Los Osos ISJ Working Group
County of San Luis Obispo
Golden State Water Company
Los Osos Community Services District
S&T Mutual Water Company

2011 Water Demand Analysis and Water Conservation Evaluation

ADMINISTRATIVE REVIEW DRAFT

April 5, 2011

MADDAUS
WATER
MANAGEMENT

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1. EXECUTIVE SUMMARY

1.1 Introduction

This 2010 demand and conservation technical analysis was conducted by Maddaus Water Management (MWM) for the Los Osos ISJ Working Group. The goals of this analysis are to:

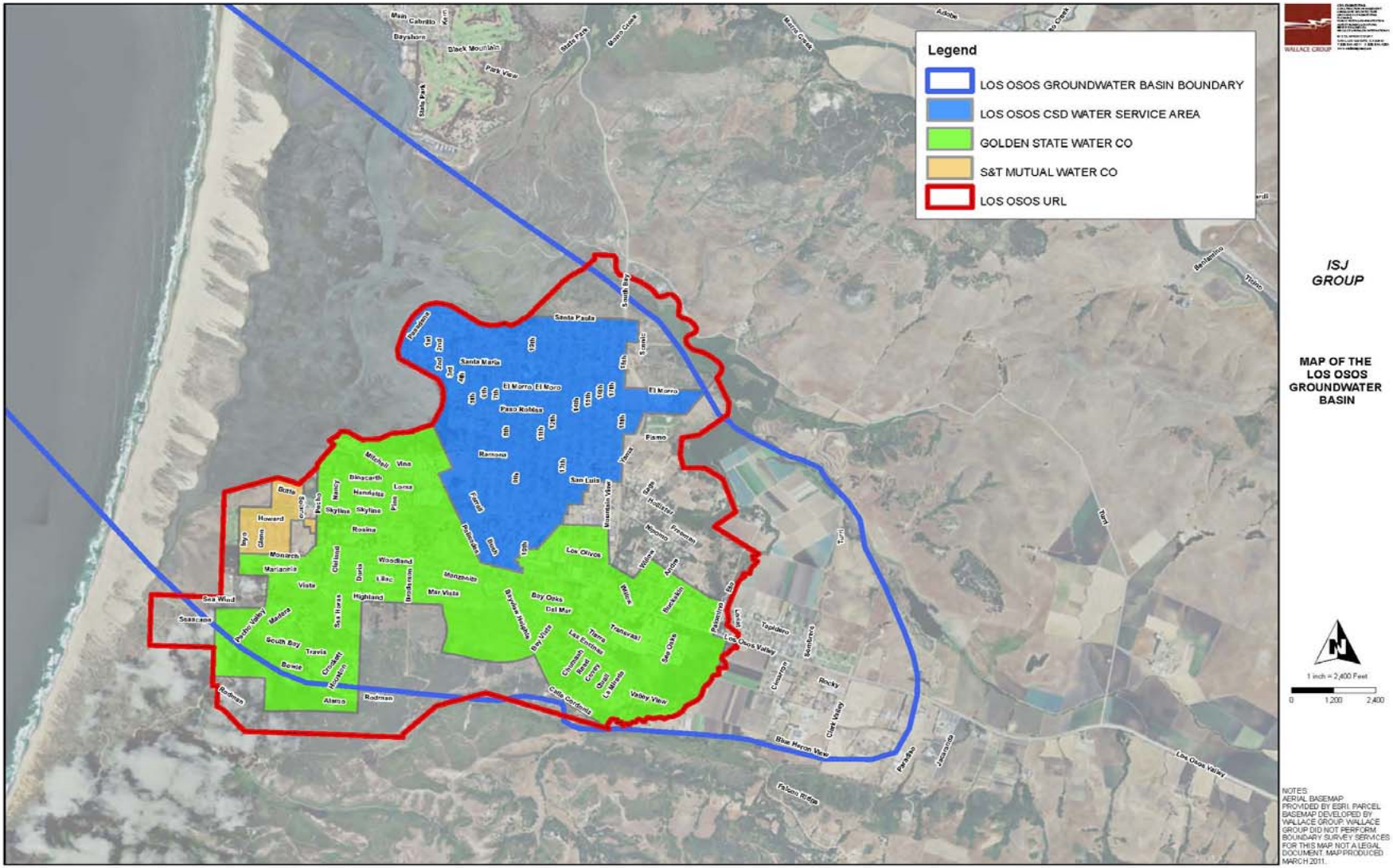
1. Create a water demand forecast for the years 2010 to 2035 under certain assumptions.
2. Project the costs and water savings of selected conservation measures for the years 2010 to 2035.
3. Develop a set of conservation programs.
4. Determine when and what combination of the proposed conservation measures would meet the residential indoor water use target of 50 gallons per person per day.

1.2 Water Use and Demographic Data Inputs to the Model

The first step in this analysis was to review and analyze historical water use production and billing data for the three Los Osos service areas included in this study: Golden State Water Company, Los Osos Community Services District and S & T Mutual Water Company. Available water production and billing data was provided for six years 2004 to 2009. The data was analyzed and discussed with the agencies. Historical water use graphs have been generated and are included in Appendix B. The historical water use and selected population projections were used to create water demand forecasts for the years 2010 to 2035.

Figure 1 shows the purveyor and planning boundaries that are relevant to this analysis. The projected water demands and projected per capita water use values were developed utilizing purveyor supplied information for the areas shown within the purveyor boundaries. Over 97% of the current population is within the Los Osos Urban Reserve Line (URL), as shown on Figure 1. The analysis assumptions derived for the current population within the purveyor boundaries have been applied to the entire URL to create the future projections. This approach is consistent with the Working Group's intent to utilize build-out projections, provided by the San Luis Obispo County Planning Department, for the population within the URL. This is also consistent with the intent to apply water conservation measures basin-wide for properties served by both purveyors and private on-site wells.

Figure 1: Water Purveyor and Planning Boundaries Map



1.3 Water Demands Analysis

The projected water demands are strongly dependent on projected population growth. Two potential population projections were supplied so two separate water demand projections have been developed, one for each population projection. The first projection is based on information developed by the County during the last update of the Estero Area Plan, the population in the Los Osos service area within the URL is anticipated to increase by 35% over the next 25 years. The addition of future population is contingent on a number of critical factors, including evidence that sea water intrusion has been addressed, a sustainable water supply has been secured, a Habitat Conservation Plan is adopted, and the Estero Area Plan is updated. The no growth population projections show less than 1% population growth over the next 25 years.

Table 1 shows the projected water demands with and without the plumbing code in five year increments for the years 2009 to 2035 for the population projection with planned growth. Table 2 shows the projected water demands with and without the plumbing code in five year increments for the years 2009 to 2035 for the population projection with no growth. The plumbing code includes the water savings from the Cal Green building requirements which took effect on January 1, 2011.

The demands were created with and without the plumbing code to help understand the effects of the plumbing code on the water demands. All water conservation programs in this analysis use the water demands with the plumbing code and with planned population growth as the starting point to calculate future water demands with savings. The Plumbing Code includes the new California State Law requiring High Efficiency Toilets and High Efficiency Urinals by 2014.

The water demands developed using the population projections with planned growth show an increase in water demand of 19% if no conservation measures are implemented and only the plumbing code is in effect. The water demands with no population growth show a decrease of 12% over the next 25 years in water demand due to the effects of the plumbing code alone. All of the water demand projections were developed using the Least Cost Planning Water Demand Management Decision Support System model (DSS model).

Table 1: Water Demand Projections for Los Osos within the URL (Planned Population Growth)

Water Demand Projections Planned Population Growth Los Osos Within Urban Reserve Line	2009	2010	2015	2020	2025	2030	2035
Water Demand without the Plumbing Code (AF/yr)	2,056	2,056	2,056	2,304	2,581	2,792	2,792
Water Demand with the Plumbing Code (AF/yr)	2,056	2,049	1,999	2,153	2,333	2,469	2,439
Population	14,452	14,452	14,452	16,192	18,142	19,627	19,627

*Data is not weather normalized. Total water use is potable only and does not include recycled water use.

Table 2: Water Demand Projections for Los Osos within the URL (No Population Growth)

Water Demand Projections No Population Growth Los Osos Within Urban Reserve Line	2009	2010	2015	2020	2025	2030	2035
Water Demand without the Plumbing Code (AF/yr)	2,056	2,056	2,057	2,058	2,059	2,060	2,061
Water Demand with the Plumbing Code (AF/yr)	2,056	2,049	2,000	1,923	1,861	1,822	1,800
Population	14,452	14,452	14,459	14,466	14,474	14,481	14,488

*Data is not weather normalized. Total water use is potable only and does not include recycled water use.

1.4 Conservation Programs and Measures

After the water demands were completed, 31 conservation measures were analyzed that addressed a wide range of water uses. A list of the conservation measures and which of the five programs contain these measures is in Table 3. Full descriptions of the 31 conservation measures can be found in section 5.1 and a list of all assumptions used for each measure can be found in Appendix A. Three measures were identified that should be strongly considered by individual property owners, but were not selected for purveyor implementation. These measures will continue to be an important part of the Public Information process. They include:

- Cisterns/rain catchment
- Gray water use
- Turf removal

The County, in conjunction with the wastewater project, has also committed to supporting the cisterns/rain catchment and gray water measures. Public outreach and assistance in the re-purposing of existing septic tanks for these uses, as well as, pilot projects and incentives are planned for the property owner connection phase of the wastewater project.

Table 3: Conservation Programs and Measures

	Conservation Programs and Measures Los Osos Within Urban Reserve Line Measure Name	Program A	Program B	Program C	Program D	Program E
22	Commercial High Efficiency Washer Rebate	✓	✓	✓	✓	✓
11	Public Information Program	✓	✓	✓	✓	✓
1	High Efficiency Toilet (HET) Rebates	✓	✓	✓		
4	Residential Washer Rebates	✓	✓	✓	✓	
24	Toilet Retrofit on Resale or Name Change on Water Account	✓	✓	✓	✓	✓
30	Commercial, Industrial and Institutional Surveys		✓	✓	✓	✓
3	Distribute Retrofit Kits		✓	✓	✓	✓
23	Media Campaign: Such as the Twenty Gallon Challenge		✓	✓	✓	✓
27	Pricing Measure Model		✓	✓	✓	✓
12	Rebates for Rain Sensors		✓	✓	✓	✓
15	Replace Restaurant Spray Nozzles		✓	✓	✓	✓
17	School Building Retrofit		✓	✓	✓	✓
21	Install Service Meters in S&T Area			✓	✓	✓
5	Residential Water Surveys			✓	✓	✓
19	Subsidized Partial Community Retrofit				✓	✓
20	Subsidized Community Retrofit (Add Washers)					✓
16	New Dev Require Efficient Fixtures in Com, Ind and Inst Buildings		✓	✓	✓	✓
9	New Dev Require Hot Water on Demand/Structured Plumbing		✓	✓	✓	✓
10	New Dev Require Multi Family Submetering on New Accounts		✓	✓	✓	✓
2	New Dev Require New Landscape and Irrigation Requirements		✓	✓	✓	✓
6	New Dev Require Plumbing for Future Gray Water Use		✓	✓	✓	✓
25	New Dev Require Smart Irrigation Controllers and Rain Sensors		✓	✓	✓	✓
8	New Dev Residential Require High Efficiency Clothes Washers		✓	✓	✓	✓
7	New Dev Residential Require Efficient Dishwashers			✓	✓	✓
28	Cisterns/Rain Catchment					
13	Efficient Outdoor Use Education and Training Programs					
29	Graywater Retrofit Single Family					
18	Prohibit Water Waste and Practices					
31	Require Fixture Replacement by a Deadline					
14	Rotating Sprinkler Nozzle Rebates					
26	Turf Removal					

Each measure that was selected was then analyzed to establish how much water the measures would save over the next 25 years if run on a stand-alone basis and to determine how much the measure would cost. This analysis was done without accounting for interaction or overlap from other measures that might address the same end uses. The interaction of overlapping end uses was taken into account in the next step, the program analysis. Only the highest benefit to cost ratio measures were included in each program.

Using the best benefit to cost ratio measures, five conservation programs were created to demonstrate different approaches to water conservation planning. Program A contains the conservation measures that are currently in place in the Los Osos area. This program is used as a baseline to compare other programs to and is used to see what is projected to happen if no further conservation measures are implemented.

Programs B and C are incrementally more aggressive than Program A. Program B contains all the measures in Program A and adds sixteen more measures with a benefit to cost ratio above four. Program C adds to Program B by adding four more measures which are more aggressive in spending but yield only slightly higher water savings.

Program D was designed to contain almost all of the measures in Program C and adds one measure, the measure to subsidize the retrofit of customer inefficient toilet, faucet and showerhead fixtures with funding provided from the County's wastewater project, consistent with the adopted Coastal Development Permit. This retrofit of fixtures is planned to occur prior to the connection of customers to the new sewer collection system. This measure is designed to take only two years to complete at a very high dollar cost but has the benefit of getting the water use per capita down quickly.

Program E is the same as Program D but it adds one more measure. It adds the measure to subsidize the retrofit of customer's clothes washers while the wastewater project construction is ongoing. This measure has a substantially higher cost than just retrofitting the other fixtures and does not return a large increase in the water savings. These conservation programs are described in detail in section 6.1.

While the population increase will not occur until substantial conservation measures are already in place, Figure 2 shows the projected water savings resulting from each potential water conservation program. For comparison, Figure 3 shows the projected water savings for each program assuming no increase in the existing population. The implementation of the selected conservation program is intended to be a key element in the correction of the existing groundwater basin overdraft condition that has led to seawater intrusion.

Following the confirmation of a sustainable water supply and adoption of a new Estero Area Plan and Habitat Conservation Plan, the population within the Los Osos URL is anticipated to increase by 35% over the next 25 years. If the population increases and only current conservation measures are in place, water demands would be expected to increase 15%. If the least aggressive Program B is implemented, water demands are projected to increase only 2% despite the increase in population. If the more aggressive Program D is chosen then the water demands are projected to slightly decrease by 1% in 25 years.

