are frequently the topic of conversation in this small, close-knit community.

DMM H – School Education Program

School education programs on water conservation began after the District developed a water conservation officer position in 1989. The Water Conservation Officer conducted education programs free of charge to the schools. In more recent years, the schools have elected to conduct their own water conservation classes using their science teachers. The CCSD also shares past water conservation officer educational materials with local schools.

DMM I – Conservation Programs for Commercial, Industrial, and Institutional (CII)

The District evaluates and funds conservation programs for its commercial, industrial, and institutional accounts on a case-by-case basis. For example, in 2004, the District provided funding to replace 15 commercial regenerative water softeners with non-regenerative softeners. In 2003, the District installed 30 water efficient pre-rinse valves for all of the restaurants and commercial kitchens within its service area. During December 2012 to January 2013, the CCSD funded replacement of 20 commercial clothes washers at the Cambria Laundromat with high efficiency machines (water factors of less than 4.0).

DMM K – Conservation Pricing

The District uses an inclining block rate structure that provides a direct financial incentive to conserve water. In addition, the District applies a drought surcharge to further curb demand during Stage 2 and 3 drought periods, which are defined within the CCSD Municipal Code. In 2003 and 2004, a drought surcharge was applied during the summer season due to rainfall being 25-percent less than normal.

DMM L – Water Conservation Coordinator

The District has staffed a full time water conservation coordinator position beginning in 1989. During 2003 this position was modified to one half-time person and support from other District staff. Due to budgetary constraints, during 2010, the duties of this position were split among the Water Department Supervisor, District Engineer, and Administrative staff. The water operators also provide field-level inspections on suspected water leaks and in support of the conservation retrofit program. In recent months, the CCSD has increased funding to provide additional water conservation coordinator staffing.

DMM M – Water Waste Prohibition

The District's first water waste prohibition ordinance was approved in 1989. This was later modified in 1990, and again in 2000. The District subsequently codified the ordinances covering water waste prohibition in 2004, which are now part of the CCSD Municipal Code (Chapter 4.08) Section 5.

DMM N – Residential Ultra-Low-Flush Toilet Replacement Program

Since beginning a rebate program for replacement of toilets in 1989, approximately 2,615 single-family residences have been retrofitted with ultra-low-flow toilets (1.6 gpf). This is the result of direct customer rebates as well as the existing CCSD plumbing retrofit program. It is estimated that a total of approximately 5,200 ultra-low-flow toilets (1.6 gpf) have been installed to date. Since these retrofits occurred, the State and County have adopted the 2010 California Green Building Standards Code, which went into effect on January 1,

2011 and July 1, 2011, respectively. These new standards have revised the toilet standard to 1.28 gpf, which provides future opportunities for additional conservation. Subject to available funding each year, the CCSD offers rebates of \$75 when replacing a greater than 3.0gpf toilet with a newer 1.28 gpf toilet. A \$50 rebate is offered when replacing a 1.6 gpf toilet with a newer 1.28 gpf toilet.

Current Conservation Program Description from 2010 Urban Water Management Plan (UWMP)

In addition to those programs which are still active today the following is an excerpt from Cambria's UWMP which describes the context for expanding the program.

“The CCSD’s current 10-year baseline consumption of 112 gpcd is already below the year 2020, 95-percent target for the central coast hydrologic area of 117 gpcd. To a certain extent, this is attributable to microclimate variability, which has much lower evapotranspiration (ET) rates along coastal areas when compared to the inland areas included within the overall central coast hydrologic region. In addition, Cambria’s forested setting tends to have less turf grass areas, such as those more commonly found in suburban subdivisions, community parks, and golf courses that may be more prevalent in certain inland areas. Regardless of the land use and ET differences that may exist within the hydrologic area, the CCSD has also had a long history of offering conservation rebate incentives, as well as requiring the retrofit of existing homes on resale, during remodels, and on new construction. Additionally, the CCSD has a tiered water rate structure in place that further serves as a direct financial incentive to conserve. In recent years, and since the 2005 UWMP was adopted, the CCSD invested heavily in replacing all of its residential water meters with newer automatic remote read meters, which allow for the sensing and flagging of household plumbing leaks that occur downstream from the meter. The new meters now allow CCSD staff to contact customers that are electronically flagged as possibly wasting water through leaks in household plumbing, fixtures, and appliances.

To meet its future challenge for achieving an interim 2015 target of 109 gpcd and 2020 target of 105 gpcd, the CCSD will continue to invest in cost-effective water conservation measures, while also looking at ways to update and expand upon the use of newer technologies. A key area of opportunity lies in the mandatory and voluntary conservation measures called for in the 2010 California Green Building Code Standards (a.k.a. 2010 Cal Green Building Code), which became effective during 2011. CCSD staffs are currently updating its retrofit inspection forms and internal tracking methods to ensure the latest 2010 Cal Green code requirements are being implemented as part of its existing conservation program. An example requirement includes newer 1.28 gallon per flush (gpf) toilets that have become the 2010 Cal Green standard effective on July 1, 2011, which will ultimately replace the prior 1.6 gpf toilets. The CCSD is further investigating the potential for lowering the standard even further by considering rebates to encourage newer 1.0 and 0.8 gpf toilets. In essence, the CCSD reduction plan will continue to proactively expand and improve upon its existing water conservation efforts as new technology becomes available; through enforcement of water conservation requirements mandated by the CCSD municipal code.”

5.2 Cambria Community Services District Water Billing Structure

Volumetrically billed water and sewer rates provide the Cambria CSD a tremendous opportunity to convey a price signal to its water customers. Customers that use more water pay a higher rate for each additional water unit. Therefore, when rates are designed to recover costs, consideration must be given to the price signal sent from the designed rates. There are several rate objectives that can drive the rate design process, ranging from revenue sufficiency, consumption efficiency, resource conservation, and affordability. Based on the Cambria CSD objectives, the Cambria CSD can choose to use various rate alternatives to meet its objectives.

The Cambria CSD’s existing rate structure, as governed by the current rate resolution, consists of differing rates on a modestly increasing block rate structure based on customer class, in addition to a base use fee. The monthly base minimum fee is dependent on the customer class and allows for up to 6 ccf in a two month billing period (100 cubic feet). The usage fee is dependent on the usage volume and residential prices increase 28 percent over the tiers shown and commercial rates increase 25 percent.

The Cambria CSD’s user classification for potable water customers is:

1. Residential
2. Commercial

Table 5-1 below summarizes the Cambria CSD’s rate structure for its bi-monthly base charges for all customers as of July 2009.

Table 5-1: Cambria Residential Water Rate Tiers

Cambria CSD Residential Water and Sewer Rates, July 2009		
Bi-Monthly Water Billing		Bi-Monthly Sewer
Tier	Rate, \$/Hcf	Rate, \$/Hcf
0-6	\$23.82 (Total)	\$65.03 (Total)
6-15	\$ 6.05	\$ 1.94
16-20	\$ 6.18	\$ 1.94
21-30	\$ 6.30	\$ 1.94
31-40	\$ 6.44	\$ 1.94
41-50	\$ 6.95	\$ 1.94
51-60	\$ 7.22	\$ 1.94
61-70	\$ 7.47	\$ 1.94
71-75	\$ 7.73	\$ 1.94

1 hundred cubic feet (hcf) = 748 gallons

Table 5-2: Cambria Commercial Water Rate Tiers

Cambria CSD Commercial Water and Sewer Rates, July 2009		
Bi-Monthly Water Billing		Bi-Monthly Sewer Billing
Tier	Rate, \$/Hcf	Rate, \$/Hcf
0-6	\$55.16(Total)	\$65.03 (Total)
6-20	\$ 6.69	\$ 1.94
21-30	\$ 6.95	\$ 1.94
31-40	\$ 7.08	\$ 1.94
41-50	\$ 7.47	\$ 1.94
51-60	\$ 7.73	\$ 1.94
61-70	\$ 8.12	\$ 1.94
71-75	\$ 8.37	\$ 1.94

6. ALTERNATIVE WATER CONSERVATION MEASURES

The Project Team’s goal is to develop a 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 Project Team held a Measure Screening Workshop with Cambria CSD staff to review existing implementation methods, including pros/cons of current efforts, and develop a plan for moving forward and implementing additional conservation measures.

A screening process was undertaken August 29, 2012 with the assistance of Cambria CSD staff to identify roughly 20 new measures for further evaluation, while taking into account the existing measures are currently being implemented.

6.1 Water Use Efficiency Planning Goals and Approach

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

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

6.2 Potential New Conservation Measures

An important step in updating the water conservation program is the review and screening of new water conservation measures. This task includes a review of the current water conservation measures, identification of measures that may be appropriate for the community, and the screening of these measures to a short-list for detailed evaluation (benefit-cost analysis). To complete this process, a list of potential demand management measures for qualitative evaluation (screening) was compiled. This list in Appendix A includes about 30 potential conservation measures in the typical customer categories of:

All Customers:

- Residential
- Commercial
- Distribution System (System)

The potential conservation measures for the Cambria CSD, are considered appropriate for this region. The table 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 potential measures in Appendix A was drawn from MWM and the Cambria CSD’s general experience, CUWCC BMPs, and review of what other water agencies with conservation programs are currently implementing.

6.3 Screening of Conservation Measures

A screening process was undertaken to reduce the number of new measures to be considered to a more manageable number and to eliminate those measures that are not as well suited to the Cambria CSD. The result of this process was a short-list of 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 Cambria CSD area.

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 Cambria CSD staff, in a one day meeting on August 29, 2012 facilitated by Maddaus Water Management.

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 native and/or water efficient gardens for multi-family or commercial sites may not be appropriate where water use analysis indicates little outdoor irrigation. Thus, a measure scored low in this category if it was not well suited for the area’s characteristics and could not save water. A measure scored high in this criterion if it was well suited for the area and could save water.
- **Customer Acceptance/Equity** – Refers to whether retail customers within the wholesale customer 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 benefit while another pays the costs without receiving benefits). Retail customer acceptance may be based on:
 - Convenience
 - Economics
 - Perceived fairness
 - Aesthetics

To reduce the list to a more manageable number, normally a score of 12 or more was necessary to pass. The process reduced the measures to be evaluated further down to 22 existing and new measures. 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.

Upon inspection of the overall list of 22 conservation measures selected for evaluation, it became apparent that some measures could be combined and others could be separated into two categories as follows:

- Measures that were voluntary and incentive based; and
- Measures that were regulatory and applied to new development only.

In addition to the existing Cambria CSD Municipal Code requiring retrofit on resale, MWM included mention of the new California Law SB 407 (Statewide Retrofit on Resale) in the measure description table for Measure 24 in Table 7-1. In the model MWM worked carefully such that the Cambria CSD Municipal Code (which has been in place for 15 years) requirement and SB 407 (which takes effect in 2017) are both taken into account to overlap with the plumbing code (natural replacement) and rebate programs (such as through HET Toilets). Because SB 407 begins from the year 2017 in residential, and 2019 in commercial properties, the current Cambria CSD was deemed to be more restrictive. SB 407 program length continues until all the older high flush toilets have been replaced in the service area, whereas the Cambria CSD Municipal Code currently in existence does not have an end. Table 7-1 shown in Section 7 includes a list of all the measures analyzed in this project.

7. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES

7.1 Conservation Measures Evaluated

The following table defines the measures that were analyzed for possible inclusion into the Conservation Plan. The measures are not ranked in any particular order and not all were selected for the recommended program. The customer categories and the 2020 water savings for each are shown.

Table 7-1: Measure Descriptions

DSS Model No.	Measure Name	Type of Customer	Description	Water Savings in Year 2020 (AFY)
1	Water Loss Control Program	System	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. Leak repairs would be handled by existing crews. After completing first system audit set a goal, such as "reduce nonrevenue water from 8 to 7% of production over 5 years."	7.56
2	Automatic Meter Reading (AMR) Conservation Benefits	SF,MF,VR	Expand the use of Automatic Meter Reading (AMR) capability to identify accounts with continuous flow. Notify those accounts with a monthly usage above a certain level of the possibility of a leak on their side of the meter. Likely only occurs on indoor leaks. Follow up with those customers and help them identify leaks. Consider expanding upon remote AMR monitoring for in-home reading units. Provide a penalty charge if leak is not fixed within 30 days. Consider offering an adjustment (reduction) on their water bill if they fix the leak before the next meter reading.	2.79
3	Public Information, Regional Outreach, Media Campaign	SF	Public education used to raise awareness of conservation measures available to customers. Coordinate with other coastal water agencies and use various methods to teach customers about efficiency measures. Include direct customer contact (classes or neighborhood ambassadors program), direct mail/posters around community, speakers to community groups, educational material, conservation website, other media (public service announcements on radio, use PPT Slides announcements via TV during local public meetings), demonstration gardens, etc. Refine and develop media messages, social marketing plan that will use public input to assist in changing attitudes.	8.79
4	Single Family Water Surveys	SF, VR	Implement 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. Eligible accounts could be about 1,000 (top 25%) of either single family homes or smaller home vacation rental properties. For conservation assumption on water savings and participation levels, only SF homes are included in the program planning. CCSD recognizes that higher conservation potential may existing in the vacation rental homes.	5.98
5	Multifamily Surveys	MF	Organize and implement water surveys for existing multifamily residential customers (4 units or more). Target those with high water use and provide a customized report to owner. Less than 70 units would be eligible.	0.26
6	High Efficiency Showerhead Giveaway	SF,MF,COM,VR	CCSD to buy low flow showerheads (1.5 gpm) in bulk and distribute them with water surveys and community events. Kit would include a 0.5 gpm faucet aerator. Target higher user and older homes (pre-1992) and full-time occupancy. This may be implemented as a targeted door canvassing program to also promote SF Survey program to both single family residences and vacation rental properties.	7.19

Table 7-1 (Continued)

DSS Model No.	Measure Name	Type of Customer	Description	Water Savings in Year 2020 (AFY)
7	High Efficiency Toilet (HET) Rebates	SF,MF	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 would be on a sliding scale depending upon what type of toilet was replaced with an HET and would range from \$60 to \$100 per toilet replaced.	1.87
8	High Efficiency Toilet and / or Urinal Exchange Program (e.g., Niagara Program)	SF,MF,COM	In lieu of toilet rebate program -CCSD could instead buy toilets and urinals in bulk and give them away or sell them at a discounted price for customers who want to replace 3.5 gallons/flush toilet or more than one gallon/flush urinal. Alternatively they could run the Niagara City Smart Program (funded by CCSD, run by a contractor) that involves giving homeowners a high efficiency toilet, 1.5 gpm showerhead and 1.5 gpm faucet aerator.	0.60
9	School Building Retrofit	COM	School retrofit program would provide a grant to a school to replace fixtures and/or upgrade irrigation systems. Learn from the successful experience of the Southern California Generation Water Program (http://www.generationwater.org) that involved support from water supplier, school district and provided on the job training for high school students. Assume one school per year is retrofitted with a grant from CCSD. Consider support by trainees for other support of CCSD Conservation Program activities.	1.96
10	Require Irrigation and Landscape Upgrades	MF,COM	For MF, CII, and IRR customers with ALL New (non SF) landscapes, require 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. May be a competition style rebate to get a grant to retrofit based on submitted plans. This is an inexpensive way to get "demonstration gardens" in the program. May run like the California Friendly or Sacramento area River Friendly garden makeover contests.	0.50
11	Require Fixture Replacement by a Deadline	SF,MF,COM,VR	When pulling a permit with remodel, CCSD would pass an ordinance that requires homeowners, vacation rental & multi-family properties and businesses to bring fixtures up to efficient standard by a fixed date at their own expense.	3.05
12	Require Multi Family Submetering on New Accounts	MF	Require the metering of individual units in new multi-family, condos, townhouses, mobile-home parks and business centers (with water heater in the units). CCSD would administer meter read and bill program.	0.15
13	Non-regenerative Water Softeners Incentives	SF,MF	This measure would reinstate the program that CCSD used to have as an incentive program for replacing ion exchange-based water softening systems, with new systems that do not perform on-site regeneration of the exchange resin. CCSD to offer \$500 rebate to switch out existing water softeners, installation of upgraded version of water softener with off-site regeneration may be eligible with CCSD pre-approval.	5.89
14	Large Meter Replacement and Leak monitoring	COM	Replace 25 large meters, assuming 2-inch and larger meters to increase accurate readings.	2.40

Table 7-1 (Continued)

DSS Model No.	Measure Name	Type of Customer	Description	Water Savings in Year 2020 (AFY)
15	Prohibit Water Waste and Practices	SF,MF,COM,VR,OTH	Enforce codified CCSD Ordinance (CCSD Municipal Code Chapter 4.08) that prohibits the waste of water and failure to repair outdoor or internal leaks in a timely manner. Code does include provisions for fee penalties for not repairing any leaks.	0.22
16	High Efficiency Washer Rebate	SF,MF,COM	Provide a rebate for the installation of a high efficiency washer (HEW). Rebate amounts would be \$100-150 and coordinated with PG&E. Rebates could be tiered but assumed would be only given on the very efficient machines of less than 4.0 Water Factor (WF) inline CCSD Ordinance adopted in November 2012. Currently (2012) PG&E offers a \$50 rebate on Tier 3 machines (currently water factor less than 4.5 gal/cu ft./cycle). CCSD may use the link on the cee1.org web site for list of qualified machines to assist with administering program. PG&E is providing rebate processing on behalf of other water utilities in Northern California.	8.36
17	CII Surveys and Top 25 Users Program	COM	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, laundries, and schools. Emphasis will be on supporting the high water users including an analysis of who the high water users are.	4.87
18	High Efficiency Urinal Rebate (<0.25 gallon)	COM	Provide a rebate for high efficiency less than 0.125 gallons per flush or waterless urinals to existing high use CII customers (such as restaurants) as per CCSD Ordinance adopted in November 2012.	1.03
19	Focused Water Audits for Hotels/Motels	COM	Continue to provide free water audits to hotels and motels; standardize service offered to reduce costs. Included would be bathrooms, kitchens, landscaping, and irrigation systems and schedules.	3.65
20	Toilet Retrofit on Resale or Name Change on Water Account	SF,MF	Compliance with CCSD Code where homebuyer is required to provide a certificate of compliance / proof of installation be submitted to CCSD that verifies a plumber has inspected the property and efficient fixtures were already there or were installed by close of escrow. Consider expanding this measure to include "change of account" compliance which would then include rental properties.	1.89
21	Conservation Pricing	All	Conduct a Water Rate Study to consider the feasibility to further enhance and adjust the existing tiered rates to further encourage conservation. Goal would be to implement an updated pricing structure designed to lower consumption. Rate design may need to be more aggressive (steeper inclining volumetric charges) to be in compliance with CUWCC BMP 1.4 (see www.cuwcc.org).	11.26
22	Hot Water Circulating Pumps	SF	CCSD will provide one no-cost hot water circulating system to homeowners upon request. Homeowner's assume all responsibility for costs and installation. Unit reduces wait time for hot water to 20 seconds or less at the retrofitted fixture.	9.11

Abbreviations:

SF = Single Family
 MF = Multifamily
 VR = Vacation Rental
 COM = Commercial (all types)
 OTH = Other Utility and Misc)
 System = Distribution System

AMR = Automatic Meter Reading
 AFY = acre-feet per year
 CUWCC = California Urban Water Conservation Council
 BMP = Best Management Practice

7.2 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. This analysis was performed using the California Urban Water Conservation Council endorsed Decision Support System (DSS) Model developed by Maddaus Water Management. 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.

Present value analysis using constant 2012 dollars and a real discount rate of 3% is used to discount costs and benefits to the base year. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in programs, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a program may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

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

The utility perspective offers two advantages. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving versus supplying more water. Second, because revenue shifts are treated as transfer payments, which means program participants will have lower water bills and non-participants will have slightly higher water bills so that Cambria CSD 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 procuring water and the reduction in retail revenue that results from reduced water sales due to conservation. This budget impact occurs slowly, and can be accounted for in water rate planning. Because it is the water provider’s role in developing a conservation plan that is paramount in this study, the utility perspective was primarily used to evaluate elements of the plan.

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

7.3 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 2012), at the real interest rate of 3.0%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate

(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.

7.4 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by the Cambria CSD. 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 2012 and 2042) to encompass the 10-year conservation planning period of 2012 to 2020. 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.

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

7.6 Assumptions about Avoided Costs

The main source of water for the Cambria CSD is pumped groundwater. The variable cost of pumping was estimated by the CSD and includes such items as energy and chemicals. The estimated cost was \$200,000 per year, which for the current levels of pumping is \$258 per million gallons pumped or \$775 per acre-foot pumped. Eventually avoided costs may be higher if a more expensive new source of water is developed. For this analysis, a conservative assumption was made that the avoided costs would be based on the current cost of pumping groundwater.

7.7 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 Cambria CSD. 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. The model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

$$\text{Annual Utility Cost} = \text{Annual market penetration rate} \times \text{total accounts in category} \times \text{unit cost per account} \times (1 + \text{administration and marketing markup percentage})$$

$$\text{Annual Customer Cost} = \text{Annual number of participants} \times \text{unit customer cost}$$

$$\text{Annual Community Cost} = \text{Annual utility cost} + \text{annual customer cost}$$

7.8 Comparison of Individual Measures

Table 7-3 presents how much water the measures would save over 30 years, how much they would cost, and what cost of saved water per unit volume *if the measures were implemented on a stand-alone basis (i.e. without interaction or overlap from other measures that might address the same end use(s))*. 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 it was without the first measure in place and then reducing the use another 10% to result in the use being 89% 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 $0.9 \times 0.9 = 0.89$ or 19% water savings.