Figure 2: Water Demands with Conservation Savings Projections (Planned Population Growth)

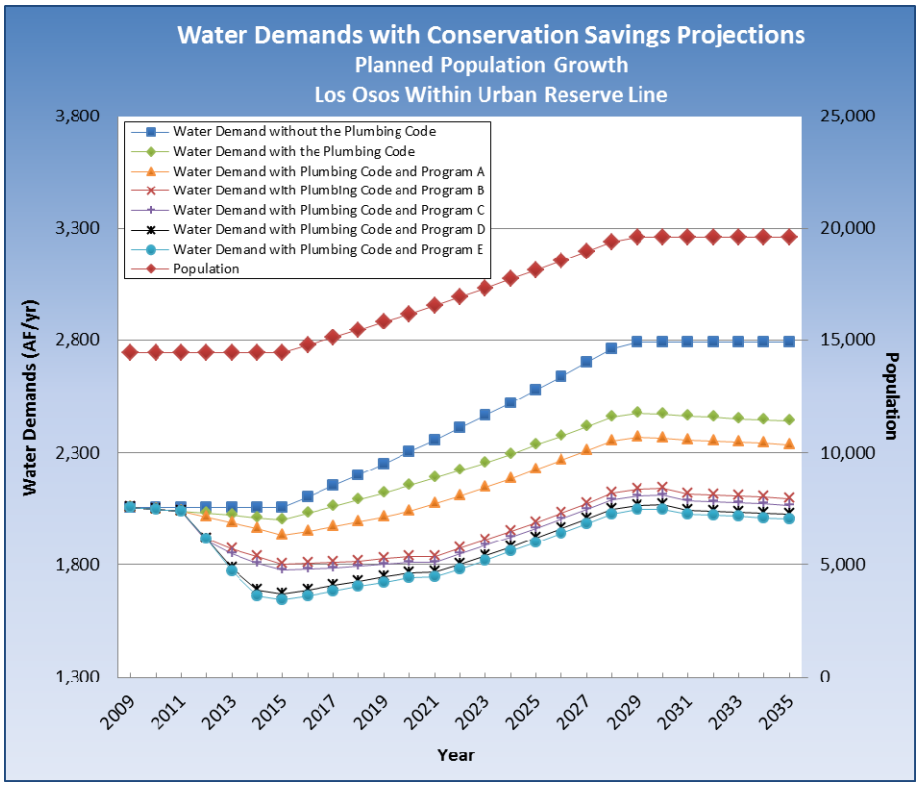
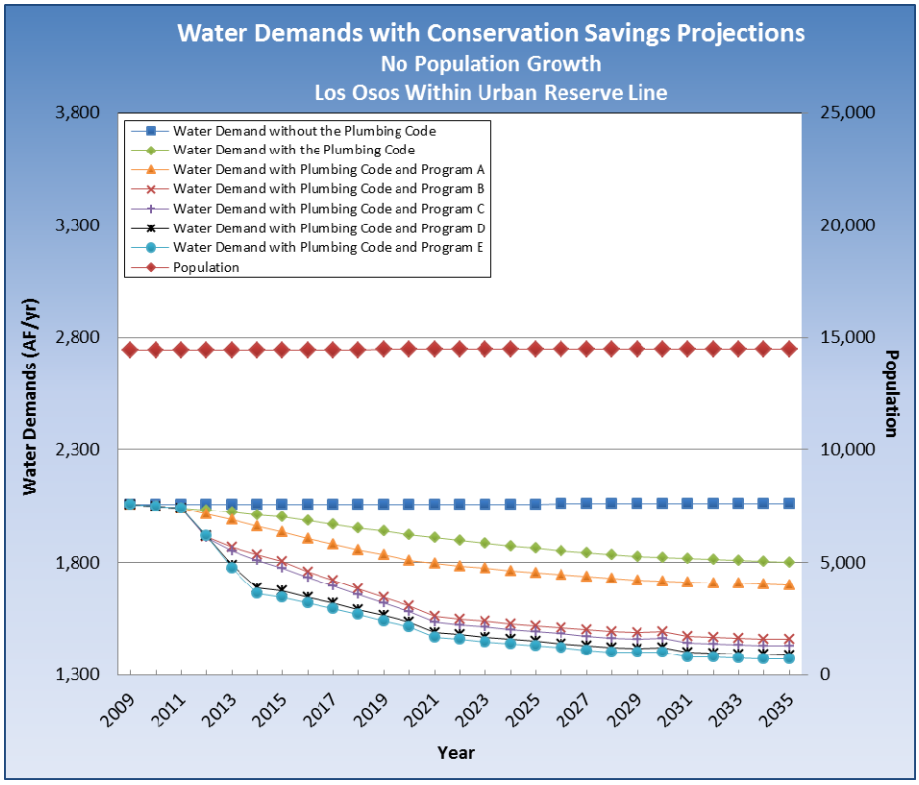


Figure 3: Water Demands with Conservation Savings Projections (No Population Growth)



The present value cost for program B is about $1.3 million over the next twenty five years while the cost of Program C is $2.1 million as shown in Table 4 below. Program D (costing $1.6 million more than C) and Program E show the same water demand trend as Programs B and C but with a sharp decrease in water use in years 2013 and 2014 due to the subsidized retrofit measures. Program E yields a less than 1% improvement in water use reduction over Program D but costs an additional $600,000 over the next twenty five years to implement. Table 4 contains the benefits and costs of each program as well as the water savings in years 2015 and 2035. Percentage reductions in water use are relative to water demands without the plumbing code. It also contains the total cost of the programs over the twenty five year analysis period and the first five year costs for these programs.

Table 4: Economic Analysis of Alternative Programs

Economic Analysis of Alternative Programs
Los Osos Within Urban Reserve Line

Conservation Program	Water Utility Benefit-Cost Ratio	Community Benefit-Cost Ratio	2035 Water Savings (AF/Yr)	2035 Indoor Water Savings (AF/Yr)	2035 Outdoor Water Savings (AF/Yr)	Total Water Savings as a Percentage of Total Production in 2035	Present Value of Water Utility Costs	First Five Year Water Utility Cost (2012 - 2016)	Water Utility Cost of Water Saved ($/AF)
Without the Plumbing Code	NA	NA	0	0	0	0%	NA	NA	NA
With the Plumbing Code	NA	NA	353	323	0	14.5%	NA	NA	NA
Plumbing Code plus Program A	7.20	2.95	455	450	5	18.7%	$692,533	$468,919	$261
Plumbing Code plus Program B	12.25	2.18	697	532	165	28.6%	$1,287,919	$675,217	$151
Plumbing Code plus Program C	8.28	2.06	726	551	175	29.8%	$2,071,509	$1,154,872	$223
Plumbing Code plus Program D	5.30	2.08	775	600	175	31.8%	$3,866,083	$3,225,215	$355
Plumbing Code plus Program E	4.76	2.25	795	620	175	32.6%	$4,554,004	$4,038,904	$396

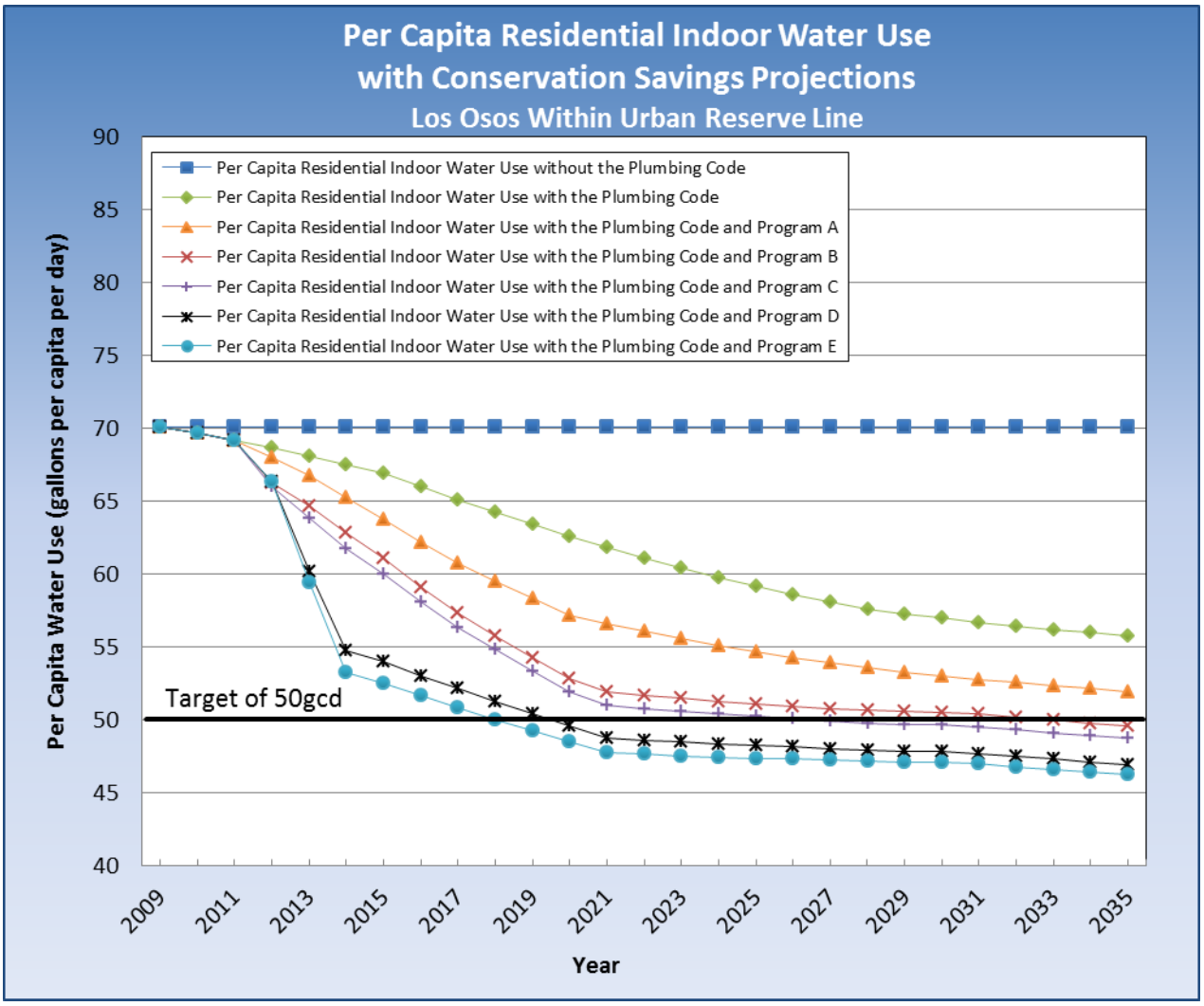
Note: The "Water Utility" refers to the agency or utility that is administering the measure. The community benefit to cost ratio includes the summation of the utility and customer benefits and costs.

1.5 Residential Per Capita Indoor Projections

The final step in the analysis was to determine which conservation programs would meet the wastewater project Coastal Development Permit per capita water use goal of 50 gcd and when this would be accomplished. Currently the indoor residential water use is estimated at 70 gallons per capita per day (gcd). According to the analysis the service area will meet the 50 gcd indoor residential water use targets, with the increase in population, at differing times depending on the conservation plan that is implemented (see Figure 4). The following list presents when each program is projected to meet the 50 gcd target.

- Program A: Will not meet the 50 gcd goal in the next 25 years.
- Program B: Will meet the target in 2032
- Program C: Will meet the target in 2026
- Program D: Will meet the target in 2019
- Program E: Will meet the target in 2018

Figure 4: Per Capita Residential Indoor Water Use with Conservation Savings Projections



2. INTRODUCTION AND PURPOSE

The purpose of this report is to present an overview and the results of the demand and conservation analysis process for the Los Osos service area. This technical analysis was conducted by Maddaus Water Management (MWM) for the Los Osos ISJ Working Group. The goals of this analysis are to:

1. Create a water demand forecast for the years 2010 to 2035 under certain assumptions.
2. Project the costs and water savings of selected conservation measures for the years 2010 to 2035.
3. Develop alternative conservation programs comprised of different combinations of conservation measures.
4. Assess which of the alternative conservation programs meet the residential indoor water use target of 50 gallons per person per day, and when.

The Los Osos ISJ water purveyors and the County of San Luis Obispo have a few conservation measures in place. These measures include a community outreach program, an ordinance which requires home sellers to replace outdated water use fixtures when a house is sold, both GSWC and LOCSD have rate structures that encourage conservation and GSWC has existing rebate programs for high efficiency toilets and clothes washers. These measures were grouped together into a conservation program, called Program A, and analyzed separately so the water demand projections and conservation efforts could be compared between current efforts and potential additional conservation measures.

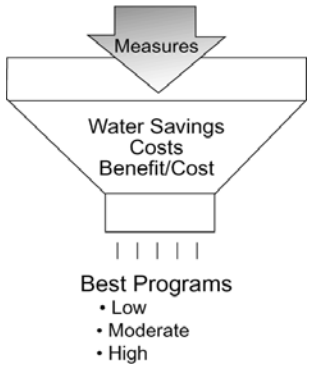
All the conservation measures and programs were analyzed using the Least Cost Planning Water Demand Management Decision Support System (DSS Model). These measures are directed at existing accounts as well as new development measures to make new residential and business customers more water efficient. Five potential conservation programs were created to compare the effects of running multiple measures together over time. These five conservation programs were also analyzed to determine when each program would meet the wastewater project Coastal Development Permit goal of reducing residential indoor water use to 50 gcd. Assumptions and results for each of the 31 individual conservation measures and five conservation programs are presented in detail.

3. OVERVIEW OF EVALUATION PROCESS

Long Term Demand and Conservation Evaluation Process

During the evaluation process, water demand and water savings were estimated. Benefits and costs were compared in a formal present value analysis and conclusions were drawn about which measures produce cost-effective water savings. The measure costs were developed by MWM and listed in Appendix A for each measure. This process can be thought of as an economic screening process, shown in Figure 5. Packaging the best measures into alternative programs allows for consideration about what level of conservation implementation is appropriate.

Figure 5: Evaluation Process



Benefit-cost analysis has been used by many water agencies to evaluate and select the water conservation measures best suited to local conditions. This analysis requires a locale-specific set of data, such as historical water consumption patterns by customer class, population projections, age of dwellings, and prior conservation efforts.

The following ten steps were used to implement this methodology:

1. **Generate water use projections with and without the state and national plumbing code**. Projections cover each key customer category and are broken down into indoor and outdoor end uses. Evaluate the impact of the plumbing code changes arising from the 1992 and 2005 Federal Energy Policy Act. The plumbing code also includes fixture changes that will result from the State of California plumbing code which requires only high efficiency toilets and high efficiency urinals be sold in the state after the year 2014. Recently, this was superseded by a new state plumbing code called Cal Green. This code will require only HETs and HEUs be used in new construction after July 2011. Older fixtures can still be sold for replacement up until 2014.
2. **Evaluate conservation measures.** Identify the measures that are applicable to the service area. Develop appropriate unit water savings and costs for each measure.
3. **Estimate the number of affected customers for each conservation measure.** Divide the number of accounts that implement the measure by the total service area accounts. This factor is called the market penetration or installation rate.
4. **Estimate total annual average day water savings.** The water savings are computed by multiplying unit water savings, per measure, by the market saturation or installation rate (e.g.

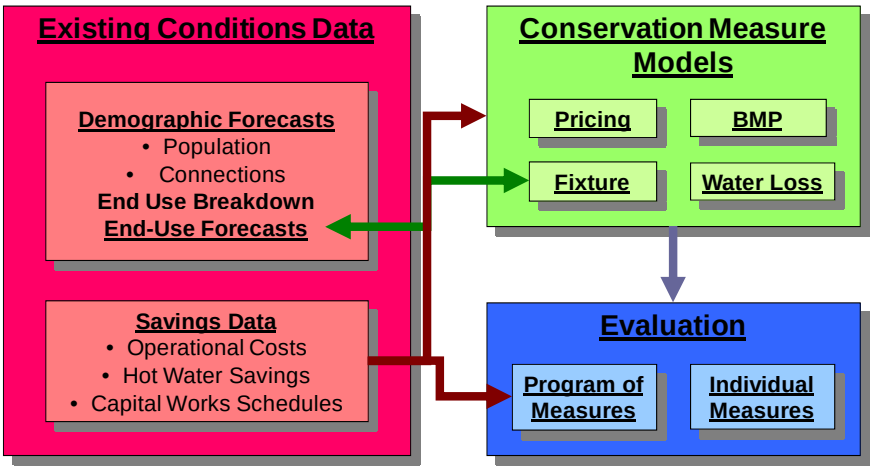
10% to 90% of accounts) and then multiplying by the number of units in the service area (such as dwelling units) targeted by a particular measure. Then indoor and outdoor water savings were calculated.

5. **Identify benefits to the water agency.** Include potential reduction of the capital and operations costs.
6. **Quantify total benefits for each year.** In the planning period multiply the average water savings for each measure by the computed value of the benefits.
7. **Determine initial and annual costs to implement the measures.** This is based upon current conservation program data, local experience, and the costs of goods, services, and labor in the community. This is multiplied by the number of units participating each year and then added to overall administration and promotion costs to arrive at a total measure cost, which may be spread over a number of years.
8. **Compare costs of measures.** Compute the present value of costs and costs of water saved over the planning period.
9. **Compile five programmatic packages.** These programs contain various new and existing measures.
10. **Evaluate the five programs for water savings and cost-effectiveness.** Identify the point of diminishing returns from further investments in conservation.

To evaluate the conservation measures, the DSS Model performs an economic analysis by using net present value and benefit-to-cost ratio as economic indicators. The benefit cost analysis is performed from various perspectives, including the utility's perspective and the community's perspective. The community's benefits and costs equate to the sum of the utility and the customer's benefits and costs.

This methodology of economic analysis of conservation measures is built into the DSS Model. Figure 6 below shows the structure of the DSS Model and gives a graphical representation of how it implements each of the above ten steps.

Figure 6: Structure of the DSS Model



4. WATER DEMANDS

To calculate the water demand projections, future population projections and current demographic data are required. The projections can come from a variety of sources or can be supplied by the agency. The demographic data is usually supplied in the form of monthly water consumption and production data for each customer class. This data is input into the DSS Model in the format it is expecting so water demand projections can be calculated. The following sections describe this data collection and input process and discuss the results of this process.

4.1 Future Population Projections

Description of Population Forecasts

Land use and zoning within the Los Osos area are governed by the adopted Estero Area Plan, a General Plan document prepared and adopted by the County and approved by the Coastal Commission. The current Estero Area Plan is slated for significant revisions in the Los Osos area. This revision is to include the acknowledgement of the previous acquisition and conservation of parcels once slated for subdivision and residential development. As a result, population projections based on the current Estero Area Plan are substantially overstated.

During the development of the LOCSD's wastewater project in 2004 and 2005, the County Planning Department developed an assessment of developable vacant parcels within the Urban Reserve Line. This analysis resulted in reasonable population projection. Wastewater project efforts undertaken by the LOCSD and County have confirmed the projection. As indicated in Section 1.2, the purveyors serve over 97% of the existing URL population, and the future extent of purveyor service within the URL is difficult to forecast. As a result, the conservation analysis has been applied to the entire URL for the purpose of future population projections.

Two potential population projections were supplied. The first projection shows the population in the Los Osos service area within the URL increasing by 35% over the next 25 years. The addition of future population is contingent on a number of critical factors, including evidence that sea water intrusion has been addressed, a sustainable water supply has been secured, a Habitat Conservation Plan is adopted, and the Estero Area Plan is updated. The no growth population projection shows less than 1% population growth over the next 25 years. The population projections are shown below in Figure 7 and Table 5.

Figure 7: Population Projections

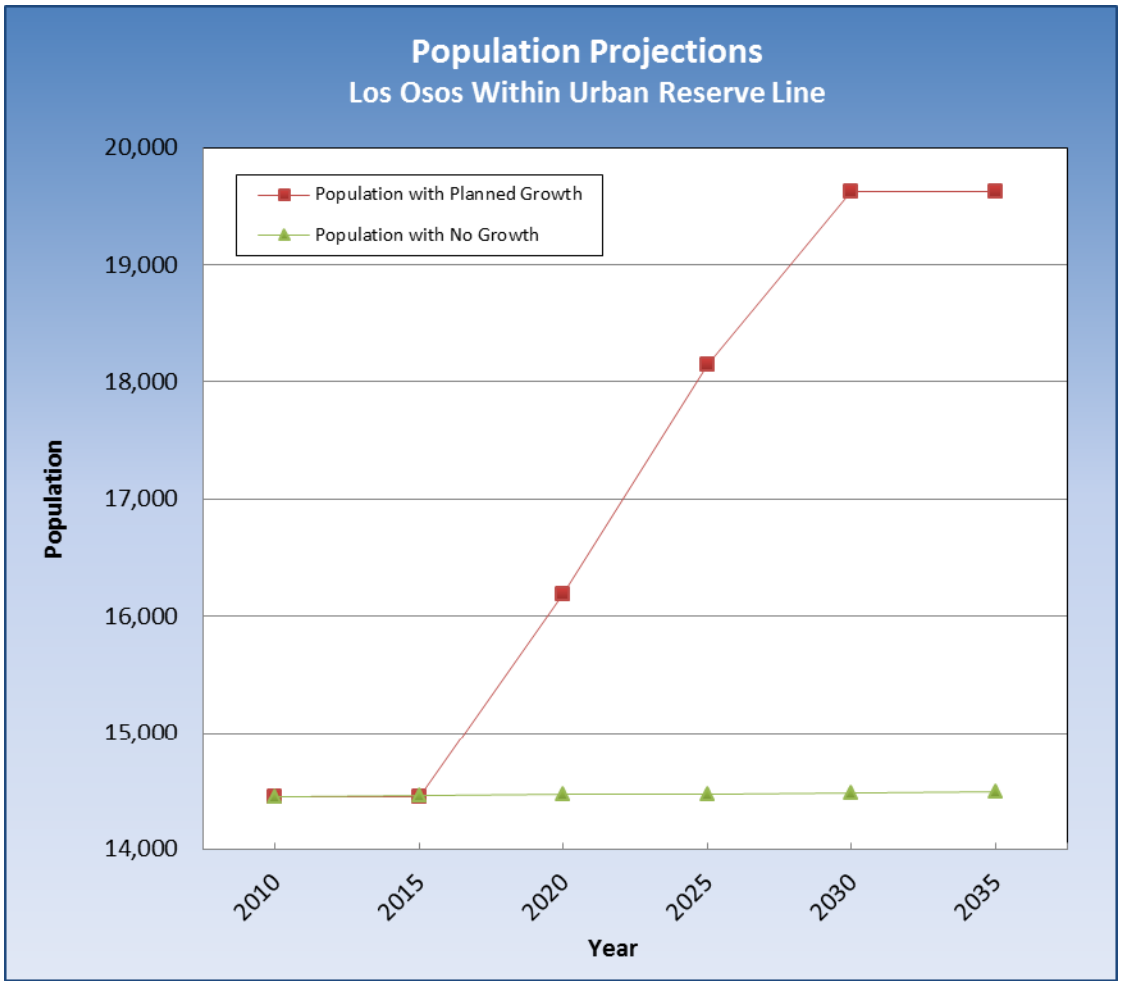


Table 5: Population Projections

Population Projections Los Osos Within Urban Reserve Line		
Year	Population with Planned Growth	Population with No Growth
2010	14,452	14,452
2015	14,452	14,459
2020	16,192	14,466
2025	18,142	14,474
2030	19,627	14,481
2035	19,627	14,488

4.2 Water Use and Demographic Data Inputs to the Model

Historical Water Use Data

The historical water use data that was input into the DSS Model came from data supplied by three Los Osos area water agencies: Golden State Water Company (GSWC), Los Osos Community Services District (LOCSD) and S & T Mutual Water Company (S&T). Each agency has different amounts of information available about their water use.

The Golden State Water Company was able to supply monthly water consumption and service connection data for the past five years divided into seven customer classes: Residential, Commercial, Industrial, Public Authority – Schools, Public Authority – Other, Commercial Irrigation, Fire Service and Other. They also supplied monthly water production for their entire system for the past five years. The Los Osos Community Service District was able to supply monthly water consumption and service connection data for the past five years divided into residential and commercial customer categories. They also supplied school water consumption data for the year 2010 which was used to extrapolate the water consumption for this category for years 2004 to 2009. LOCSD also supplied monthly water production for their entire system for the last twelve years. The S & T Mutual Water Company does not have meters so they were only able to supply production data for their service area for the past sixteen years. The S&T production data was assumed to be all residential water use. We used this data to extrapolate the residential water consumption for the S&T service area by assuming an unaccounted for water (UFW) value of 10%.

This raw and assumed data from all three agencies was combined into three customer categories: Residential, Commercial and Institutional and input into the DSS Model. In order to combine these data sets we had to combine data from multiple customer categories from each agency. The contents of each of the three combined categories are listed below:

Residential Combined Customer Class Contents:

- GSWC Residential
- LOCSD Residential
- S&T Residential

Commercial Combined Customer Class Contents:

- GSWC Commercial
- GSWC Industrial
- GSWC Commercial Irrigation
- GSWC Fire Services
- GSWC Other
- LOCSD Commercial

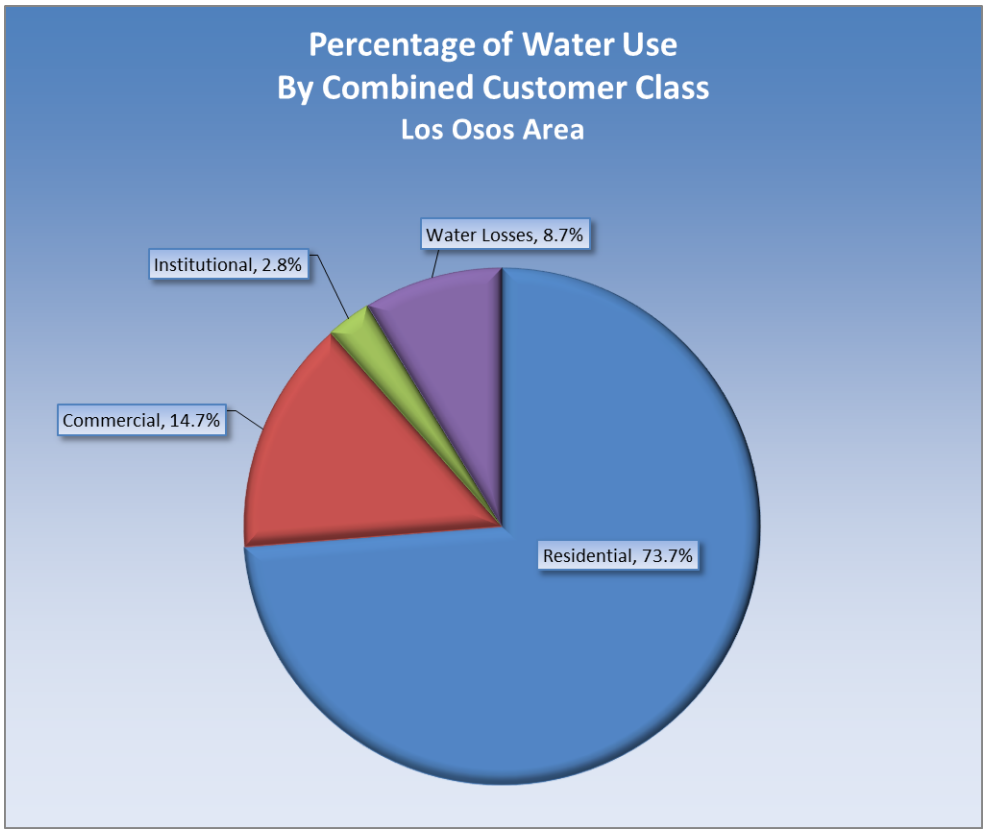
Institutional Combined Customer Class Contents:

- GSWC Public Authority - Schools

- GSWC Public Authority - Other
- LOCSD Schools

The current total percentage of the water use for these combined customer classes is presented in Figure 8 below. Residential water use is the largest use at 74% and therefore conservation measures addressing this customer class should have the largest potential for water savings. As the community grows, the percentages referenced below are expected to remain roughly the same, though they are dependent on the types and mix of commercial activities present in the community at any given time.

Figure 8: Percentage of Water Use by Combined Customer Class



Description of "Water Use Data Input Sheet"

Table 6 shows the data input into the DSS Model. The purpose of this "Water Use Data Input Sheet" is to combine all of the information gathered from the agencies about the service area into one place for input into the DSS Model. The data shown on the "Water Use Data Input Sheet" can be broken into two main categories: (a) current water use data and (b) demographic data. Each area is broken out below and helps to provide some basic definitions and assumptions.

(a) Water Use Data

- *Model Start Year* – This is the starting year for the analysis. For this project, the start year for the model is 2009 as this was the last year of historical data that was available. The DSS Model includes 25 years of data projecting information until the year 2035.
- *Base Year for Future Water Factors* - Based on an analysis of historical water billing data, an average of the years 2006 through 2008 was selected. These base year demand factors are used

to develop future water use projections. The years 2006 through 2008 were chosen for the following reasons:

1. The selected base years show less of an effect of the recent recession in years 2008, 2009 and 2010.
2. The years selected had relatively "normal" climate conditions – i.e. not a drought or excessively wet year, so no significant weather adjustments were necessary. The water billing or production data was not weather normalized for this analysis.