Since interaction between measures has not been accounted for in Table 7-2, 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 Cambria CSD as the water utility would incur to operate the Water Conservation Program, including administrative costs.
- Utility Benefits - the avoided cost of purchasing water at the identified rate of \$775 per AF.
- Customer Costs - those costs customers would incur to implement a measure in the Cambria CSD’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 7-2, as well as those used later in Table 8-4, are defined as follows:

- Present Value 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
- First Year Cost to Utility (\$) = the sum of the annual Utility Costs for the years 2013 to 2017.
- Utility Cost of Water Saved per Unit Volume (\$/AF) = PV of Utility Costs over 30 years divided by the 30-Year Water Savings. This value is compared to the utility's avoided cost of water as one indicator of the cost effectiveness of conservation efforts. It should be noted that the value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

Table 7-2: Estimated Conservation Measure Costs and Savings

**Cambria, California
Conservation Measure Costs and Savings**

Measure Name	Present Value of Water Utility Benefits	Present Value of Water Utility Costs	Water Utility Benefit to Cost Ratio	First Five Years Total Utility Costs	Average Annual Utility Costs (2013-2018)	Water Savings in Year 2020 (AFY)	Cost of Savings per Unit Volume (\$/AF)	Program
NRW Measure Model	\$99,879	\$565,925	0.18	\$205,000	\$41,000	7.6	\$2,557	A
AMR Conservation Benefits	\$35,128	\$152,165	0.23	\$121,083	\$24,217	2.8	\$2,021	A
Public Information, Regional Outreach, Media Campaign	\$113,346	\$313,925	0.36	\$77,280	\$15,456	8.8	\$1,250	A
Single Family Water Surveys	\$75,944	\$326,482	0.23	\$80,371	\$16,074	6.0	\$1,985	A
Multifamily Surveys	\$3,287	\$35,641	0.09	\$8,774	\$1,755	0.3	\$5,012	B
High Efficiency Showerhead Giveaway	\$90,782	\$10,588	8.57	\$11,570	\$2,314	7.2	\$54	A
High Efficiency Toilet (HET) Rebates	\$23,456	\$35,164	0.67	\$36,762	\$7,352	1.9	\$676	A
High Efficiency Toilet and / or Urinal Exchange Day (Niagara Program)	\$7,393	\$28,663	0.26	\$30,867	\$6,173	0.6	\$1,777	C
School Building Retrofit	\$24,825	\$72,519	0.34	\$66,677	\$13,335	2.0	\$1,358	C
Require Irrigation and Landscape Upgrades	\$6,188	\$3,323	1.86	\$2,336	\$467	0.5	\$251	A
Require Fixture Replacement by a Deadline	\$37,497	\$10,900	3.44	\$11,910	\$2,382	3.0	\$134	A
Require Multi Family Submetering on New Accounts	\$1,724	\$8,656	0.20	\$6,085	\$1,217	0.1	\$2,354	C
Non regenerative Water Softeners Incentives	\$74,153	\$196,356	0.38	\$96,583	\$19,317	5.9	\$1,235	C
Large Meter Replacement and Leak monitoring	\$29,976	\$65,275	0.46	\$32,107	\$6,421	2.4	\$1,016	A
Prohibit Water Waste and Practices	\$2,974	\$148,533	0.02	\$34,897	\$6,979	0.2	\$22,701	C
High Efficiency Washer Rebate	\$95,942	\$679,123	0.14	\$540,403	\$108,081	8.4	\$3,327	B
CII Surveys and Top 25 Users Program	\$60,810	\$116,775	0.52	\$93,750	\$18,750	4.9	\$896	A
High Efficiency Urinal Rebate (<0.25 gallon)	\$11,713	\$9,310	1.26	\$7,409	\$1,482	1.0	\$374	A
Focused Water Audits for Hotels/Motels	\$45,607	\$116,775	0.39	\$93,750	\$18,750	3.6	\$1,195	B
Toilet Retrofit on Resale or Name Change on Water Account	\$23,176	\$19,951	1.16	\$17,987	\$3,597	1.9	\$395	A only
Pricing Measure Model	\$165,154	\$314,289	0.53	\$90,000	\$18,000	11.3	\$853	B
Hot Water Recirculator	\$113,672	\$199,059	0.57	\$183,025	\$36,605	9.1	\$815	B

8. RESULTS OF CONSERVATION PROGRAM EVALUATION

8.1 Selection of Measures for Programs

The following section provides a summary of which measures are included in each of the three alternative programs. The three packages are designed to illustrate a range of various measure combinations and resulting water savings.

8.2 Menu of Water Use Efficiency Alternative Programs (Programs A to C)

These 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 a percent overlap in water savings (and benefits) and estimates combined savings and benefits from programs or packages of measures.

A description of each program evaluated follows.

Program A – Existing/Planned in UWMP

Savings for the “Existing Program” include the measures that are being run now or are planned to be run according to the UWMP. For the Cambria CSD this includes the following¹¹ measures:

- Reduce System Water Losses
- Use Automatic Meter Reading System to Identify Customer Leaks
- Pubic Information and School Education (includes conservation coordinator staff support)
- Single Family Surveys
- Showerhead Giveaway
- High Efficiency Toilet Rebates
- High Efficiency Urinal Replacement
- Fixture Replacement by ordinance
- CII Surveys
- Large Meter Replacement
- New Home Irrigation Upgrades

Program B – “Recommended Program”

Savings for the “Program B” include the additional measures that are generally cost-effective and save significant amounts of water. Program B includes all measures in Program A plus four additional measures:

- Multi-family Surveys
- High Efficiency Washing Machine Rebates
- Conservation Pricing
- Circulating Hot Water System Incentive

Program C – “All Measures Modeled”

Program C includes 21 measures evaluated, so it is the “maximum” conservation program. It includes Programs A plus the four added measures from Program B and six additional measures:

- High Efficiency Toilet and Urinal Exchange
- School Retrofit
- Multi-family Submetering
- Regenerative Water Softener Removal Rebate
- Implement CCSD Municipal Code to Prohibit Irrigation Water Waste
- Hotel/Motel Water Audits

The only measure evaluated but not included in any program was the “Toilet Retrofit on Resale or Account Change” due to “Fixture Replacement by Ordinance” being selected that has overlapping benefits and saves more water.

Figure 8-1 shows annual water demand with no conservation, plumbing code only, and the three program scenarios. Table 8-1 shows the estimated water savings in 5 year increments for all three programs. The savings in Table 8-2 are just from the conservation programs alone and do not include the plumbing code savings.

As discussed in Section 4, the demand values shown are based on a 1% annual growth rate between 2012 and 2020. The starting point for Figure 8-1 is based on the three year (2006-2008) average production, where 733 AFY includes consumption and non-revenue water of 7.6% of production (and is slightly higher than actual demand in 2012 of 724 AFY).

Figure 8-2 and Table 8-2 depict the projected average daily per residential indoor 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.

Figure 8-1: Water Demand Projections with Water Use Efficiency Program Savings

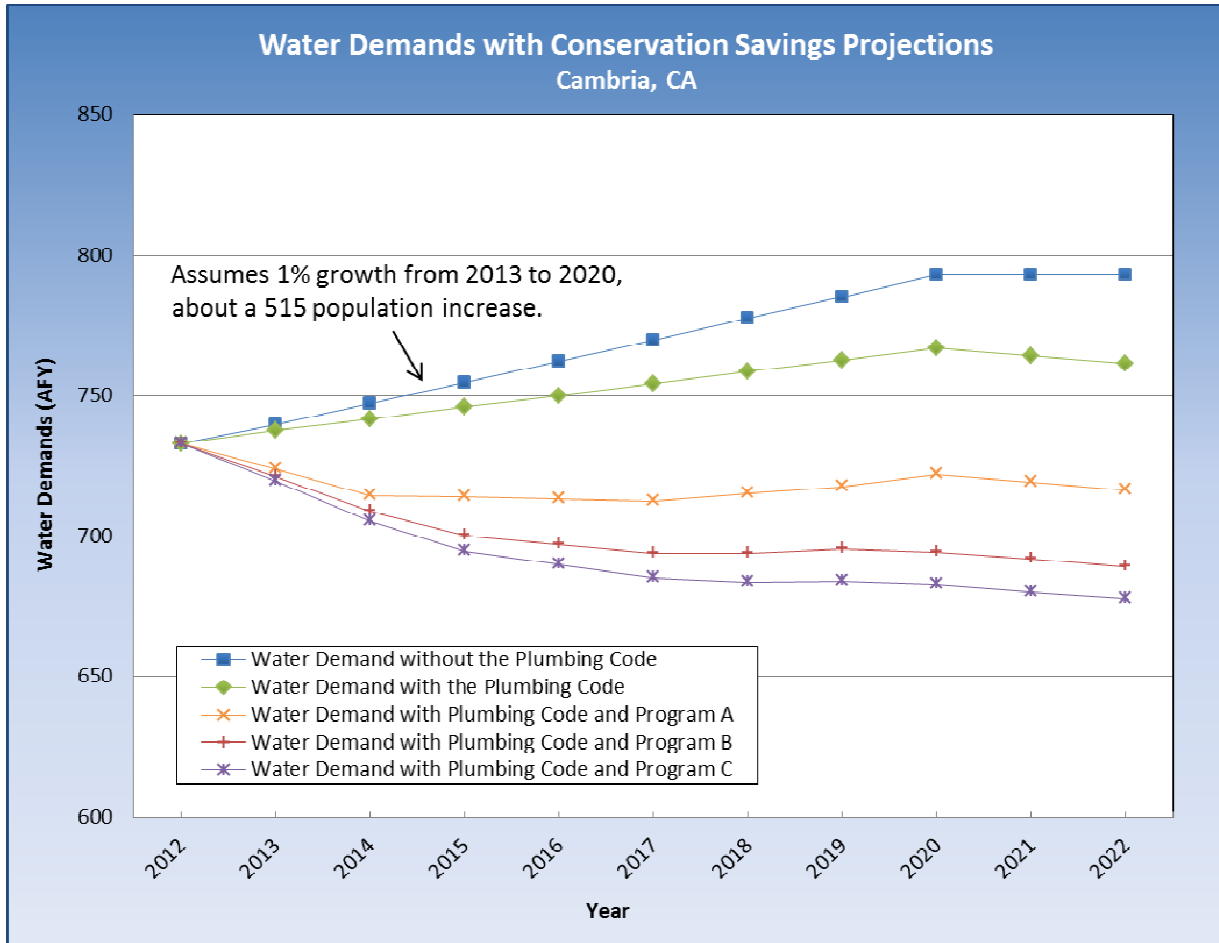


Table 8-1: Long Term Conservation Program Projected Water Savings

Long Term Conservation Program Water Savings Cambria, California					
Water Savings (AFY)	2015	2020	2025	Water Utility	Community
				Benefit to Cost Ratio	Benefit to Cost Ratio
Program A	32	45	45	0.35	0.33
Program B	46	73	71	0.33	0.34
Program C	51	84	83	0.32	0.32

Figure 8-2: Projected Per Capita Residential Indoor Use Reduction with Estimated Conservation Savings

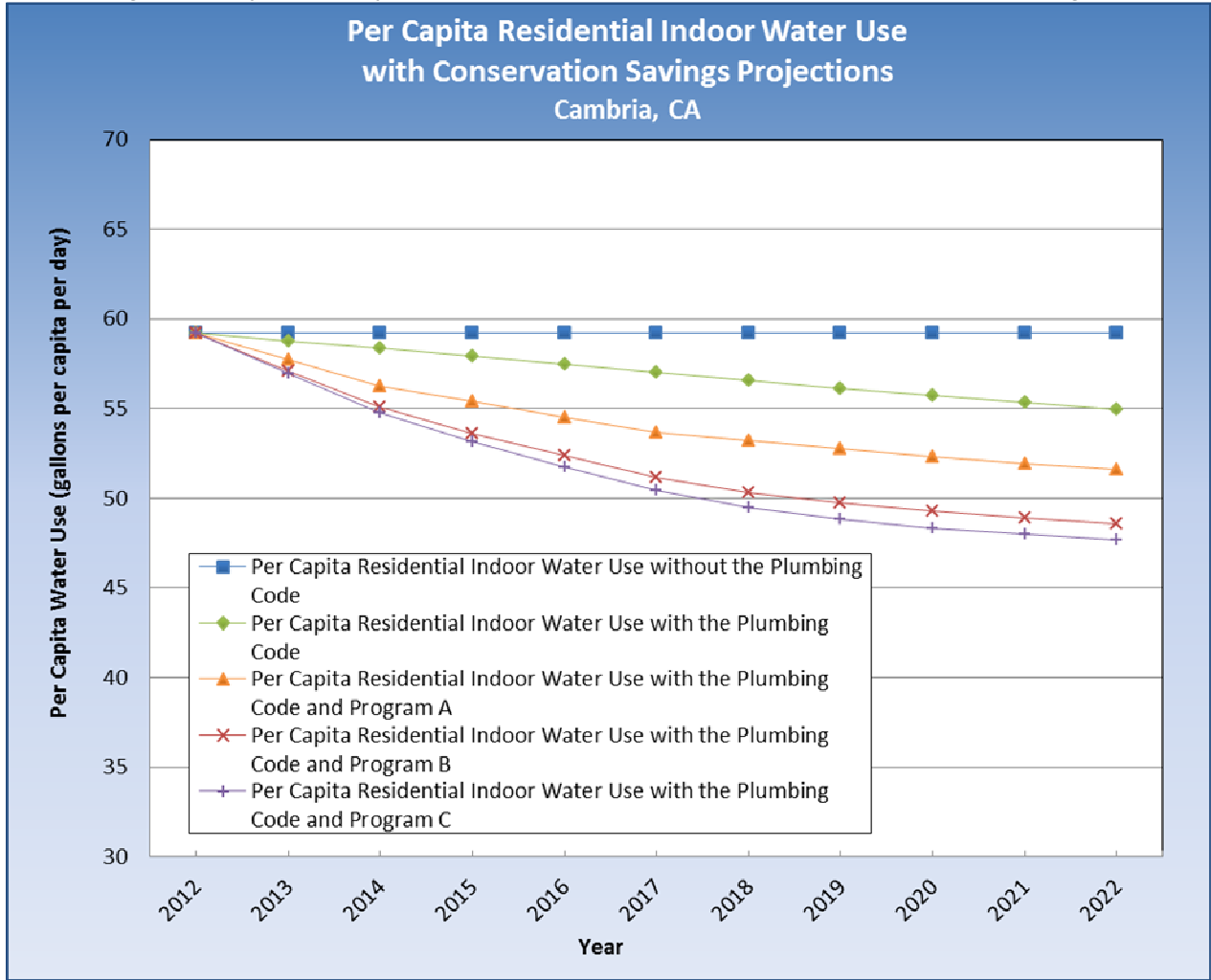
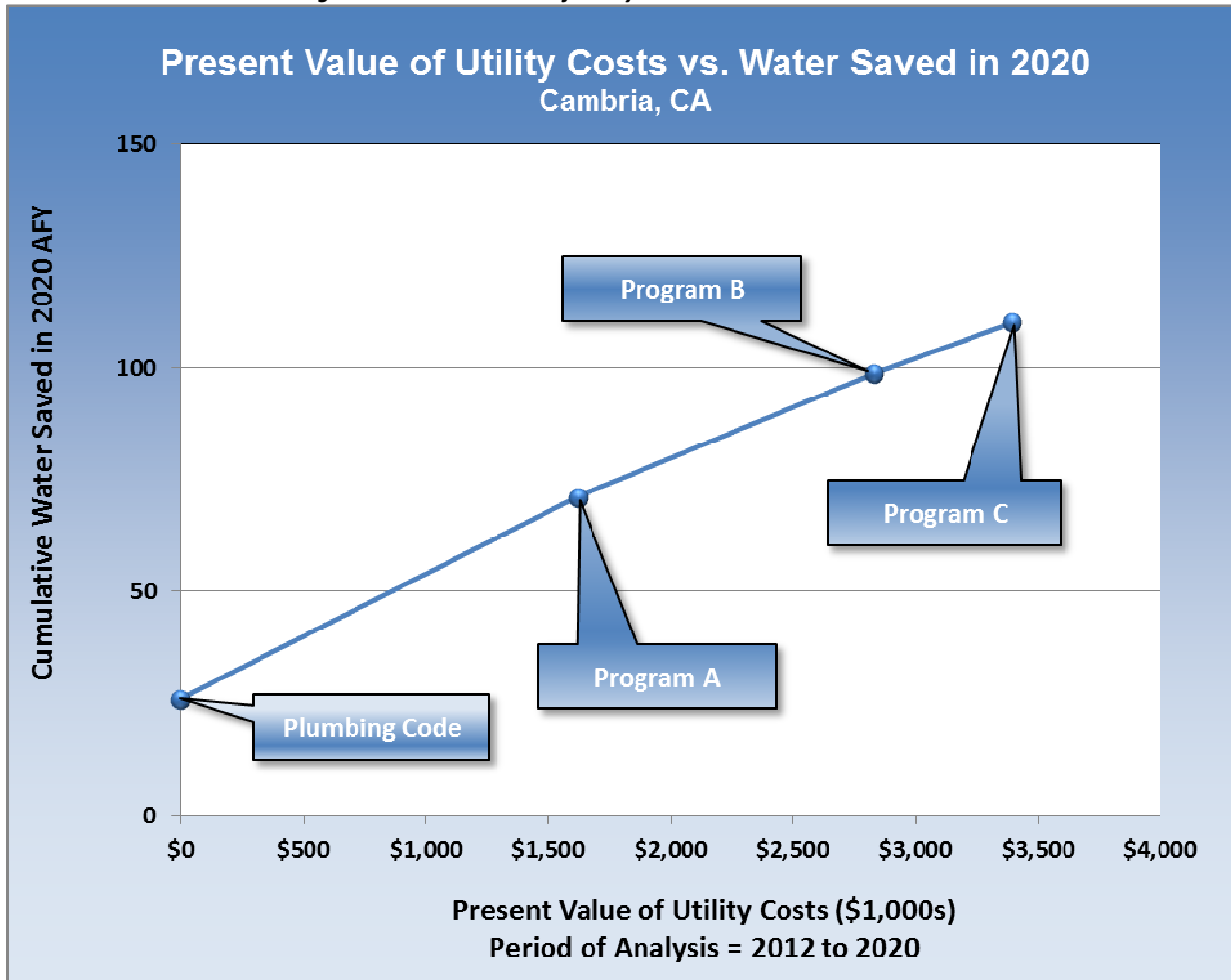


Table 8-2: Projected Per Capita Residential Indoor Use Reduction with Estimated Conservation Savings

Residential Indoor Per Capita Water Use (gcd)	2015	2020	2025
Per Capita Residential Indoor Water Use without the Plumbing Code	59.21	59.21	59.21
Per Capita Residential Indoor Water Use with the Plumbing Code	57.92	55.71	53.98
Per Capita Residential Indoor Water Use with the Plumbing Code and Program A	55.38	52.34	50.66
Per Capita Residential Indoor Water Use with the Plumbing Code and Program B	53.60	49.26	47.74
Per Capita Residential Indoor Water Use with the Plumbing Code and Program C	53.13	48.33	46.81

Figure 8-3 illustrates how marginal returns change as more money is spent to achieve water savings. As the figure shows the cost versus saving curve is changing lesser slope from Program B to C. This means that the added cost of going from B to C will save less water per unit expenditure. The decision on which program is appropriate for Cambria CSD is dependent on many factors.

Figure 8-3: Present Value of Utility Costs vs. Water Saved in 2020



Tables 8-3 presents key evaluation statistics compiled from the DSS Model. Assuming all measures are successfully implemented, projected water savings for 2020 in AFY respectively are shown, as are the costs of achieving this reduction.

Cost of water saved is presented two ways: for the utility and the total community (customer plus utility).

Detailed statistics on the utility costs are expressed two ways:

- Total present value over up to the 30-year period (annual estimated costs of the doing the conservation program over time put into today's dollars); and
- The cost of water saved (present value of costs of the conservation program over time divided by the water saved).

These cost parameters are derived from the estimated annual utility, customer and community costs. Program costs for each program A, B and C are presented in Table 8-3.

The plumbing code is an additional savings that could be added on top of the water savings shown in Table 8-1. This allows the plumbing code savings percent and water savings in AFY shown in Table 4-4 to be additive, such that the total conservation program savings in AFY and percentages of total production can be shown in Table 8-3.

Table 8-3: Comparison of Program Estimated Costs and Water Savings in 2020

Comparison of Conservation Program Costs and Savings Cambria, California								
Conservation Program	Water Utility Benefit-Cost Ratio	Community Benefit-Cost Ratio	2020 Water Savings (MGD)	2020 Water Savings (AFY)	Total Water Savings as a Percentage of	Present Value of Water Utility Costs	Annual Average Water Utility Cost in First Five Years (2013 - 2017)	Water Utility Cost of Water Saved (\$/AF)
					Total Production in 2020			
Without the Plumbing Code	NA	NA	0.00	0.00	0.00%	NA	NA	NA
With the Plumbing Code	NA	NA	0.02	26.16	3.41%	NA	NA	NA
Plumbing Code plus Program A	0.35	0.33	0.064	71.26	9.29%	\$1,620,732	\$142,265	\$1,296
Plumbing Code plus Program B	0.33	0.34	0.088	98.72	12.87%	\$2,828,761	\$302,323	\$1,392
Plumbing Code plus Program C	0.32	0.32	0.098	110.29	14.38%	\$3,396,958	\$379,561	\$1,449

Notes:

- Present Value is determined using an interest rate of 3%
- Present Value of Water Utility Cost based on annual costs (or benefits) over a 30-year period discounted to today's dollars.
- Cost of water saved is present value of water utility cost divided by total 30-year water savings.
- % water saved refers to the demand without the plumbing code
- Total water savings in 2020 as a percent of production is relative to no plumbing code production
- Conversion 1 MGD is equal to 1120 AFY

9. RECOMMENDED PLAN

This section presents an overview of the recommended conservation plan for the Cambria Community Services District service area. The recommended plan includes several elements: (1) how the plan was selected from the alternatives presented in Section 8; (2) a more detailed description of the components including goals; (3) overall benefits of the plan; and (4) recommended next steps.