- *Average gal/day/acct*- This is the amount of water in gallons that is used per day, per account.
- *Indoor/outdoor water use*- This is the amount of water per account split into the percent that is used indoors and outdoors.
- *Consumption by customer class*- This shows the annual amount of water used for an entire calendar year, broken down by customer class (Residential, Commercial, Institutional).
- *Unaccounted for water (UFW) also known as Non-Revenue Water* – is defined as the difference between the amount of water produced, whether from a well or a treatment facility, and the amount of water measured at usage meters. Although commonly thought of as water that is lost due to leaky pipes or pipe breakage, unaccounted for water can also be the result of a number of other issues, including:
  - Source and usage meter inaccuracies, such as under registering service meters.
  - Firefighting activities.
  - System flushing to maintain water quality.
  - Theft.
  - Well flushing or other treatment maintenance activities.
- *Water Produced*– This is the total amount of potable water produced. In Los Osos water produced represents only groundwater. This does not include recycled water.
- *Peak day factor* – The ratio of water produced on the maximum day of the year to that produced on the average day.

(b) Demographic Data

- *Census 2000* – The 2000 Census data was used as a check for the data in the DSS Input sheet.
- *2009 Los Osos Service Area Population*- The 2009 total population was taken from the ISJ Census Block Map dated August 2010 created by the ISJ Working Group.
- *Single and multifamily dwelling units*- The 2009 single family dwelling units is equal to the number of single family accounts for 2009. The 2009 multifamily dwelling unit estimate was calculated by applying a growth factor to the 2000 data as noted on the water use data sheet in Table 6.
- *The effects of household size changes on future water demand* - This can either increase or decrease future water demands. If household size decreases it takes more housing units to accommodate the existing population.

Table 6: Water Use Data Input Sheet

Los Osos Within Urban Reserve Line[1] DSS Input Sheet						
Base Year Average Use and Indoor Percentages by Billing Category for DSS Model[2]						
	Residential		Commercial		Institutional	
Start Year	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2009	**243**	**75%**	**1,012**	**67%**	**5,748**	**30%**
	Include SF, MF		Include Commercial, Retail, Fire and Irrigation		Includes Public Authority Schools and Other	

Data for DSS Model						
Category	Average Number of Accounts in Base Year(s)[3]	Average Water Use in Base Year(s)[2] (gpd/a)	Average Water Use in Base Year(s)[2] (mgd)	Percent of Total Water Use	Total Water Use (gcd)	Indoor Water Use (gcd)
Residential	**5,574**	243	1.354	**80.77%**	94	70
Commercial	**267**	1,012	0.271	**16.14%**		
Institutional	**9**	5,748	0.052	**3.09%**		
Total	5,851	7,004	1.676	100.00%		

Estimated UFW for DSS Model[5]	**8.7%**	Percent
Water Produced for use in DSS Model[4]	**1.836**	MGD
Peaking Factor	NA	Provided by Agency or Water Master Plan (or NA)
Peaking Factor for DSS Model	**1.60**	If NA use default value of 1.6.

Notes

1. - Communities served includes portions of all agencies

2 - Average gpd/a is based on an average of all months in selected base year(s). Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.

3 - Number of accounts is the average number of billed accounts for the base year(s) selected (see worksheet with account data in this file)

4 - Total water Purchased (produced) provided by all agencies

5 - Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.

6 - For reference see additional population estimates provided in population and employment estimates corresponding to service area table.

7 - Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area.

8 - Group Quarters Population includes Institutionalized and non-Institutionalized and assumes their water use is in the Commercial sector

Definitions / Abbreviations			
DOF	Department of Finance	MF	multi family
DSS	Decision Support System Model	MGD	million gallons per day
du	dwelling unit	MH	mobile homes
FY	Fiscal Year	NA	not available
gcd	gallons per capita per day	No.	number
gpd/a	gallons per day per account	Pop	population
gpd	gallons per day	Res	residential
GQ	group quarters	SF	single family
HHS	household size	UFW	unaccounted for water

Versions		
Date Prepared :	*December 3, 2010*	By: C. Matyas
Revised:	*February 22, 2011*	By: C. Matyas

Table 6: (Continued)

Los Osos Within Urban Reserve Line[1]
DSS Input Sheet
Total Dwelling Units in Census 2000 for Baywood / Los Osos CDP

Single Family	2000 Units	Estimated No. Meters	Service Area Billing Accounts Year 2009[3]	Difference between billing and census data	Assumptions
1-detached	4,810	4,810			
1-attached	150	150			
Subtotal Single Family	**4,960**	**4,960**			
Multifamily					
2-units	236	118			
3-4 units	225	64			
5 to 9 units	88	13			*7 units per building*
10 to 19 units	82	5			*15 units per building*
20 or more units	71	2			*35 units per building*
Subtotal Multifamily	**702**	**202**			
Mobile Homes					
mobile homes	513	68			*may be separately metered*
Subtotal Mobile Homes	**513**	**68**			
Total Units	**6,175**		**5,574**	**601**	*Difference due to vacancy and that not all units are served by the agencies*
Vacant Units=	**53**				
Total Occupied Units =	**6,122**				

Group Quarters Population, Average Household Size Data and Vacancy Rates

2000 Group Quarters Data	
Institutionalized	0
Non-Institutionalized	74
Mobile home population	1,247
Total	1,321

2000 Census Data	
Average household size	2.42
Average household size of owner-occupied unit	2.42
Average household size of renter-occupied unit	2.43
Homeowner vacancy rate (percent)	0.80
Rental vacancy rate (percent)	1.90

Population and Household Size in Census 2000

		Service Area 2000	Estimated Population 2009	Estimated Service Area Residential Population 2009	*Estimated growth from 2000 to 2009:*	
Total Population from census data[6]		14,351	14,452		*0.70%*	
Subtract Institutionalized, Mobile Home Populatio		1,321	1,330			
Residential Population		13,030	13,122			
Avg. HHS		2.30	2.30			
MF Pop @ MF HHS[7]	2.43	1,706	1,718	**1,718**	**11.9%**	*Percent Multifamily*
SF Pop		11,325	11,404	**11,404**	**78.9%**	*Percent Single Family*
SF HHS [7]		2.28	2.30	**1,330**	**9.2%**	*Percent MH & GQ*
			Total	**14,452**	**100.0%**	*Total Population*

Estimate Service Area Dwelling Units for 2009

SF Dwelling Units	**4,960**
MF Dwelling Units	**702**
Total Units w/o mobile h	**5662**

Population and Employment Projections

Year	Population
2009	14,452
2010	14,452
2015	14,452
2020	16,192
2025	18,142
2030	19,627
2035	19,627

Key Assumptions for the DSS Model

Table 7 shows the key assumptions used in the DSS Model. The assumptions having the most dramatic effect on future demands are the natural replacement rate of fixtures, how residential or commercial future use is projected, and finally the percent of estimated water losses.

Table 7: List of Baseline Demand Projection Assumptions for DSS Model

List of Baseline Demand Projection Assumptions for DSS Model Los Osos Within Urban Reserve Line	
Parameter	**Model Input Value, Assumptions, and Key References**
Model Start Year	2009
Water Demand Factor Years (Base Years)	Average of Years: 2006-2008
Peak Day Factor	1.60
Unaccounted for Water in the Start Year	8.7%
Population Projection Source	Projection Formula Supplied by ISJ Working Group
Number of Water Accounts for Start Year	5,851
Avoided Cost of Water $/AF	$3,000
Distribution of Water Use Among Categories	Residential: 80.8% Commercial: 16.1% Institutional: 3.1%
Indoor Water Use by Category	Residential: 74.8% Commercial: 66.7% Institutional: 29.9%
Residential End Uses	AWWARF Report “Residential End Uses of Water” 1999
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, , CUWCC Cost and Savings Study April 28, 2005, Agency supplied data on costs and savings, professional judgement where no published data availble
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 2% (1.28 gpf toilets), 2% (1.6 gpf and higher toilets) Commercial Toilets 2% (1.28 gpf toilets), 2% (1.6 gpf and higher toilets) Residential Showers 4% Residential Clothes washers 6.7% A 2% replacement rate corresponds to 50 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

Water demand projections were developed to the year 2035 using the DSS Model. The demands were created with and without the plumbing code to help understand the effects of the plumbing code on the water demands. All water conservation programs in this analysis use the water demands with the plumbing code as the starting point to calculate future water demands with savings. The plumbing code sets forth standards that new water fixtures must meet. These standards are discussed in detail below. This means that when a water fixture is replaced that is not up to the plumbing code standards; a more efficient water fixture must be obtained. If the plumbing code were ignored, a large portion of conservation water savings would be lost. The DSS model creates these water demands using the following information:

- Water Use Data Sheet
- Key Assumptions
- Questions asked of agencies
- Contractor provided data
- 2000 Census data

Figure 10, Table 8, Figure 11 and Table 9 show the projected demands with and without the plumbing code below.

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 (2011). The net result of the plumbing code is that new buildings will have more efficient fixtures and old inefficient fixtures will slowly be replaced with new more efficient models. The national plumbing code is an important piece of legislation and must be carefully taken into consideration when analyzing the overall water efficiency of a service area.

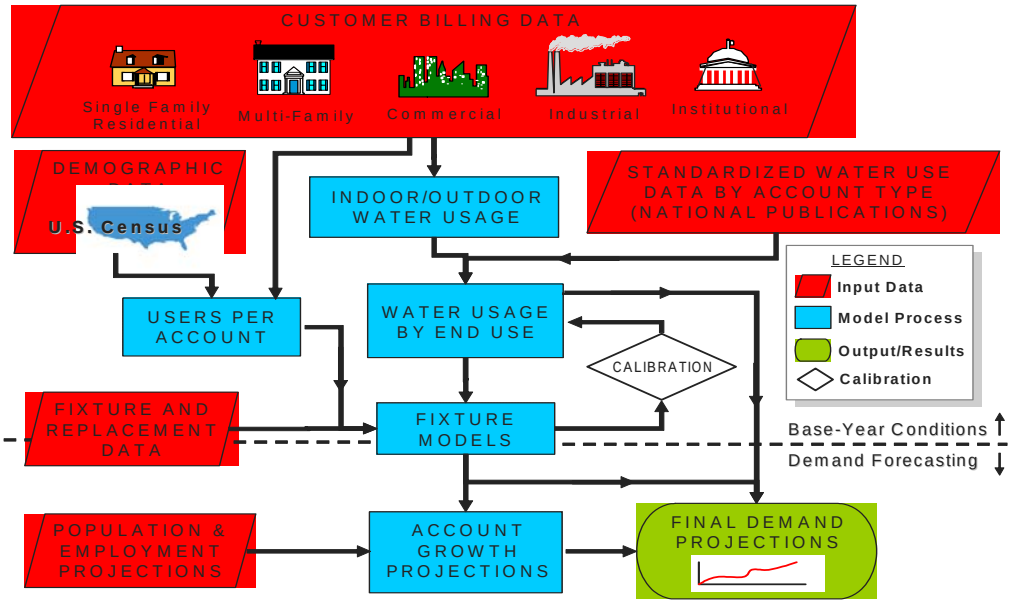
In addition to the plumbing code, the US Department of Energy regulates appliances such as residential clothes washers. Regulations to make these appliances more energy efficient has driven manufacturers to dramatically reduce the amount of water these efficient machines use. Generally horizontal axis washing machines use 30 to 50 percent less water than conventional models which are still available. 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, eventually all machines in the agency's service area will be of this type.

State Plumbing Code

The Plumbing Code includes a California State Law requiring High Efficiency Toilets (HET) and High Efficiency Urinals (HEU) be exclusively sold in the state by 2014. Recently, this was superseded by a new state plumbing code called Cal Green. This code will require only HETs and HEUs be used in new construction after July 2011. Older fixtures can still be sold for replacement up until 2014. **Error! Not a valid bookmark self-reference.** below describes conceptually how the above listed items are incorporated into the flow of information in the DSS Model.

Figure 9: DSS Model Overview Used to Make Potable Water Demand Projections with the Plumbing Code



Projected Water Demands

Figure 10 and Table 8 show the annual potable water demand projections for the case where planned population growth occurs. Figure 11 and Table 9 show the annual potable water demand projections for the case where no population growth occurs. All of the graphs show projections for demand with and without the plumbing code through 2035 without any conservation.

Table 8 and Table 9 below show the potable water demands in five year increments. The water demands projections are based on the following:

1. The population projections provided in Table 5.
2. Projections were made *with and without* the plumbing codes.
3. Projections are for potable water only. It does not include recycled water use.

Dry Year Demands

The demand projections reflect average weather conditions and do not reflect drier and hotter drought conditions. Climate change, which might alter weather patterns, either increased or decreased rainfall, and possibly increased irrigation demand in the spring and fall due to a warmer climate have also not been addressed in this analysis.

Figure 10: Water Demand Projections without Conservation (Planned Population Growth)

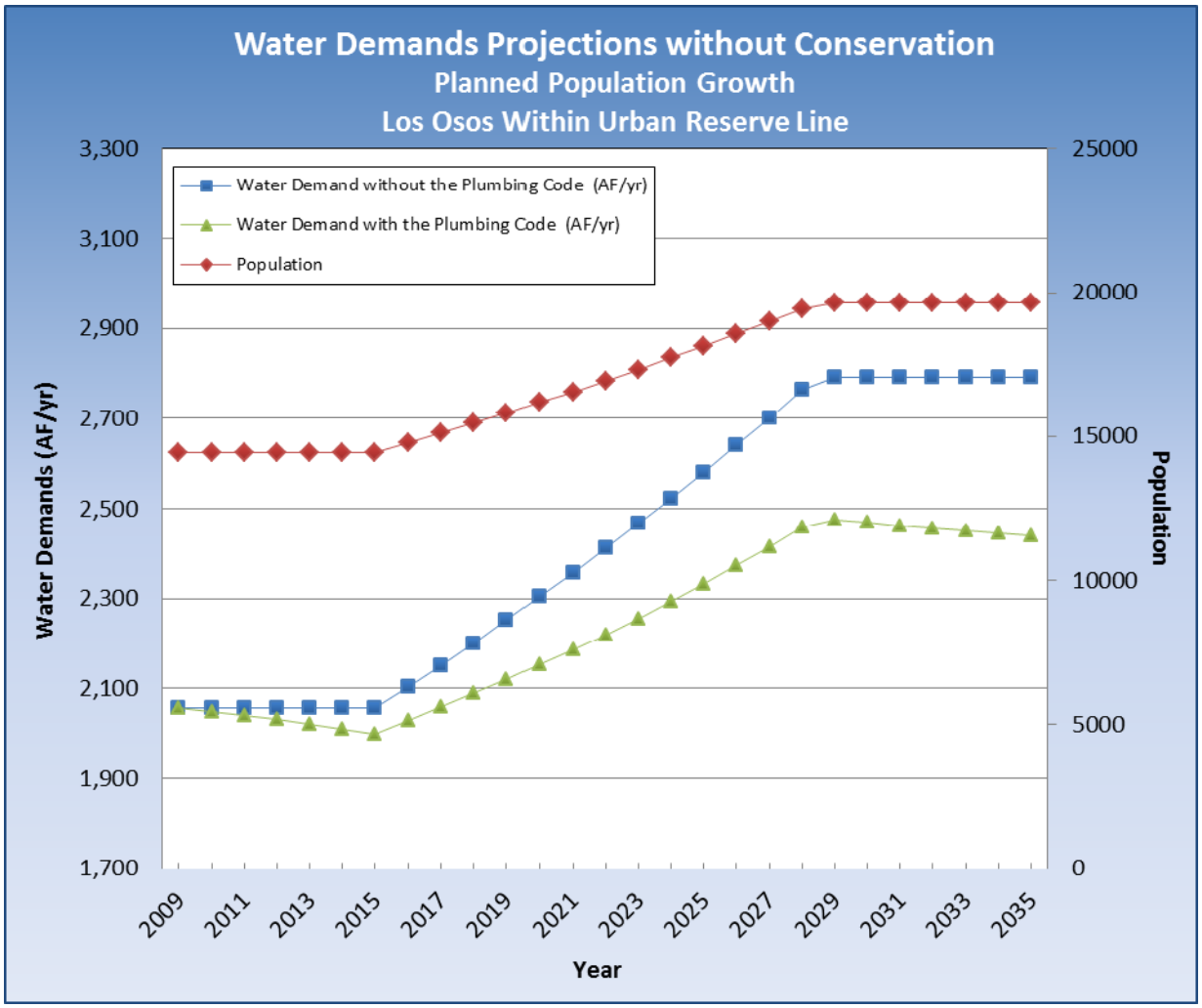


Table 8: Water Demand Projections without Conservation (Planned Population Growth)

Water Demand Projections Planned Population Growth Los Osos Within Urban Reserve Line	2009	2010	2015	2020	2025	2030	2035
Water Demand without the Plumbing Code (AF/yr)	2,056	2,056	2,056	2,304	2,581	2,792	2,792
Water Demand with the Plumbing Code (AF/yr)	2,056	2,049	1,999	2,153	2,333	2,469	2,439
Population	14,452	14,452	14,452	16,192	18,142	19,627	19,627

*Data is not weather normalized. Total water use is potable only and does not include recycled water use.