9.1 Selection Criteria and Process

The recommended plan was presented at a regularly scheduled Cambria CSD Board meeting held January 17, 2013. MWM presented the results of the evaluation of water conservation issues and options for Cambria CSD.

This activity brought the Board to a common level of understanding of water conservation issues for Cambria CSD. MWM also explained the various conservation program options that they had prepared for the Cambria CSD.

Decision criteria were reviewed with the group and were as follows:

- Cost-Effectiveness
- Water Savings
- Ease of Implementation
- Availability of Technology
- Average Annual Cost

9.2 Description of Recommended Plan

The recommended plan is to begin to implement Program B and after a few years consider expanding the plan to encompass Program C. The recommended plan's 16 measures are listed below.

Recommended Measures in the Plan

1. Reduce System Water Losses
2. Use Automatic Meter Reading System to Identify Customer Leaks
3. Public Information and Education
4. Single Family Surveys
5. Showerhead Giveaway
6. High Efficiency Toilet Rebates
7. High Efficiency Urinal Replacement
8. Fixture Replacement by ordinance
9. CII Surveys
10. Large Meter Replacement
11. Irrigation Upgrades

12. Multifamily Surveys
13. High Efficiency Washing Machine Rebates
14. Conservation Pricing
15. Implement CCSD Municipal Code to Prohibit Irrigation Water Waste
16. Hot Water Recirculation Incentive

9.3 Projected Water Savings of Plan

The Cambria CSD's service area has a relatively high portion of residential water use. Consequently, residential conservation programs produce the most savings. The Cambria CSD's service area is not an intense commercial area, and as a result the conservation potential in the commercial sector is less. Overall conclusions are:

- The Plan (Program B) without the plumbing Code is estimated to save approximately 70 acre-feet by the year 2020. The benefit-cost ratio of the plan is less than 1.0 when compared to the current cost of pumping groundwater. However, Cambria has water supply constraints, so comparing the cost of conservation to the cost of the current supply may not be appropriate.
- Total savings from Program B is 10 percent (without the plumbing code) in 2020.
- The average cost of water saved for the plan from the utility standpoint (as shown on Table 8-4) is \$1,400 per AF.
- The cost for the conservation measures could be largely funded by the builders of the new homes.

9.6 Estimated Implementation Budget

The cost to Cambria CSD to implement the recommended plan is approximately \$300,000 per year of additional budget and includes additional staff time, materials, rebates, giveaways, etc.

This budget was developed as part of the DSS Model evaluations for level of activity by year. The opportunities for State grants or cost sharing partnership with other County utilities or other means for lowering the cost of a conservation measure would lower the budgetary needs for implementation. The Cambria CSD should 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 and associated budgets on an annual basis.

9.7 Monitoring Progress

Each year a progress update will be used to analyze the progress on meeting the Plan targeted water savings. It will be imperative to track activities and also water demand to understand the level of progress being made in meeting overall targets.

9.8 Challenges Ahead and Recommended Next Steps

Successful implementation of the Plan will require a significant increase in efforts on the part of the Cambria CSD. Many new conservation measures will be employed and high participation rates are needed to achieve Plan goals. At current staffing and budget levels Cambria CSD would have difficulty

implementing such an aggressive conservation program. Additional resources are needed.

Recommendations to assist with implementation include the following next steps:

- Budget an additional \$300,000 per year to cover the added cost of implementing this plan.
- Recover the costs by adjusting the current points program as needed or consider charging extra for new water meters to pay for the plan.
- Prioritize measures for implementation with those that contribute the most to meeting water saving targets given highest priority for implementation.
- Consider working with the largest water using customers to try to reduce water use as described in section 3.
- Develop an Implementation Plan that describes exactly how the plan measures will be implemented.
- Develop an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process).
- Update codes and ordinances, as necessary.
- Form partnerships and apply for grants where appropriate.
- Contract if needed to gain enough staff support to help administer or accelerate the new program measures.
- Maintain the Cambria CSD Staff Conservation Working Group to guide the implementation.
- Develop analytical tools to track water use by customer class and overall water use reductions adjusted for the weather and external factors.
- Set up a database to store and manage measure participation, cost and other data to gauge successes and failures.
- Use the tools annually to help decide on priorities for the next plan year.
- Use the DSS Model to annually update the 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.
- Use the input from the Cambria CSD Staff Working Group and annual work planning process as the forum to amend the plan, budgets, staffing, contracting, schedule etc. to stay on track.

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Appendix A - Water Conservation Measures Considered for Evaluation

Screened Water Conservation Measures as of August 29, 2012										
Key to 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; CCSD - Cambria Community Services District										
Key to Topical Area: W – Water Loss (CCSD), I – Indoor Use, P – Peaking Demand (Outdoor), I, P – Both Indoor and Peaking Demand (Outdoor)										
Recommendation #	Measure	Key Commitments to CUWCC or Other Agencies	Measure			Ranking Criteria and Score (0 to 5) (0 = poor; 5 = excellent)				Pass, Yes/No
	Device or Program		Equipment or Program Type	Applicable Category	Measure Description	Technology/Market Maturity	Feasibility for CCSD to Implement	Customer Acceptance/Equity	Total Score	
1	Prohibit Water Waste and Practices	Existing CUWCC Foundational BMP 1.1	Ordinance	ALL	Enforce ordinance that prohibits the waste of water with penalties for failure to repair leaks in a timely manner or include penalties for any leaks. Water savings estimate will be made based on prior years enforcement activities.	5	5	4	14	Yes
2	Water Loss Control Program	CUWCC Foundational BMP 1.2 - Assume combine with other Water Loss measures	Water Loss	System	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. Leak repairs would be handled by existing crews. After completing first system audit set a goal, such as "reduce nonrevenue water from 8 to 7% of production over 5 years".	5	5	5	15	Yes
3	AMR Conservation Benefits	Supporting CUWCC Foundational BMP 1.3.	AMR	ALL	Use the AMR capability to identify accounts with continuous flow. Notify those accounts with a monthly usage above a certain level of the possibility of a leak on their side of the meter. Follow up with those customers and help them identify leaks. Provide a penalty charge if leak is not fixed within 30 days. Consider offering an adjustment (reduction) on their water bill if they fix the leak before the next meter reading.	5	5	5	15	Yes
5	Public Information, Regional Outreach, Media Campaign	Existing CUWCC Foundational BMP 2	Public Education	SF Indoor, Outdoor, All	Public education used to raise awareness of conservation measures available to customers. Coordinate with other coastal water agencies 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.	5	5	5	15	Yes
6	Efficient Outdoor Use Outreach, Education and Training Programs for homeowners, property managers, landscape maintenance workers	CUWCC Foundational BMP 2	Public Education on Efficient Landscape Watering	SF/MF Outdoor	CCSD to offer, organize and sponsor a series of educational workshops or other means for educating homeowners and those in landscaping in efficient landscaping and irrigation principles. Utilize guest speakers, native demonstration gardens, incentives, such as a nursery plant coupon.				0	No

Recommendation #	Measure	Key Commitments to CUWCC or Other Agencies	Measure			Ranking Criteria and Score (0 to 5) (0 = poor; 5 = excellent)				Pass, Yes/No
	Device or Program		Equipment or Program Type	Applicable Category	Measure Description	Technology/Market Maturity	Feasibility for CCSD to Implement	Customer Acceptance/Equity	Total Score	
7	Single Family Water Surveys	CUWCC BMP 3.1 & 3.2	SF Equipment	SF Indoor / Outdoor	Implement 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. Eligible accounts could be about 1,000 (top 25%).	5	5	5	15	Yes
8	Multifamily Surveys	CUWCC BMP 3.1 & 3.2	MF Equipment	MF Indoor	Organize and implement water surveys for existing multifamily residential customers (4 units or more). Target those with high water use and provide a customized report to owner. Less than 70 units would be eligible.	5	5	5	15	Yes
9	High Efficiency Showerhead Giveaway	Sunseted old CUWCC BMP 2.	Showerhead	SF MF CII	CCSD to buy low flow showerheads (1.5 gpm) in bulk and distribute them with water surveys and community events. Target higher user and older homes (pre-1992) and full-time occupancy.	5	5	5	15	Yes
11	High Efficiency Toilet (HET) Rebates	CUWCC BMP 3.4. And New State Law AB 715 after 2014.	Toilet	SF/MF Indoor	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 would be at least \$100 and more if flush volume was less than 1.28 gpf such as 0.8 gpf.	5	5	5	15	Yes
12	High Efficiency Toilet and / or Urinal Exchange Day (Niagara Program)	CUWCC BMP 3.4. And New State Law AB 715 and SB 407	Toilet	ALL	In lieu of toilet rebate program -CCSD could instead buy toilets and urinals in bulk and give them away or sell them at a discounted price for customers who want to replace 3.5 gallons/flush toilet or more than one gallon/flush urinal. Alternatively they could run the Niagara City Smart Program (funded by CCSD, run by a contractor) that involves giving homeowners a high efficiency toilet, 1.5 gpm showerhead and 1.5 gpm faucet aerator.	5	5	5	15	Yes
13	CII Surveys and Top 25 Users Program	Supports new CUWCC BMP 4 that requires savings be met. Need supporting surveys.	CII Equipment	CII Indoor / Outdoor	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, laundries, and schools. Emphasis will be on supporting the high water users including an analysis of who the high water users are (e.g., large motels, etc.).	5	5	4	14	Yes
14	Focused Water Audits for Hotels/Motels	Include with CUWCC BMP 4	CII Equipment	CII Indoor / Outdoor	Continue to provide free water audits to hotels and motels; standardize service offered to reduce costs. Included would be bathrooms, kitchens, landscaping, and irrigation systems and schedules.	5	5	3	13	Yes

Recommendation #	Measure	Key Commitments to CUWCC or Other Agencies	Measure			Ranking Criteria and Score (0 to 5) (0 = poor; 5 = excellent)				Pass, Yes/No
	Device or Program		Equipment or Program Type	Applicable Category	Measure Description	Technology/Market Maturity	Feasibility for CCSD to Implement	Customer Acceptance/Equity	Total Score	
15	School Building Retrofit	Include with CUWCC BMP 4	CII Equipment	CII Indoor / Outdoor	School retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Pattern after MWD of Southern California Program. Would need to limit to a pre-determined number of schools annually.	5	5	5	15	Yes
16	High Efficiency Urinal Rebate (<0.25 gallon)	Supports CUWCC BMP 4	Urinals	Existing CII Indoor	Provide a rebate for high efficiency or waterless urinals to existing high use CII customers (such as restaurants).	5	5	4	14	Yes
17	Irrigation Water Surveys	CUWCC BMP 5.	Irrigation	CII Outdoor	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.				0	No
18	Irrigation Water Budgets	CUWCC BMP 5.	Irrigation	IRR Outdoor	Irrigators of landscapes with separate irrigation account (meter) use would receive a monthly or bi-monthly irrigation water use budget.				0	No
20	Rain Sensors	Potential. Inexpensive device.	Irrigation	ALL/ IRR	Provide a rain sensor shut-off device for an existing large landscape irrigation controller.	0	0	0	0	No
21	Weather Adjusting Smart Irrigation Controllers	Required on new buildings per Cal Green	Irrigation	SF	Provide incentive for weather adjusting "smart" irrigation controllers for new homes only as per Cal Green Code.	0	0	0	0	No

Recommendation #	Measure	Key Commitments to CUWCC or Other Agencies	Measure			Ranking Criteria and Score (0 to 5) (0 = poor; 5 = excellent)				Pass, Yes/No
	Device or Program		Equipment or Program Type	Applicable Category	Measure Description	Technology/Market Maturity	Feasibility for CCSD to Implement	Customer Acceptance/Equity	Total Score	
22	Weather Adjusting Smart Irrigation Controllers	Required on new buildings per Cal Green	Irrigation	CII	Provide incentive for weather adjusting "smart" irrigation controllers for new homes only as per Cal Green Code.	0	0	0	0	No
23	Require Fixture Replacement by a Deadline	Combine with New Ordinance update (measure 24). Make a part of CUWCC BMP 3.5	Ordinance	ALL	When pulling a permit with remodel, CCSD would pass an ordinance that requires homeowners and businesses to bring fixtures up to efficient standard by a fixed date at their own expense.	5	5	5	15	Yes
24	Toilet Retrofit on Resale or Name Change on Water Account	CUWCC BMP 3.4. And New State Law AB 715	Toilet	ALL	Work with the real estate industry to require a certificate of compliance / proof of installation be submitted to CCSD that verifies a plumber has inspected the property and efficient fixtures were already there or were installed at the time of sale; require submittal within certain time frame such as 90 days of the sale. (Model after Utility of Los Angeles and San Diego or Utility of Santa Cruz). Coordinate with new CA law SB 407 but require fixture upgrades rather than notifying new owner of the presence of inefficient fixtures.	5	4	3	12	Yes
25	Require Multi Family Submetering on New Accounts	Expensive for owner.	Ordinance	New MF Indoor	Require the metering of individual units in new multi-family, condos, townhouses, mobile-home parks and business centers (less than four stories and with water heater in the units). Utility administer meter read and bill program.	5	5	5	15	Yes
26	Regenerative Water Softeners Incentives				Incentive to replace. CCSD used to have an incentive. Want to move to a resin style.	5	5	5	15	Yes
27	Large Meter Replacement and leak monitoring				Need to have a similar program to AMR leak flagging on SF accounts.	5	5	5	15	Yes

Appendix B - Assumptions for Water Conservation Measures Evaluated in the DSS Model

	1	2	3	4	5
Short Name	Reduce Water Loss	AMR	Public Info	SF Surveys	MF Surveys
Measure Name	Water Loss Control Program	AMR Conservation Benefits	Public Information, Regional Outreach, Media Campaign	Single Family Water Surveys	Multifamily Surveys
Applicable Customer Classes	System	All	SF Indoor, Outdoor, All	SF VR Indoor / Outdoor	MF Indoor
		Supporting CUWCC Foundational BMP 1.3.	Existing CUWCC Foundational BMP 2	CUWCC BMP 3.1 & 3.2	CUWCC BMP 3.1 & 3.2
		AMR	Public Education	SF Equipment	MF Equipment
Customer Classes	System	SF,MF,VR	SF	SF, VR	MF
Applicable End Uses	Non Revenue Water	ALL	All	Internal and External	Internal and External
Market Penetration by End Of Program (%)		50%	100%	25%	25%
Annual Market Penetration (%)		7%	50%	5.0%	5.0%
Use Only New Accounts	FALSE	FALSE	FALSE	FALSE	FALSE
Water Use Reductions For Targeted End Uses	0.2% Reduction/year for 5 years (total 1.0	10%	2%	5%	5%
Evaluation Start Year	2013	2013	2013	2013	2013
Evaluation End Year	2019	2019	2042	2042	2042
Program Length, years	7	7	30	30	30
Measure Life, years	Permanent	Permanent	2	5	5
Saves Hot Water	FALSE	FALSE	TRUE	TRUE	TRUE
Utility Unit Cost for SF accounts, \$/unit		\$100	\$10	\$100	
Utility Unit Cost for MF accounts, \$/unit		\$100	\$0		\$200
Utility Unit Cost for non-Res accounts, \$/unit			\$0		
Customer Unit Cost. \$/SF unit		\$500	\$0		
Customer Unit Cost. \$/MF unit		\$500	\$0		
Customer Unit Cost. \$/non-Res unit		\$500	\$0		
Annual Utility Admin & Marketing Cost		30%	25%	30%	30%
SF Number of Fixtures per Account		1	1	1	1
MF Number of Fixtures per Account		1		1	1
Non-Res Number of Fixtures per Account				1	1
Affected Units	System	Account	Account	Account	Account
	Costs include: \$30,000 for a leak detection survey; \$50,000 to set up a baseline monitoring program of nighttime leakage; \$50,000 to deal with the backlog of leaks found on mainlines and service connections plus \$25,000 per year for maintaining a lower level of leakage indefinitely.	Program includes customer contact and follow up concerning continuous reads. Those with leaks may get a remote reading device to track water use more closely, depending upon cost and availability from Badger meter. Customers spend \$500 to deal with identified leaks on their side of meter.			
Notes					
Number of SF Accounts in 2015	NA	279	NA	124	
Number of MF Accounts in 2015	NA	103	NA		7
Number of COM Accounts in 2015	NA		NA		
Total Number of SF/VR Accts		3,912			

Notes:

RSF = Residential Single Family
 RMF = Residential Multi Family
 BUS/COM= Commercial
 IND = Industrial
 IRR = Dedicated irrigation meters

INS = Institutional/Public, buildings / grounds owned by the Water Utility or Cambria CSD
 NRSF = New Single Family Homes
 GOV = Government

	6	7	8	9	10
Short Name	Showerhead Giveaway	HET Rebates	HET HEU Exchange	School Retrofit	Irr Upgrades
Measure Name	High Efficiency Showerhead Giveaway	High Efficiency Toilet (HET) Rebates	High Efficiency Toilet and / or Urinal Exchange Day (e.g., Niagara Program)	School Building Retrofit	Require Irrigation and Landscape Upgrades
Applicable Customer Classes	SF MF CII VR	SF/MF Indoor	ALL	CII Indoor / Outdoor	New construction only
	Sunset old CUWCC BMP 2.	CUWCC BMP 3.4. And New State Law AB 715 after 2014.	CUWCC BMP 3.4. And New State Law AB 715 and SB 407	Include with CUWCC BMP 4	CUWCC BMP 5.
	Showers, Faucets	Toilet	Toilet	CII Equipment	Irrigation
Customer Classes	SF,MF,COM,VR	SF,MF	SF,MF,COM	COM	MF,COM
Applicable End Uses	Showers, Faucets	Toilets	Toilets, Urinals	School Indoor and Outdoor use	Irrigation
Market Penetration by End Of Program (%)	14%	15.0%	5%	6%	100%
Annual Market Penetration (%)	2.0%	3.0%	0.71%	1.50%	100%
Use Only New Accounts	FALSE	FALSE	FALSE	FALSE	TRUE
Water Use Reductions For Targeted End Uses	.49,.49,.49,.25,.25,.25	53%	.53,.53,.53,.53	15%	15%
Evaluation Start Year	2013	2013	2014	2013	2013
Evaluation End Year	2017	2014	2015	2018	2042
Program Length, years	7	3	7	4	30
Measure Life, years	Permanent	Permanent	Permanent	Permanent	Permanent
Saves Hot Water	TRUE	FALSE	FALSE	TRUE	FALSE
Utility Unit Cost for SF accounts, \$/unit	\$10	\$80	\$300		
Utility Unit Cost for MF accounts, \$/unit	\$10	\$80	\$300		\$100
Utility Unit Cost for non-Res accounts, \$/unit	\$10		\$600	\$3,000	\$100
Customer Unit Cost. \$/SF unit	\$0	\$200			
Customer Unit Cost. \$/MF unit	\$0	\$200			\$500
Customer Unit Cost. \$/non-Res unit	\$0			\$3,000	\$500
Annual Utility Admin & Marketing Cost	25%	30%		30%	30%
SF Number of Fixtures per Account	2.2	2.2	2.2		
MF Number of Fixtures per Account	2.3	4.0	2.3		1
Non-Res Number of Fixtures per Account	2.2		3.3	1	1
Affected Units	Showers, Faucets	Toilets	Toilets, Urinals	School	Irrigation
Notes		Stop program in 2014, when new HET sales law takes effect and to avoid running out of old toilets to replace. Assume 1/3 of replacements are 1.6 gpf and 2/3 are 3.5 gpf.	Run program for two years after rebate program. Assume 1/3 of replacements are 1.6 gpf and 2/3 are 3.5 gpf.		
Number of SF Accounts in 2015	49	0	18		
Number of MF Accounts in 2015	49	0	1		1
Number of COM Accounts in 2015	3		2	3	2
Total Number of SF/VR Accts					