Figure 11: Water Demand Projections without Conservation (No Population Growth)

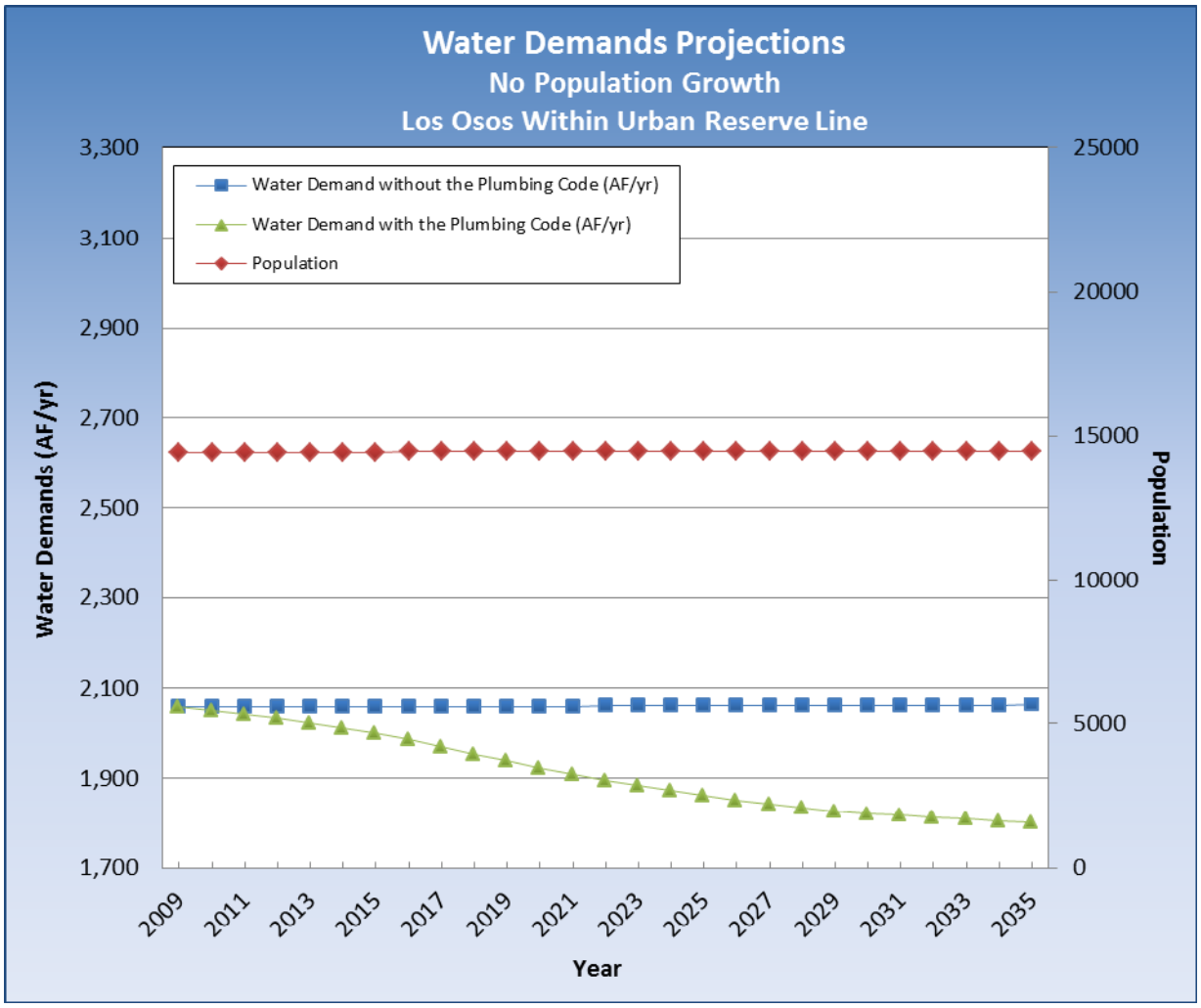


Table 9: Water Demand Projections without Conservation (No Population Growth)

Water Demand Projections
No Population Growth
Los Osos Within Urban Reserve Line

	2009	2010	2015	2020	2025	2030	2035
Water Demand without the Plumbing Code (AF/yr)	2,056	2,056	2,057	2,058	2,059	2,060	2,061
Water Demand with the Plumbing Code (AF/yr)	2,056	2,049	2,000	1,923	1,861	1,822	1,800
Population	14,452	14,452	14,459	14,466	14,474	14,481	14,488

*Data is not weather normalized. Total water use is potable only and does not include recycled water use.

5. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES

5.1 Selecting Conservation Measures (Conservation Measure Screening)

An important step in updating the water conservation program is the review and screening of new water conservation measures. In November 2010, a list of 60 potential conservation measures was developed by Maddaus Water Management from known technology that included devices or programs (e.g., such as a high efficiency toilet) that would save water if installed by a water retailer, contractor, or customer. These measures were developed using information from the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU) Best Management Practices (BMPs), the California Department of Water Resources Demand Management Measures and from Maddaus Water Management's experience in the field. A description of each potential conservation measure was developed which defined how the device or program would be implemented. This included the distribution method that would be used to activate the device or program.

A screening process was undertaken to reduce the number of measures to a more manageable number and to eliminate those measures that are not as well suited to the Los Osos area. An example of a poorly suited measure is a pool cover rebate program, which is applicable to a different climate and demographic. Each potential measure was screened based on three qualitative criteria (described below). Each of the three criteria was scored on a scale of 0 to 5 (with 5 being the most acceptable). This gives each measure a value between 0 and 15. The screening was completed in a one day ISJ Working Group meeting in November 2010, 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 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 Xeriscape 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 equity (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 and aesthetics.

Measures with low scores were eliminated from further consideration, while those with high scores passed into the next evaluation phase (cost-effectiveness analysis using the DSS Model). This process reduced the measures to be evaluated down to 31 measures which can be found in Table 10 below.

Table 10: Measure Descriptions

Measure Descriptions Los Osos Within Urban Reserve Line			
Measure No.	Name	Customer Categories	Description
1	High Efficiency Toilet (HET) Rebates	All	Provide a $100 rebate or voucher for the installation of a 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 reflect the incremental purchase cost.
2	New Dev Require New Landscape and Irrigation Requirements	All	Enforce current County Landscape Design Standards for Water Conservation. Standards specify that development projects subject to design review be landscaped according to Xeriscape principals, with appropriate turf ratios, plant selection, efficient irrigation systems and smart irrigation controllers.
3	Distribute Retrofit Kits	Single Family	Provide owners of pre-1992 homes with retrofit kits that contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices.
4	Residential Washer Rebates	Single Family	Homeowners would be eligible to receive a $150 rebate on a new high efficiency clothes washer. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology.
5	Residential Water Surveys	Single Family/ Multifamily	Conventional indoor and outdoor water surveys for existing single and multifamily residential customers. Normally those with high water use are targeted and provided a customized report to the homeowner on how to save water in their home. These surveys will be completed in two years and will need to be repeated every seven years to maintain the water savings.
6	New Dev Require Plumbing for Future Gray Water Use	Single Family	Require that the drain lines in new single-family homes be plumbed for future installation of graywater systems.
7	New Dev Residential Require Efficient Dishwashers	Single Family	Revise County's Building Code to require efficient dishwasher (meeting certain water efficiency standards, such as gallons/load).
8	New Dev Residential Require High Efficiency Clothes Washers	Single Family	County Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. County can enforce conditions of water service that may include efficiency standards for washing machines.
9	New Dev Require Hot Water on Demand/Structured Plumbing	Single Family	Require developers to equip new homes or buildings with efficient hot water on demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having a an on-demand pump on a recirculation line.
10	New Dev Require Multi Family Submetering on New Accounts	Multifamily	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). Water Providers administer meter read and bill program.

Table 10: (Continued)

Measure Descriptions Los Osos Within Urban Reserve Line			
Measure No.	Name	Customer Categories	Description
11	Public Information Program	Single Family	Public education would be used to raise awareness of conservation measures available to customers. Programs could continue efforts including school programs, poster contests, speakers to community groups, conservation hotline, website, video loan, radio and television time, demonstration gardens and printed educational material such as bill inserts, etc. Could also consider increasing current County efforts possibly adding cell phone apps, Facebook, interactive kiosk with view screen, etc. Program would continue indefinitely.
12	Rebates for Rain Sensors	Single Family	Provide a free rain sensor shut-off device for an existing irrigation controller.
13	Efficient Outdoor Use Education and Training Programs	Single Family	Water Providers would offer, organize and sponsor a series of educational workshops or other means for educating homeowners in efficient landscaping and irrigation principals. Utilize guest speakers, Xeriscape demonstration gardens, incentives, such as a nursery plant coupon.
14	Rotating Sprinkler Nozzle Rebates	All	Provide rebate for rotating spray nozzle for existing sprinkler irrigation systems properties.
15	Replace Restaurant Spray Nozzles	Commercial /Industrial /Institutional	Provide free installation of 1.6 gpm (or lower) spray nozzles for the rinse and clean operation in restaurants and other commercial kitchens. Coordinate with past historical efforts through the CPUC or CUWCC.
16	New Dev Require Efficient Fixtures in Com, Ind and Inst Buildings	Commercial /Industrial /Institutional	Revise County Building Code requirements for new commercial buildings for high efficiency commercial equipment such as ice machines, food steamers, conductivity controllers, etc.
17	School Building Retrofit	Commercial /Industrial /Institutional	Run a program patterned after MWD of Southern California's school retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems.
18	Prohibit Water Waste and Practices	All	Adopt or modify an existing County Ordinance that prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.
19	Subsidized Partial Community Retrofit	All	Subsidize the replacement of designated fixtures at the time homes and businesses are connecting to the new sewer system. Included in the retrofit would be inefficient toilets (flushing with more than 1.6 gallons) and showerheads using more than 2.0 gallons/minute (gpm) and faucets using more than 15 gpm. Subsidy would cover entire cost of fixtures (excluding installation labor).

Table 10: (Continued)

Measure Descriptions Los Osos Within Urban Reserve Line			
Measure No.	Name	Customer Categories	Description
20	Subsidized Community Retrofit (Add Washers)	All	This measure would add washing machines to list of fixtures replaced by measure 19 (Subsidized Partial Community Retrofit). Washing machines using less than 20 gal/load would be provided. Subsidy would cover entire cost of the washing machines (excluding installation labor).
21	Install Service Meters in S&T Area	Single Family	Accounts without meters would be metered to comply with State law by 2025. The County plans to mandate it prior to hookup to the new wastewater project, so it will need to be done by 2014.
22	Commercial High Efficiency Washer Rebate	Commercial /Industrial /Institutional	Provide a $400 rebate for the installation of a high efficiency washer (HEW) in two coin operated Laundromats each having 30 machines. Rebate amounts would reflect the incremental purchase cost.
23	Media Campaign: Such as the Twenty Gallon Challenge	All	The 20-Gallon Challenge is a media campaign run recently in Southern California whose message is a call for residents and businesses to reduce water use on average by 20 gallons per person, per day. Determine appropriate media campaign message with marketing study/focus groups.
24	Toilet Retrofit on Resale or Name Change on Water Account	All	Work with the real estate industry to require a certificate of compliance be submitted to the County that verifies that a plumber has inspected the property and efficient fixtures where either already there or were installed at the time of sale, before close of escrow. (Model after County of Los Angeles and San Diego or County 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.
25	New Dev Require Smart Irrigation Controllers and Rain Sensors	All	Require developers for all properties of greater than two residential units and all commercial development to provide the latest state of the art SMART irrigation controllers and rain sensors. These SMART controllers have on-site temperature sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly.
26	Turf Removal	All	Provide a 50¢ per square foot incentive for turf removal. The replacement of irrigated vegetation with synthetic turf or low water use landscaping may significantly reduce your outdoor watering needs.
27	Conservation Pricing Modification	Single Family/ Multifamily	Goal of this measure is to change current water rate structure to reduce discretionary water use. For example with a single family inclining block rate structure, the number of tiers, volume in each tier, or water rates within each tier could be changed so that more customers are encouraged to conserve. Could also consider seasonal rates. Would require a water rate study.
28	Cisterns/Rain Catchment	Single Family	Provide a rebate ($100) to assist a certain percentage of single family homeowners per year with installation of rain barrels or cisterns.
29	Graywater Retrofit Single Family	Single Family	Provide a rebate (up to $1,000) to assist a certain percentage of single family homeowners per year to install graywater systems.

Table 10: (Continued)

Measure Descriptions Los Osos Within Urban Reserve Line			
Measure No.	Name	Customer Categories	Description
30	Commercial, Industrial and Institutional Surveys	Commercial /Industrial /Institutional	Top 5% of CII customers would be offered a free water survey that would evaluate ways for the business to save water and money. The CII surveys (accounts that use more than 5,000 gallons of water per day) would be for CII accounts such as hotels, restaurants, stores and schools.
31	Require Fixture Replacement by a Deadline	All	County would pass an ordinance that requires homeowners and businesses to bring fixtures up to efficient standard by a fixed date at their own expense. Deadline could be the date residences and businesses are required to connect to new sewer system. Should follow SB 407.

5.2 Perspectives on Benefits and Costs

The determination of the economic feasibility of water conservation programs depends on comparing the costs of the programs to the benefits provided. This benefit-cost analysis was performed using the DSS Model. The DSS Model calculates water 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. Then a present value analysis using constant 2009 dollars and a real discount rate of 3% is applied to discount costs and benefits to the start 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 water 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 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 include the utility and the community. The utility benefit-cost analysis is based on the benefits and costs to the water provider. The community benefit-cost analysis includes the utility's benefits and costs combined with the customer's 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 for this analysis. 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 and supplying water. Second, because revenue shifts are treated as transfer payments, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. Because it is the water provider's role in developing a conservation plan that is paramount in this study, the utility's 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. Other factors external to the utility, such as environmental effects and climate change, are not included in the benefit-cost analysis. Because these external factors are often difficult to quantify and are not necessarily under the control of the utility, they are therefore frequently excluded from economic analyses, including this one.

5.3 Present Value Parameters

The time value of money is explicitly considered. The value of all future costs and benefits is discounted to 2009 (the model start year) 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.

5.4 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by the water agencies and contractor. 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 setup 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. Measure costs were estimated for 25 years, (each year between 2009 and 2035). 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.

5.5 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 ten years after the start of implementation, depending upon the implementation schedule.

5.6 Assumptions about Avoided Costs

San Luis Obispo County produced an Imported Water Technical Memorandum in July of 2008 that estimated the operations costs for importing Nacimiento water. This technical memorandum estimated that the capital costs were $36 million and would have an operational cost of $400 per acre ft. If the capital costs are amortized over 25 years at 5% this makes an avoided cost of water of $3,000 per acre ft.

The County also supplied an avoided cost for wastewater using the following assumptions. They assumed a dynamic head of 150 feet to pump to the wastewater plant and another 180 feet to pump to the pressurized disposal or percolation site. The wire to water efficiency is assumed to be 60% to 70%. The power costs are assumed to be 13 to 15 cents. With a contingency for the power factor this results in an avoided cost of $105 per acre ft.

In evaluating the benefit-cost ratio of conservation measures and programs it is appropriate to consider the net increase in benefits (i.e., the net increase in the avoided cost of water). Other costs, such as the cost of conservation will increase presumably at the CPI rate. Also the cost of conservation programs will be paid for with inflated dollars.

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

Appendix A includes assumptions in the DSS Model for each of the following variables for all measures modeled:

- *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 (for contractor)* – 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 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 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 a direct installation implementation method. Typically water utilities have found that there are increased costs associated with achieving higher market saturation, such as more surveys per year. Appendix A shows the unit costs used in the study. The model calculates the annual costs based on the number of participants each year. The general formulas for calculating annual costs are:

Annual Utility Cost = Annual market saturation * total accounts in category * utility unit cost per account * (1+administration and marketing markup)

Annual Customer Cost = Annual number of participants * retail customer unit cost

Annual Community Cost = Annual utility cost + annual customer cost

5.8 Comparison of Individual Measures

Table 11 presents how much water the measures would save over 25 years, how much they would cost, and what cost of water saved is if the measures were run on a stand-alone basis (i.e. without interaction or overlap from other measures that might address the same end use(s). Only the net or highest water savings for overlapping conservation measures was included in each program.

Economic indicators are defined below:

- *Utility costs:* those costs that the utility would spend include measure set-up, annual administration, and payment of rebates or purchase of devices or services as specified in the measure design.

- *Customer costs:* those costs customers would spend to participate in the programs and maintaining its effectiveness over the life of the measure.
- *Community costs:* Community costs include utility and customer costs to implement measures.

The column headings in Table 11 are defined as follows:

- **Present Value of Water Utility Costs:** 25 year present value of the time stream of annual costs.
- **Water Utility Benefit to Cost Ratio:** Net Present Value (NPV) of utility costs/NPV of utility benefits over 25 years.
- **First Five Year Water Utility Costs (2012-2016):** Total cost in dollars to run the program for the years 2012 to 2016. This is a five year cost often useful for short term financial budgeting purposes.
- **Community Benefit-Cost Ratio:** NPV of Utility Benefits plus NPV of customer energy savings divided by NPV of utility plus NPV of customer costs.
- **Water Savings in Year 2035 (AF/yr)**: Water savings in 2035 (AF/yr) where AF/yr = acre-feet per year.
- **Cost of Savings per Unit Volume ($/AF)**: NPV of Category Costs divided by 25-year volume of water saved.

Table 11: Conservation Measure Cost and Savings

Conservation Measure Costs and Savings
Los Osos Within Urban Reserve Line

	Measure Name	Present Value of Water Utility Costs	Water Utility Benefit to Cost Ratio	First Five Year Water Utility Costs (2012-2016)	Community Benefit to Cost Ratio	Water Savings in Year 2035 (afy)	Cost of Savings per Unit Volume ($/af)	Indoor Measures for Potential Wastewater Project Funding
24	Toilet Retrofit on Resale or Name Change on Water Account	$31,804	84.05	$10,970	2.76	3	$767	
31	Require Fixture Replacement by a Deadline	$40,158	77.78	$7,313	2.59	5	$5,415	
23	Media Campaign: Such as the Twenty Gallon Challenge	$30,685	58.18	$14,604	15.61	6	$672	✓
15	Replace Restaurant Spray Nozzles	$6,023	39.87	$6,681	107.86	0	$470	✓
30	Commercial, Industrial and Institutional Surveys	$45,170	22.11	$50,104	16.49	2	$1,562	✓
27	Pricing Measure Model	$294,944	20.31	$105,000	22.85	9	$1,095	
22	Commercial High Efficiency Washer Rebate	$27,046	12.67	$30,000	19.33	42	$689	✓
17	School Building Retrofit	$22,971	9.49	$25,480	5.87	3	$406	✓
3	Distribute Retrofit Kits	$7,320	5.01	$3,484	3.90	79	$23	
1	High Efficiency Toilet (HET) Rebates	$115,127	4.53	$131,490	2.10	12	$7	✓
12	Rebates for Rain Sensors	$30,452	4.35	$14,493	1.61	14	$161	
19	Subsidized Partial Community Retrofit	$1,941,505	3.81	$2,218,414	2.82	131	$511	✓
4	Residential Washer Rebates	$215,339	3.15	$173,919	2.53	0	$37	✓
11	Public Information Program	$303,216	2.83	$57,694	3.69	6	$153	✓
26	Turf Removal	$669,410	2.56	$318,592	1.01	17	$887	
13	Efficient Outdoor Use Education and Training Programs	$76,170	2.51	$14,493	0.24	4	$200	
5	Residential Water Surveys	$447,310	2.26	$144,933	2.28	8	$34	✓
18	Prohibit Water Waste and Practices	$321,104	1.97	$61,146	0.87	5	$388	
21	Install Service Meters in S&T Area	$298,506	1.78	$331,115	2.37	17	$671	
14	Rotating Sprinkler Nozzle Rebates	$116,863	1.63	$55,619	1.02	12	$187	
20	Subsidized Community Retrofit (Add Washers)	$903,260	1.50	$1,032,088	1.53	12	$618	✓
28	Cisterns/Rain Catchment	$58,562	1.13	$27,872	0.33	5	$1,082	
29	Graywater Retrofit Single Family	$609,050	0.33	$289,865	0.18	23	$1,308	
16	New Dev Require Efficient Fixtures in Com, Ind and Inst Buildings	$1,420	249.29	$0	18.22	9	$436	
10	New Dev Require Multi Family Submetering on New Accounts	$4,592	48.71	$0	0.65	17	$111	
8	New Dev Residential Require High Efficiency Clothes Washers	$14,453	23.82	$0	3.66	19	$87	
2	New Dev Require New Landscape and Irrigation Requirements	$32,798	14.53	$0	0.89	60	$22	
25	New Dev Require Smart Irrigation Controllers and Rain Sensors	$40,547	10.07	$0	0.57	23	$818	
9	New Dev Require Hot Water on Demand/Structured Plumbing	$38,632	8.99	$0	0.85	0	$89	
6	New Dev Require Plumbing for Future Gray Water Use	$33,997	4.17	$0	0.04	4	$49	
7	New Dev Residential Require Efficient Dishwashers	$37,774	2.18	$0	0.38	8	$76	

Note: Some measures have zero dollars in the First Five Year Water Utility Costs (2012 to 2016) column. That indicates there are no costs in that particular 5 year period but costs may occur after the first five years of the measure. This column is meant to be helpful for budgeting purposes only.

6. RESULTS OF CONSERVATION PROGRAM EVALUATION

6.1 Creation of Conservation Programs

Table 12 provides a summary of which measures are included in each of the five alternative programs. The five packages are designed to illustrate a range of various measure combinations and resulting water savings. Some measures were not used in programs because they either were not cost effective or duplicated other measures effects but were less attractive.

Table 12: Conservation Programs and Measures

Conservation Programs and Measures Los Osos Within Urban Reserve Line						
	Measure Name	**Program A**	**Program B**	**Program C**	**Program D**	**Program E**
22	Commercial High Efficiency Washer Rebate	✓	✓	✓	✓	✓
11	Public Information Program	✓	✓	✓	✓	✓
1	High Efficiency Toilet (HET) Rebates	✓	✓	✓		
4	Residential Washer Rebates	✓	✓	✓		
24	Toilet Retrofit on Resale or Name Change on Water Account	✓	✓	✓	✓	✓
30	Commercial, Industrial and Institutional Surveys		✓	✓	✓	✓
3	Distribute Retrofit Kits		✓	✓	✓	✓
23	Media Campaign: Such as the Twenty Gallon Challenge		✓	✓	✓	✓
27	Pricing Measure Model		✓	✓	✓	✓
12	Rebates for Rain Sensors		✓	✓	✓	✓
15	Replace Restaurant Spray Nozzles		✓	✓	✓	✓
17	School Building Retrofit		✓	✓	✓	✓
21	Install Service Meters in S&T Area			✓	✓	✓
5	Residential Water Surveys			✓	✓	✓
19	Subsidized Partial Community Retrofit				✓	✓
20	Subsidized Community Retrofit (Add Washers)					✓
16	New Dev Require Efficient Fixtures in Com, Ind and Inst Buildings		✓	✓	✓	✓
9	New Dev Require Hot Water on Demand/Structured Plumbing		✓	✓	✓	✓
10	New Dev Require Multi Family Submetering on New Accounts		✓	✓	✓	✓
2	New Dev Require New Landscape and Irrigation Requirements		✓	✓	✓	✓
6	New Dev Require Plumbing for Future Gray Water Use		✓	✓	✓	✓
25	New Dev Require Smart Irrigation Controllers and Rain Sensors		✓	✓	✓	✓
8	New Dev Residential Require High Efficiency Clothes Washers		✓	✓	✓	✓
7	New Dev Residential Require Efficient Dishwashers			✓	✓	✓
28	Cisterns/Rain Catchment					
13	Efficient Outdoor Use Education and Training Programs					
29	Graywater Retrofit Single Family					
18	Prohibit Water Waste and Practices					
31	Require Fixture Replacement by a Deadline					
14	Rotating Sprinkler Nozzle Rebates					
26	Turf Removal					

These programs are not intended to be rigid programs but rather to demonstrate the range in water savings that could be generated if selected measures were run together. In this step we account for a percent overlap in water savings and benefits and estimate combined savings and benefits from programs or packages of measures.

Program A
Program A was created by selecting measures that are already in place in the Los Osos area. This can give a good baseline for how water demands will progress if nothing is changed.

Program B
Program B includes the measures from Program A and adds additional low cost measures with a high benefit to cost ratio of above 4. This includes 18 measures, 7 of which are new development measures which only effect new construction. The cost for the new development measures is largely funded by the builders of the new homes, which tends to reduce the overall cost to the utility for all measures.

Program C
Program C includes all of the measures in Program B and adds in the remaining low cost measures that do not have very high benefit to cost ratios. This includes 22 measures, 8 of which are new development measures.

Program D
Program D includes most of the measures in Program C with some very important additions and subtractions. Program D includes the Subsidized Partial Community Retrofit measure. This measure was designed to model what will happen if the County of San Luis Obispo subsidized inefficient water fixture replacement during construction of the sewer project. It will have a high cost and a short implementation period. The County will work with customers to replace inefficient toilets, shower heads and faucets in the homes designated as a part of the wastewater project. The following measures were removed from this program as they will have no effect after the Subsidized Partial Community Retrofit measure takes effect: Toilet Retrofit on Resale or Name Change on Water Account, High Efficiency Toilet (HET) Rebates. The Washer Rebates program was also removed from this program as it wasn't required to meet the goals of this program and it was relatively expensive.

Program E
Program E includes all of the measures in program D but adds in the Subsidized Community Retrofit (Add Washers) measure. This measure adds clothes washers to the list of subsidized water use fixtures that will be replaced during the wastewater project.

6.2 Results of Program Evaluation

Figure 12 and Table 13 show the annual water demand projections with and without the plumbing code, and the projected water demands for the five programs if they are implemented with an assumed level of population growth. Figure 13 and Table 14 show the water demand projections if no population growth occurs. Figure 12 shows that the water demands with planned growth would increase about 736 acre feet per year if the plumbing code wasn't followed and no conservation was attempted. Because water use is tempered with the plumbing code and current conservation efforts an increase of only 281 acre feet per year is expected.

If Program B or Program C is implemented a substantial water savings is expected. Both programs make water use more efficient over the next 25 years such that water use will end up at the same levels in 25 years that are currently being seen despite a planned increase in population. The cost for Program B is about $1.3 million over the next 25 years while the cost of Program C is $2.1 million as shown in Table 15 below.

Program D and Program E show the same water demand curve as Programs B and Program C but with a sharp decrease in water use in years 2012 and 2013 due to the subsidized retrofit measures. Program E shows a less than 1% improvement in water use reduction over Program D but costs an additional $600,000 over the next 25 years to implement due to the cost of the washing machines replacement measure.