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	11	12	13	14	15
Short Name	Fixture Replace	MF Submetering	Water Softeners	Meter Replacement	Prohibit Waste
Measure Name	Require Fixture Replacement by a Deadline	Require Multi Family Submetering on New Accounts	Non regenerative Water Softeners Incentives	Large Meter Replacement and Leak monitoring	Prohibit Water Waste and Practices
Applicable Customer Classes	ALL	New MF Indoor	All	COM	ALL
	Combine with New Ordinance update (measure 24). Make a part of CUWCC BMP 3.5	Expensive for owner.		Supporting CUWCC Foundational BMP 1.3.	Existing CUWCC Foundational BMP 1.1
	Ordinance	Ordinance	Water Softeners	AMR	Ordinance
Customer Classes	SF,MF,COM,VR	MF	SF,MF	COM	SF,MF,COM,VR,OTH
Applicable End Uses	Toilets,Urinals,Faucets,Showers	All	Int. Leakage, Other	ALL	Leakage
Market Penetration by End Of Program (%)	6%	100%	12%	10%	25%
Annual Market Penetration (%)	0.86%	100%	2%	1%	5%
Use Only New Accounts	FALSE	TRUE	FALSE	FALSE	
Water Use Reductions For Targeted End Uses	.53,.05,.23,.53,.05,.23,.53,.53,.05,.23,.	0.1	60%	15%	5%
Evaluation Start Year	2013	2013	2013	2013	2012
Evaluation End Year	2017	2042	2019	2019	2042
Program Length, years	7	30	7	7	30
Measure Life, years	Permanent	Permanent	Permanent	Permanent	5
Saves Hot Water	TRUE	TRUE	FALSE	TRUE	FALSE
Utility Unit Cost for SF accounts, \$/unit	\$50		\$500		\$25
Utility Unit Cost for MF accounts, \$/unit	\$50	\$300	\$100		\$25
Utility Unit Cost for non-Res accounts, \$/unit	\$50		\$300	\$2,200	\$25
Customer Unit Cost. \$/SF unit	\$400		\$300		
Customer Unit Cost. \$/MF unit	\$400	\$3,000	\$300		
Customer Unit Cost. \$/non-Res unit	\$3,000		\$1,000		
Annual Utility Admin & Marketing Cost	30%	30%	25%	45%	30%
SF Number of Fixtures per Account	1		1		1
MF Number of Fixtures per Account	1	2.3	1		1
Non-Res Number of Fixtures per Account	1		1	1	1
Affected Units	Toilets,Urinals,Faucets,Showers	Meter	Water Softeners	Account	Account
	Stop program after AB 407 takes effect. Assume 1/3 of toilet replacements are 1.6 gpf and 2/3 are 3.5 gpf.		Price based on moving to a salt free system (Pelican); Pelican claims 6,500 gal/yr savings or about 10% of SF total use or 60% of other + leak end uses. http://www.pelicanwater.com/salt_free_water_softeners.php?gclid=C17090u6hLQCFcN_QgodNh0ADA	Badger meter cost for 2 inch meter. Add installation cost? All paid by CCSD? Admin cost allows for monitoring for leaks	
Notes					
Number of SF Accounts in 2015	21				124
Number of MF Accounts in 2015		1		49	11
Number of COM Accounts in 2015		2		3	1
Total Number of SF/VR Accts					

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	16	17	18	19	20
Short Name	HECW Rebate	CII Surveys	HEU Rebate	Hotel Surveys	Retrofit on Resale
Measure Name	High Efficiency Washer Rebate	CII Surveys and Top 25 Users Program	High Efficiency Urinal Rebate (<0.25 gallon)	Focused Water Audits for Hotels/Motels	Toilet Retrofit on Resale or Name Change on Water Account
Applicable Customer Classes	ALL	CII Indoor / Outdoor	Existing CII Indoor	CII Indoor / Outdoor	ALL
	CUWCC BMP 3.3. Partner with PG&E.	Supports new CUWCC BMP 4 that requires savings be met. Need supporting surveys.	Supports CUWCC BMP 4	Include with CUWCC BMP 4	CUWCC BMP 3.4. And New State Law AB 715
	Clothes Washers	CII Equipment	Urinals	CII Equipment	Toilet
Customer Classes	SF,MF,COM	COM	COM	COM	SF,MF
Applicable End Uses	Laundry	All	Urinals	All	Toilets
Market Penetration by End Of Program (%)	25%		25%	100%	
Annual Market Penetration (%)	4.0%	5	5%	5	1%
Use Only New Accounts	FALSE	FALSE	FALSE	FALSE	FALSE
Water Use Reductions For Targeted End Uses	40%	20%	84%	15%	53%
Evaluation Start Year	2013	2013	2013	2013	2012
Evaluation End Year	2019	2019	2019	2019	2017
Program Length, years	7	7	7	7	7
Measure Length, years	Permanent	Permanent	Permanent	Permanent	Permanent
Saves Hot Water	TRUE	TRUE	FALSE	TRUE	FALSE
Utility Unit Cost for SF accounts, \$/unit	\$150				\$50
Utility Unit Cost for MF accounts, \$/unit	\$300				\$50
Utility Unit Cost for non-Res accounts, \$/unit	\$1,500	\$3,000	\$100	\$3,000	\$50
Customer Unit Cost. \$/SF unit	\$300				\$400
Customer Unit Cost. \$/MF unit	\$600				\$400
Customer Unit Cost. \$/non-Res unit	\$3,000	\$5,000	\$500	\$3,000	\$3,000
Annual Utility Admin & Marketing Cost	25%	25%	30%	25%	25%
SF Number of Fixtures per Account	1				2.2
MF Number of Fixtures per Account	2				2.3
Non-Res Number of Fixtures per Account	5	1	1	1	3.3
Affected Units	Clothes Washers	Account	Urinals	Account	Account
Notes					Stop program after AB 407 takes effect. Assume 1/3 of toilet replacements are 1.6 gpf and 2/3 are 3.5 gpf.
Number of SF Accounts in 2015	98				25
Number of MF Accounts in 2015	5				1
Number of COM Accounts in 2015	9	5	11	5	
Total Number of SF/MR Accts					

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 NRSF = New Single Family Homes
 GOV = Government

	21	22
Short Name	Conservation Pricing	Hot Water Recirc
Measure Name	Conservation Pricing	Hot Water Recirculator
Applicable Customer Classes	SF,VR Indoor / Outdoor	SF Indoor
	CUWCC Foundational BMP 1.4.	
	SF,VR Indoor / Outdoor	SF
Customer Classes	All	SF
Applicable End Uses		Faucets,Showers
Market Penetration by End Of Program (%)		35%
Annual Market Penetration (%)		5.8%
Use Only New Accounts	FALSE	FALSE
Water Use Reductions For Targeted End Uses	Elasticity's: -0.05 indoor; -0.2 outdoor	21%
Evaluation Start Year	2013	2013
Evaluation End Year	2040	2018
Program Length, years	22	6
Measure Life, years	Permanent	Permanent
Saves Hot Water	TRUE	TRUE
Utility Unit Cost for SF accounts, \$/unit	\$10	\$203
Utility Unit Cost for MF accounts, \$/unit	\$0	\$203
Utility Unit Cost for non-Res accounts, \$/unit	\$0	\$0
Customer Unit Cost. \$/SF unit	\$0	\$100
Customer Unit Cost. \$/MF unit	\$0	\$100
Customer Unit Cost. \$/non-Res unit	\$0	\$0
Annual Utility Admin & Marketing Cost	25%	25%
SF Number of Fixtures per Account		1.0
MF Number of Fixtures per Account		1.0
Non-Res Number of Fixtures per Account		
Affected Units	Account	Faucets,Showers
		Assume unit saves 10 gal/day/home and have about 30 participants per year. Units cost CCED when purchased in bulk.
Notes		
Number of SF Accounts in 2015	NA	144
Number of MF Accounts in 2015	NA	
Number of COM Accounts in 2015	NA	
Total Number of SF/VR Accts		

Notes:

RSF = Residential Single Family
 RMF = Residential Multi Family
 BUS/COM= Commercial
 IND = Industrial
 IRR = Dedicated irrigation meters

INS = Institutional/Public, buildings / grounds owned by the Water Utility or Cambria CSD
 NRSF = New Single Family Homes
 GOV = Government

Appendix C – Detailed Analysis of Water Usage by Customer Category

Figure C-1. Number of lots by size

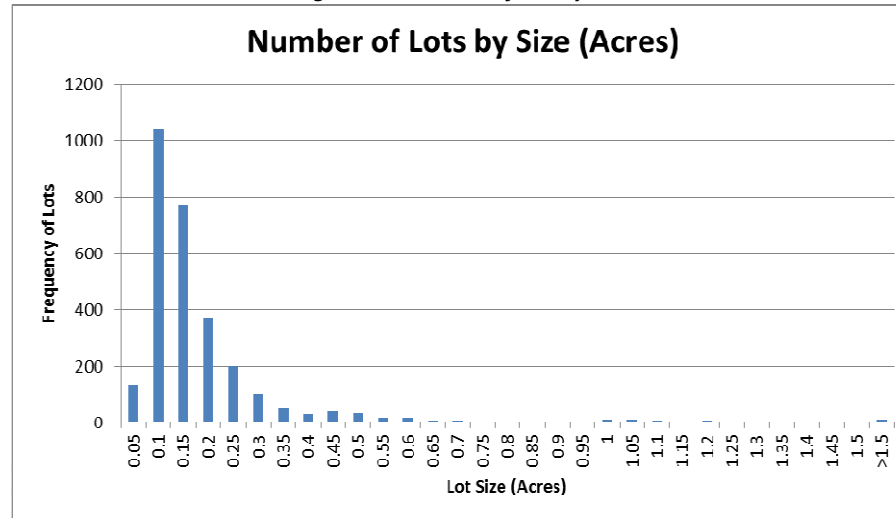


Figure C-2. Single Family Water Use with Lot Size 0.3 to 2 acres and water use more than 25 gal/day