Figure 12: Water Demands with Conservation Saving Projections (Planned Population Growth)

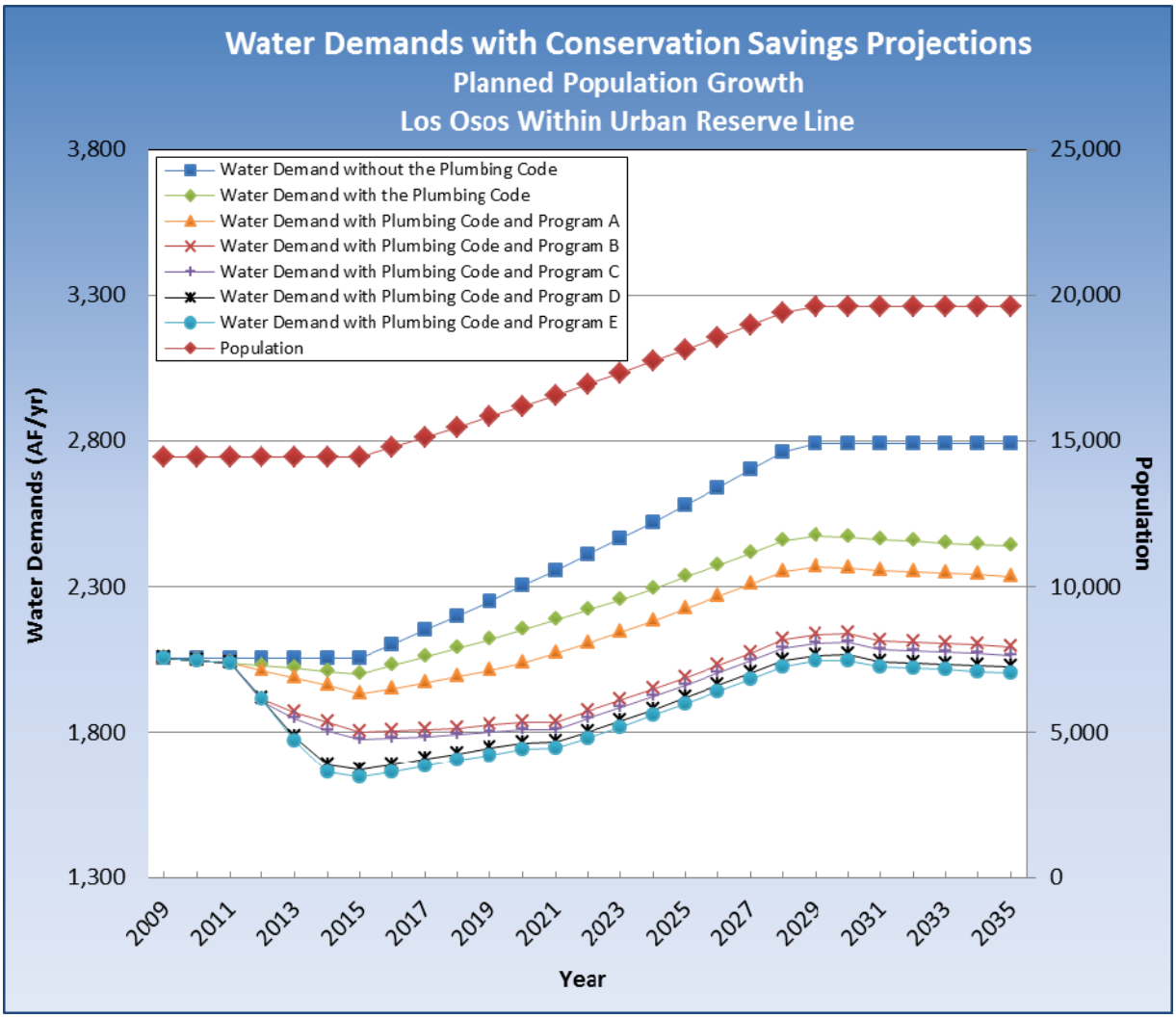


Table 13: Water Demands with Conservation Saving Projections (Planned Population Growth)

Water Demands with Conservation Savings Projections
Planned Population Growth
Los Osos Within Urban Reserve Line

Water Demands (AF/Yr)	2009	2010	2015	2020	2025	2030	2035
Water Demand without the Plumbing Code	2,056	2,056	2,056	2,304	2,581	2,792	2,792
Water Demand with the Plumbing Code	2,056	2,049	1,999	2,153	2,333	2,469	2,439
Water Demand with Plumbing Code and Program A	2,056	2,049	1,934	2,038	2,224	2,364	2,337
Water Demand with Plumbing Code and Program B	2,056	2,049	1,801	1,834	1,989	2,138	2,095
Water Demand with Plumbing Code and Program C	2,056	2,049	1,775	1,809	1,963	2,109	2,066
Water Demand with Plumbing Code and Program D	2,056	2,049	1,671	1,764	1,920	2,066	2,024
Water Demand with Plumbing Code and Program E	2,056	2,049	1,645	1,743	1,900	2,048	2,006
Population	14,452	14,452	14,452	16,192	18,142	19,627	19,627

Figure 13: Water Demands with Conservation Saving Projections (No Population Growth)

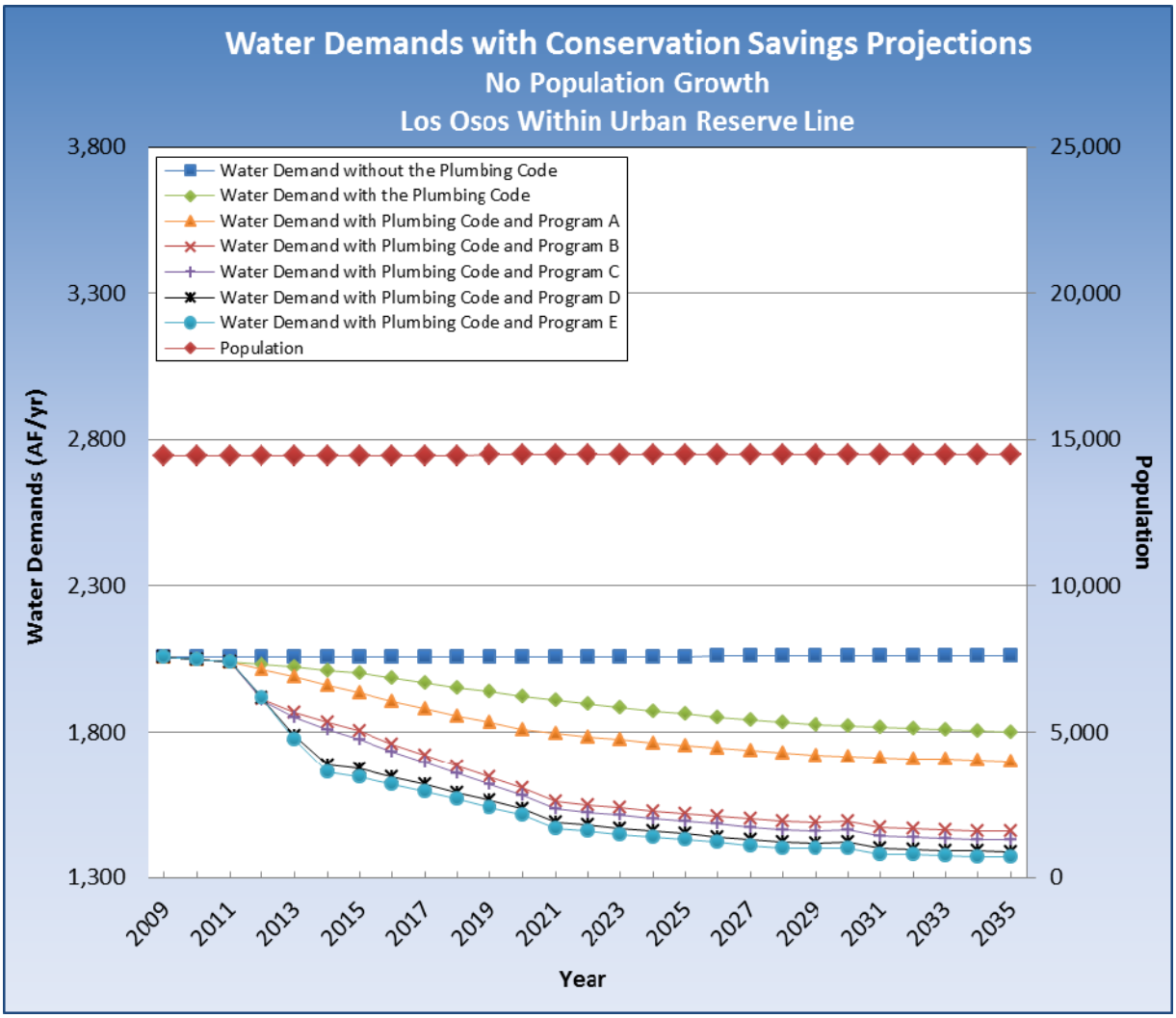
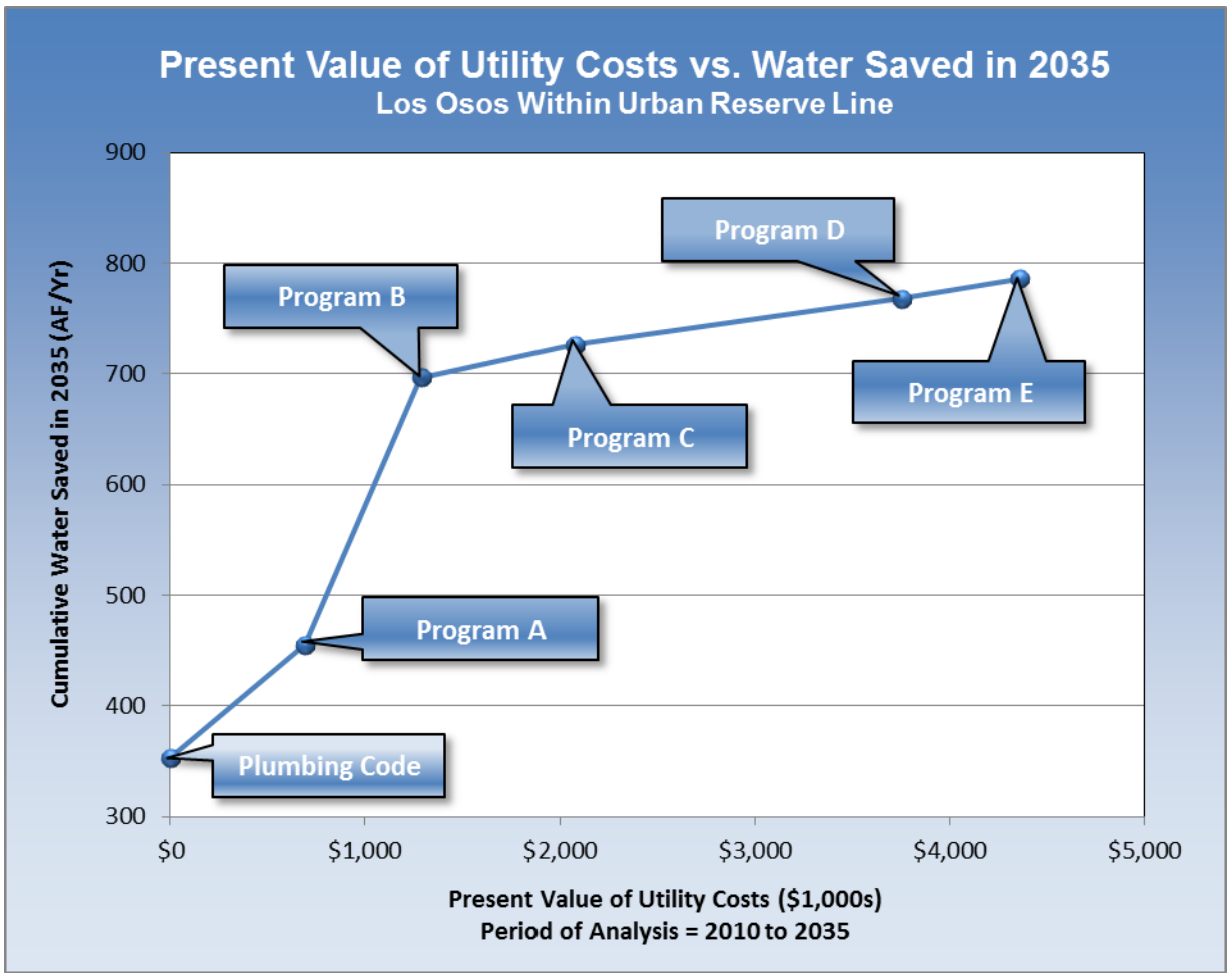


Table 14: Water Demands with Conservation Saving Projections (No Population Growth)

Water Demands with Conservation Savings Projections No Population Growth Los Osos Within Urban Reserve Line							
Water Demands (AF/Yr)	**2009**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Water Demand without the Plumbing Code	2,056	2,056	2,057	2,058	2,059	2,060	2,061
Water Demand with the Plumbing Code	2,056	2,049	2,000	1,923	1,861	1,822	1,800
Water Demand with Plumbing Code and Program A	2,056	2,049	1,935	1,808	1,753	1,717	1,698
Water Demand with Plumbing Code and Program B	2,056	2,049	1,802	1,605	1,518	1,491	1,457
Water Demand with Plumbing Code and Program C	2,056	2,049	1,776	1,580	1,491	1,461	1,427
Water Demand with Plumbing Code and Program D	2,056	2,049	1,672	1,535	1,448	1,419	1,386
Water Demand with Plumbing Code and Program E	2,056	2,049	1,646	1,513	1,428	1,400	1,368
Population	14,452	14,452	14,459	14,466	14,474	14,481	14,488

Figure 14 demonstrates how marginal returns change as more money is spent to achieve water savings. As the figure shows the cost versus saving curve is starting to decline after Program B. This means that the added cost of going from Program B to Program C saves less water per unit expenditure. In other words, there are diminishing returns when the curve starts to flatten out. It is clear that the measures listed in program B are more cost-effective to the utility than their current measures. It is not to say that any of the measures are a poor investment. The decision on which program is appropriate for each agency is dependent on many factors. Most recently it may be impacted by the special conditions set forth in the Coastal Development Permit for the wastewater project which calls for a reduction in residential indoor per capita water use to 50 gcd.

Figure 14: Present Value of Utility Costs vs. Water Saved in 2035



6.3 Comparison of Long-Term Conservation Programs – Utility Costs and Savings

Table 15 presents key evaluation statistics compiled from the DSS Model. Assuming all measures are successfully implemented, projected water savings for 2035 in AF are shown for each program, as are the financial costs of achieving this reduction. The present values of water utility costs are expressed as the total present value over the 25 year analysis period. Present Value is determined using an interest rate of 3%. The cost parameters are derived from the annual time stream of utility, customer and community costs. The water savings percentages are expressed as a percentage of the projected 2035 demand without the plumbing code. The cost of water saved is present value of water utility cost divided by total 25-year water savings. The Total Water Savings as a Percentage of Total Production in 2035 is relative to the water demands projections without plumbing code savings.