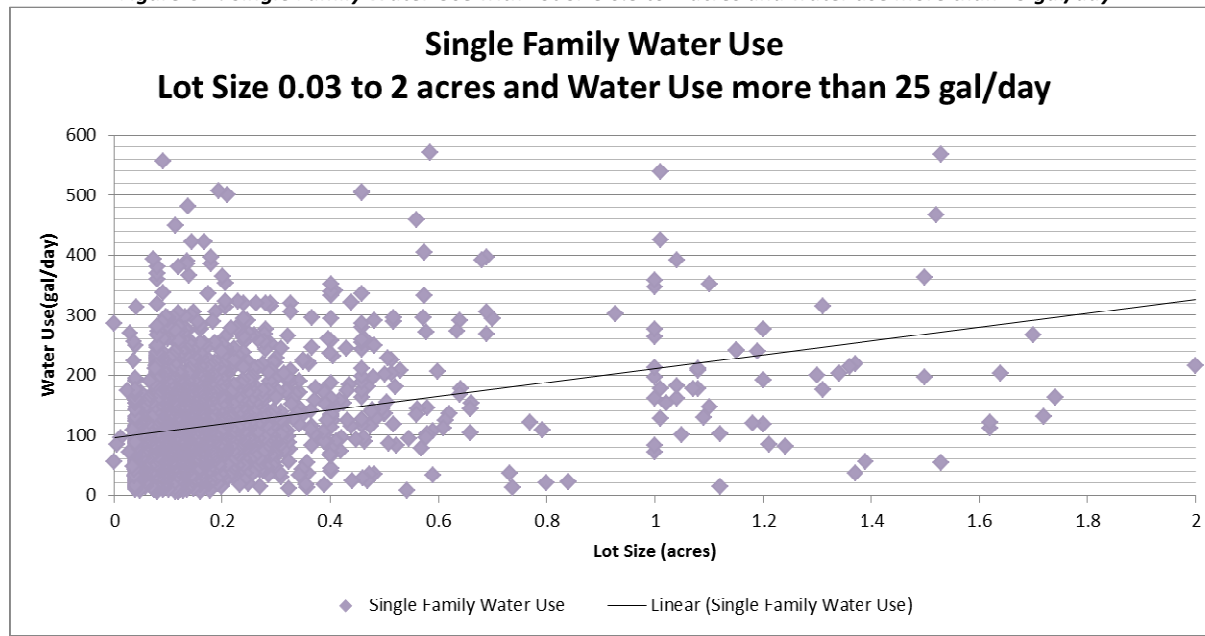


Figure C-3. Number of Single Family Houses by Size

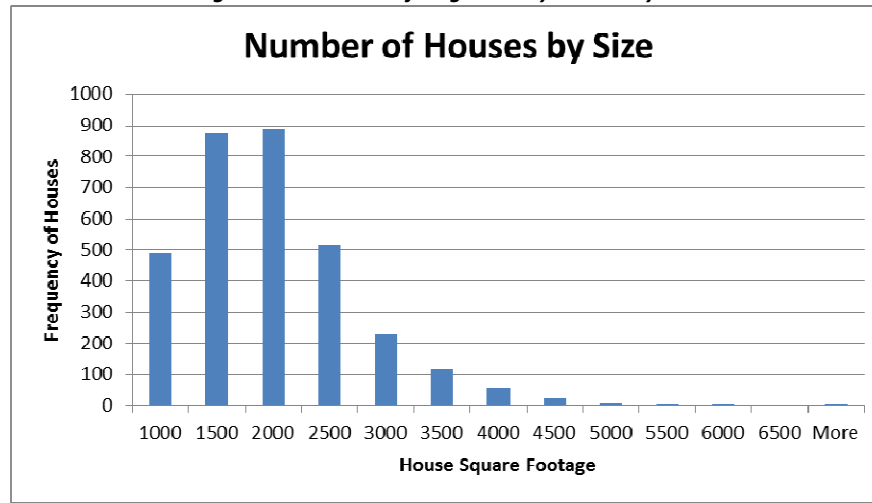


Figure C-4. Single Family Water Use with House Size 300 to 6,800 sq ft and water use more than 25 gal/day

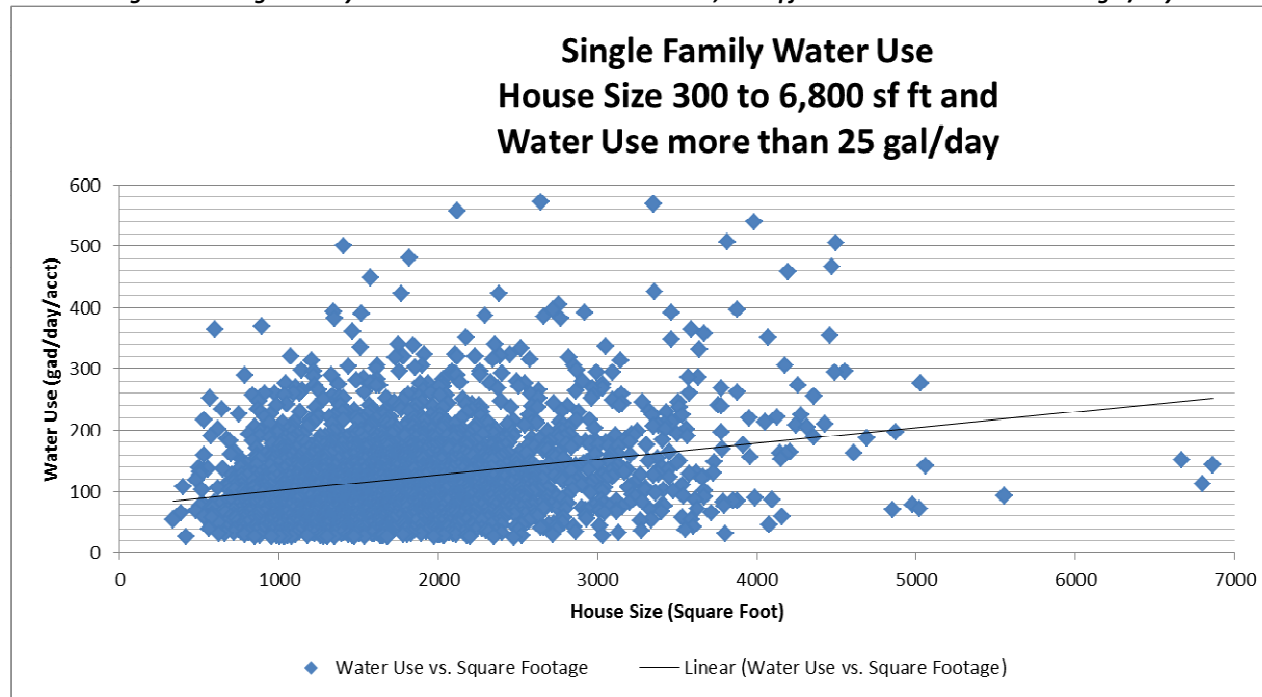


Figure C-5. Single Family Water Use with number of bathrooms and water use more than 25 gal/day

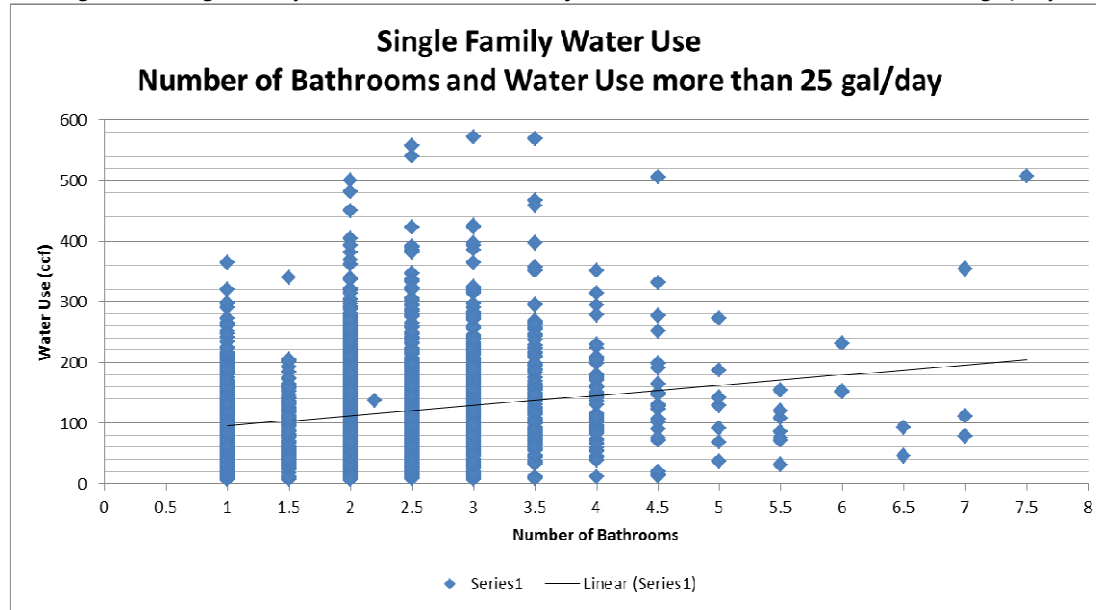


Figure C-6. Single Family Water Use with number of bedrooms and water use more than 25 gal/day

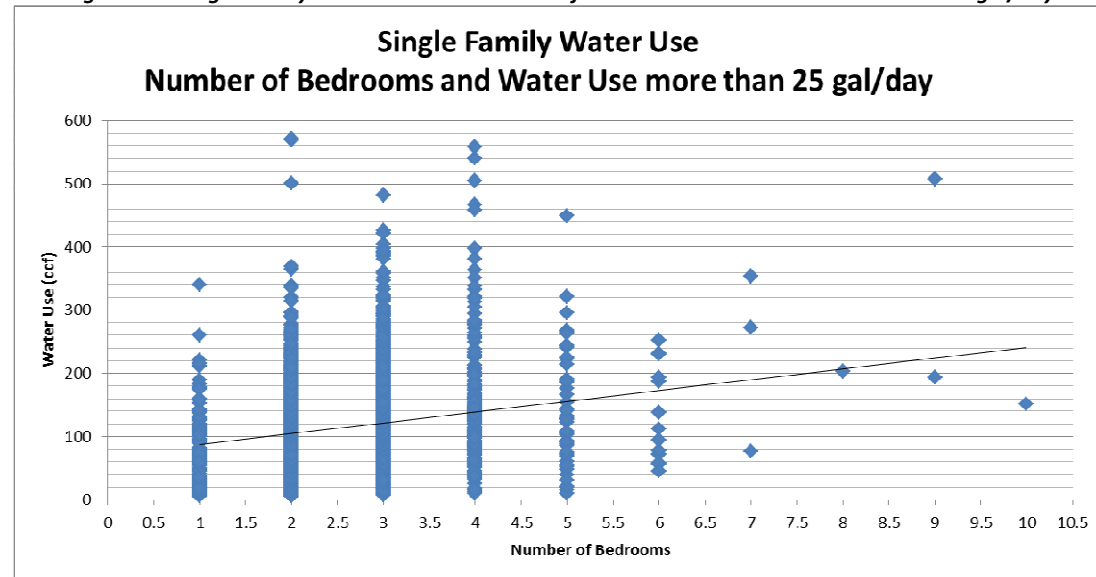


Figure C-7. Commercial Water Use with Parcel Size less than 1 acre vs. water use in gallons per day

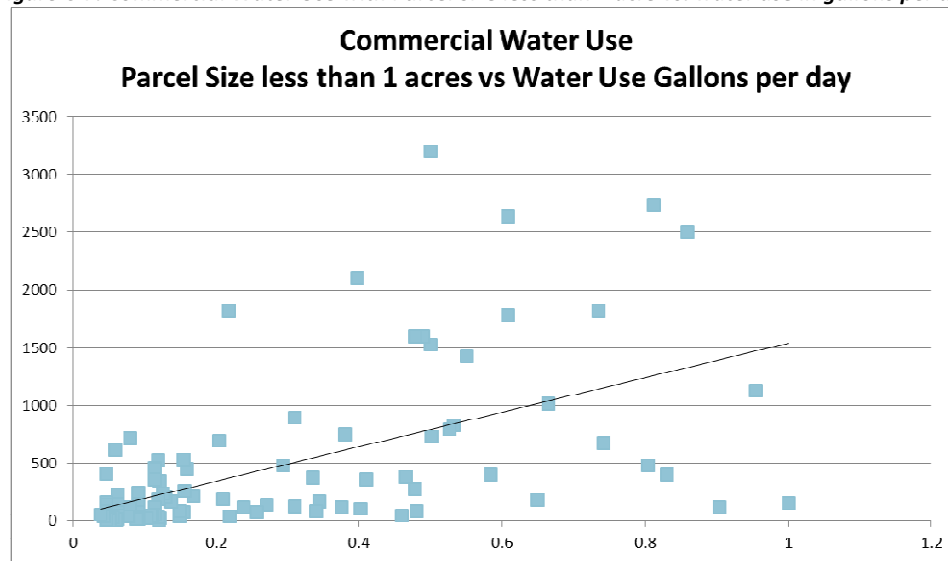


Figure C-8. Commercial Water Use by building size