Table 15: Comparison of Conservation Program Costs and Savings

Economic Analysis of Alternative Programs
Los Osos Within Urban Reserve Line

Conservation Program	Water Utility Benefit-Cost Ratio	Community Benefit-Cost Ratio	2035 Water Savings (AF/Yr)	2035 Indoor Water Savings (AF/Yr)	2035 Outdoor Water Savings (AF/Yr)	Total Water Savings as a Percentage of Total Production in 2035	Present Value of Water Utility Costs	First Five Year Water Utility Cost (2012 - 2016)	Water Utility Cost of Water Saved ($/AF)
Without the Plumbing Code	NA	NA	0	0	0	0%	NA	NA	NA
With the Plumbing Code	NA	NA	353	323	0	14.5%	NA	NA	NA
Plumbing Code plus Program A	7.20	2.95	455	450	5	18.7%	$692,533	$468,919	$261
Plumbing Code plus Program B	12.25	2.18	697	532	165	28.6%	$1,287,919	$675,217	$151
Plumbing Code plus Program C	8.28	2.06	726	551	175	29.8%	$2,071,509	$1,154,872	$223
Plumbing Code plus Program D	5.30	2.08	775	600	175	31.8%	$3,866,083	$3,225,215	$355
Plumbing Code plus Program E	4.76	2.25	795	620	175	32.6%	$4,554,004	$4,038,904	$396

Note: The column labeled 2015 Water Savings (AF/Yr) shows the water savings due to conservation after the completion of the County's wastewater project but before the increase in population begins.

6.4 Per Capita Water Use Targets

The final step in the analysis was to determine which conservation programs would meet the wastewater project Coastal Development Permit per capita water use goal of 50 gcd and when this would be accomplished. Currently the indoor residential water use is estimated at 70 gallons per capita per day (gcd). This is based on the historical water use and population data from years 2006 through 2008. According to the analysis the service area will meet the 50 gcd indoor residential water use targets, with the increase in population, at differing times depending on the conservation plan that is implemented. Figure 15 and Table 16 show the change in per capita use over time for each potential conservation program. The following list presents when each program is projected to meet the 50 gcd target.

- Program A: Will not meet the 50 gcd goal in the next 25 years.
- Program B: Will meet the target in 2032
- Program C: Will meet the target in 2026
- Program D: Will meet the target in 2019
- Program E: Will meet the target in 2018

Figure 15: Per Capita Residential Indoor Water Use with Conservation Savings Projections

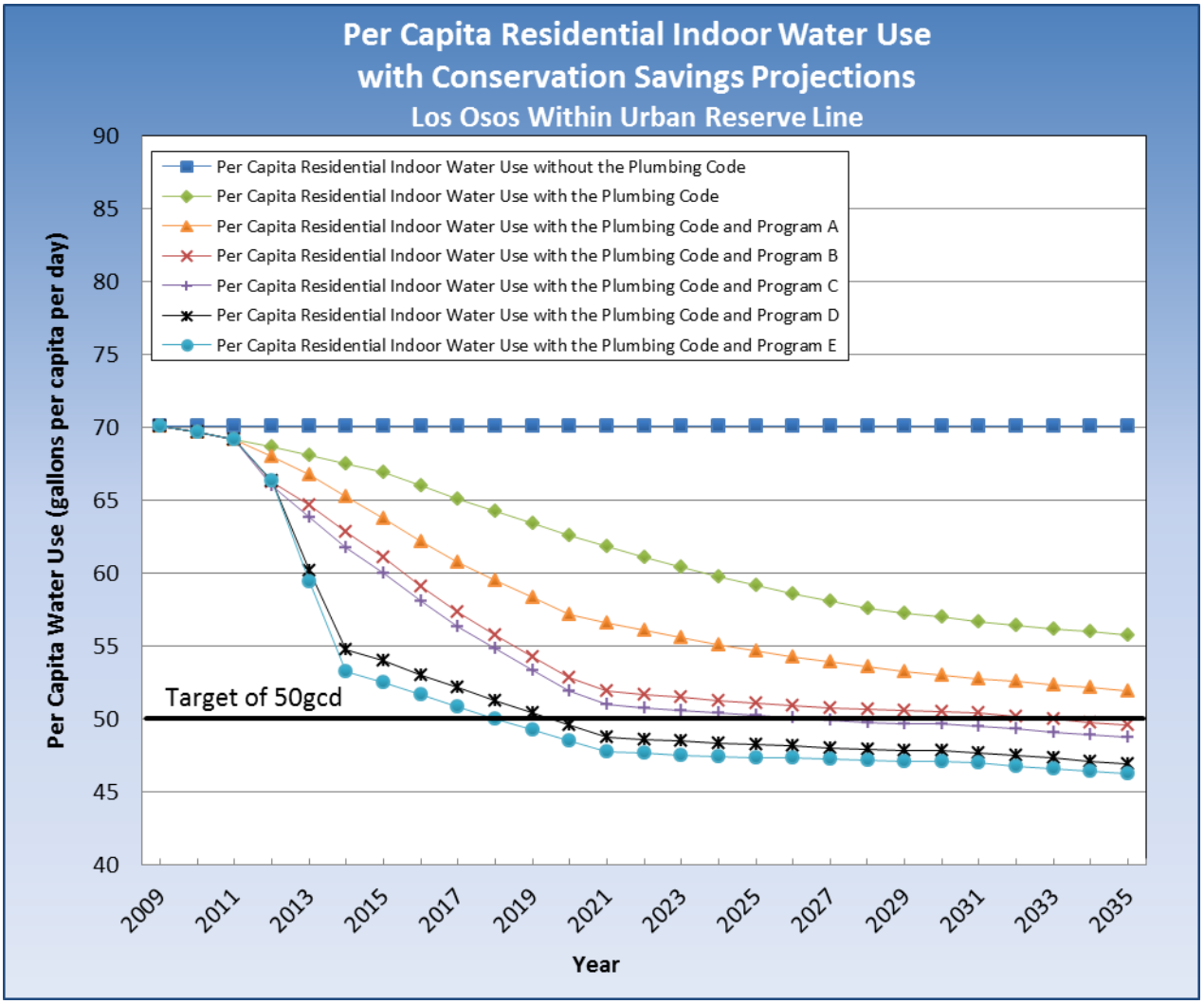


Table 16: Per Capita Residential Indoor Water Use with Conservation Savings Projections

Per Capita Residential Indoor Water Use with Conservation Savings Projections Los Osos Within Urban Reserve Line							
Residential Indoor Per Capita Water Use (gcd)	**2009**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Per Capita Residential Indoor Water Use without the Plumbing Code	70.07	70.07	70.07	70.07	70.07	70.07	70.07
Per Capita Residential Indoor Water Use with the Plumbing Code	70.07	69.64	66.92	62.59	59.16	56.95	55.73
Per Capita Residential Indoor Water Use with the Plumbing Code and Program A	70.07	69.64	63.72	57.17	54.66	52.99	51.91
Per Capita Residential Indoor Water Use with the Plumbing Code and Program B	70.07	69.64	61.04	52.79	51.06	50.52	49.57
Per Capita Residential Indoor Water Use with the Plumbing Code and Program C	70.07	69.64	59.99	51.90	50.22	49.63	48.68
Per Capita Residential Indoor Water Use with the Plumbing Code and Program D	70.07	69.64	53.96	49.55	48.21	47.81	46.90
Per Capita Residential Indoor Water Use with the Plumbing Code and Program E	70.07	69.64	52.47	48.47	47.35	47.07	46.19

7. CONCLUSIONS

7.1 Relative Savings and Cost-Effectiveness of Programs

The Los Osos service area has a relatively high portion of residential water use and a significant amount of outdoor water use. Consequently, residential conservation programs produce the most water savings. The Los Osos service area is not a heavy manufacturing sector so the conservation potential in the commercial sector is relatively low. Based on the assumed avoided cost of new water, water conservation programs are cost-effective.

The population in the Los Osos service area may increase by up to 35% over the next 25 years and with it the water demands are expected to increase 14% if the current conservation measures remain in place. If the least aggressive Program B is implemented, water demands are projected to only increase 2% despite the increase in population. If the more aggressive Program D is chosen then the water demands are projected to slightly decrease by 1.6% in 25 years despite the increase in population.

Program B has the highest internal utility benefit to cost ratio of 12 and has a water savings of 29% over the next 25 years. It does have the drawback of not reaching the residential indoor water use reduction target of 50 gcd until the year 2032. The more aggressive Program D has a lower benefit to cost ratio of 5, but it has an improved water savings of 32% over the next 25 years. It also has the benefit of reaching the 50 gcd target much sooner in the year 2019. The first five year cost for Program D is $3.1 million and the 25 year present value of costs is $3.8 million.

The benefit-cost ratios of the programs range from 5 to 12 so all program combinations are cost-effective from the utility standpoint.

APPENDIX A: CONSERVATION MEASURES ASSUMPTIONS UTILIZED IN THE DSS MODEL

Measure Assumptions Los Osos Within Urban Reserve Line						
Measure Name	**High Efficiency Toilet (HET) Rebates**	**New Dev Require New Landscape and Irrigation Requirements**	**Distribute Retrofit Kits**	**Residential Washer Rebates**	**Residential Water Surveys**	**New Dev Require Plumbing for Future Gray Water Use**
Measure No.	1	2	3	4	5	6
Applicable Customer Classes	All	All	Single Family	Single Family	Single Family/ Multifamily	Single Family
Applicable End Uses	Toilets	Irrigation	Shower, Toilet, Faucet	Laundry	Internal and External	Irrigation
Market Penetration by End Of Program (%)	8%	70%	5%	40%	20%	90%
Annual Target	245 Residential Rebates, 32 Commercial Rebates, 1 Institutional Rebates	100 Residential Accounts per Year, 5 Commercial Accounts per Year, 1 Institutional Account Every 5 Years	30 Residential Accounts per Year	235 Clothes Washer Rebates per Year	560 Surveys per Year	120 New Accounts per Year
Annual Market Penetration (%)	2%	70%	0.5%	4%	10.0%	90%
Water Use Reductions For Targeted End Uses	63%	15%	10%	40%	5% indoor, 10% outdoor	5.0%
Evaluation Start Year	2012	2015	2012	2012	2013	2015
Program Length, years	4	25	10	10	27	25
Measure Life, years	Permanent	Permanent	5	Permanent	7	Permanent
Utility Unit Cost for SF accounts, $/unit	$100	$25	$25	$150	$100	$25
Utility Unit Cost for MF accounts, $/unit	$100	$25	$0	$0	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$100	$25	$0	$0	$0	$0
Customer Unit Cost. $/SF unit	$150	$500	$25	$250	$30	$3,000
Customer Unit Cost. $/MF unit	$150	$500	$0	$0	$0	$0
Customer Unit Cost. $/CII unit	$150	$500	$0	$0	$0	$0
Annual Utility Admin & Marketing Cost	30%	30%	25%	30%	30%	10%
Affected Units	Toilets	Account	Account	Clothes Washer	Account	Account
Comments	Provide a $100 rebate or voucher for the installation of a 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 reflect the incremental purchase cost.	Enforce current County Landscape Design Standards for Water Conservation. Standards specify that development projects subject to design review be landscaped according to Xeriscape principals, with appropriate turf ratios, plant selection, efficient irrigation systems and smart irrigation controllers.	Provide owners of pre-1992 homes with retrofit kits that contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices.	Homeowners would be eligible to receive a $150 rebate on a new high efficiency clothes washer. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology.	Conventional indoor and outdoor water surveys for existing single and multifamily residential customers. Normally those with high water use are targeted and provided a customized report to the homeowner on how to save water in their home. These surveys will be completed in two years and will need to be repeated every seven years to maintain the water savings.	Require that the drain lines in new single-family homes be plumbed for future installation of graywater systems.

Measure Assumptions Los Osos Within Urban Reserve Line						
Measure Name	**New Dev Residential Require Efficient Dishwashers**	**New Dev Residential Require High Efficiency Clothes Washers**	**New Dev Require Hot Water on Demand/Structured Plumbing**	**New Dev Require Multi Family Submetering on New Accounts**	**Public Information Program**	**Rebates for Rain Sensors**
Measure No.	7	8	9	10	11	12
Applicable Customer Classes	Single Family	Single Family	Single Family	Multifamily	Single Family	Single Family
Applicable End Uses	Dishwashers	Clothes Washers	Faucet and shower	All	All	Irrigation
Market Penetration by End Of Program (%)	100%	100%	90%	90%	100%	20%
Annual Target	146 New Accounts per Year	146 New Accounts per Year	131 New Accounts per Year	16 New Multifamily Accounts per Year	NA	117 Rebates per Year
Annual Market Penetration (%)	100%	100%	90%	90%	50%	2%
Water Use Reductions For Targeted End Uses	34%	50%	14.2 gpd per house	15%	1.0%	5%
Evaluation Start Year	2015	2015	2015	2015	2012	2012
Program Length, years	25	6	25	25	28	10
Measure Life, years	Permanent	Permanent	Permanent	Permanent	2	Permanent
Utility Unit Cost for SF accounts, $/unit	$25	$25	$25	$0	$4.50	$25.0
Utility Unit Cost for MF accounts, $/unit	$0	$0	$0	$25	$0	$0
Utility Unit Cost for non-Res accounts, $/unit	$0	$0	$0	$0	$0	$0
Customer Unit Cost. $/SF unit	$400	$300	$500	$0	$0	$55
Customer Unit Cost. $/MF unit	$0	$0	$0	$3,000	$0	$0
Customer Unit Cost. $/CII unit	$0	$0	$0	$0	$0	$0
Annual Utility Admin & Marketing Cost	10%	10%	25%	25%	15%	30%
Affected Units	Account	Account	Account	Accounts	Education	Account
Comments	Revise County's Building Code to require efficient dishwasher (meeting certain water efficiency standards, such as gallons/load).	County Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. County can enforce conditions of water service that may include efficiency standards for washing machines.	Require developers to equip new homes or buildings with efficient hot water on demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having a an on-demand pump on a recirculation line.	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). Water Providers administer meter read and bill program.	Public education would be used to raise awareness of conservation measures available to customers. Programs could continue efforts including school programs, poster contests, speakers to community groups, conservation hotline, website, video loan, radio and television time, demonstration gardens and printed educational material such as bill inserts, etc. Could also consider increasing current County efforts possibly adding cell phone apps, Facebook, interactive kiosk with view screen, etc. Program would continue indefinitely.	Provide a free rain sensor shut-off device for an existing irrigation controller.

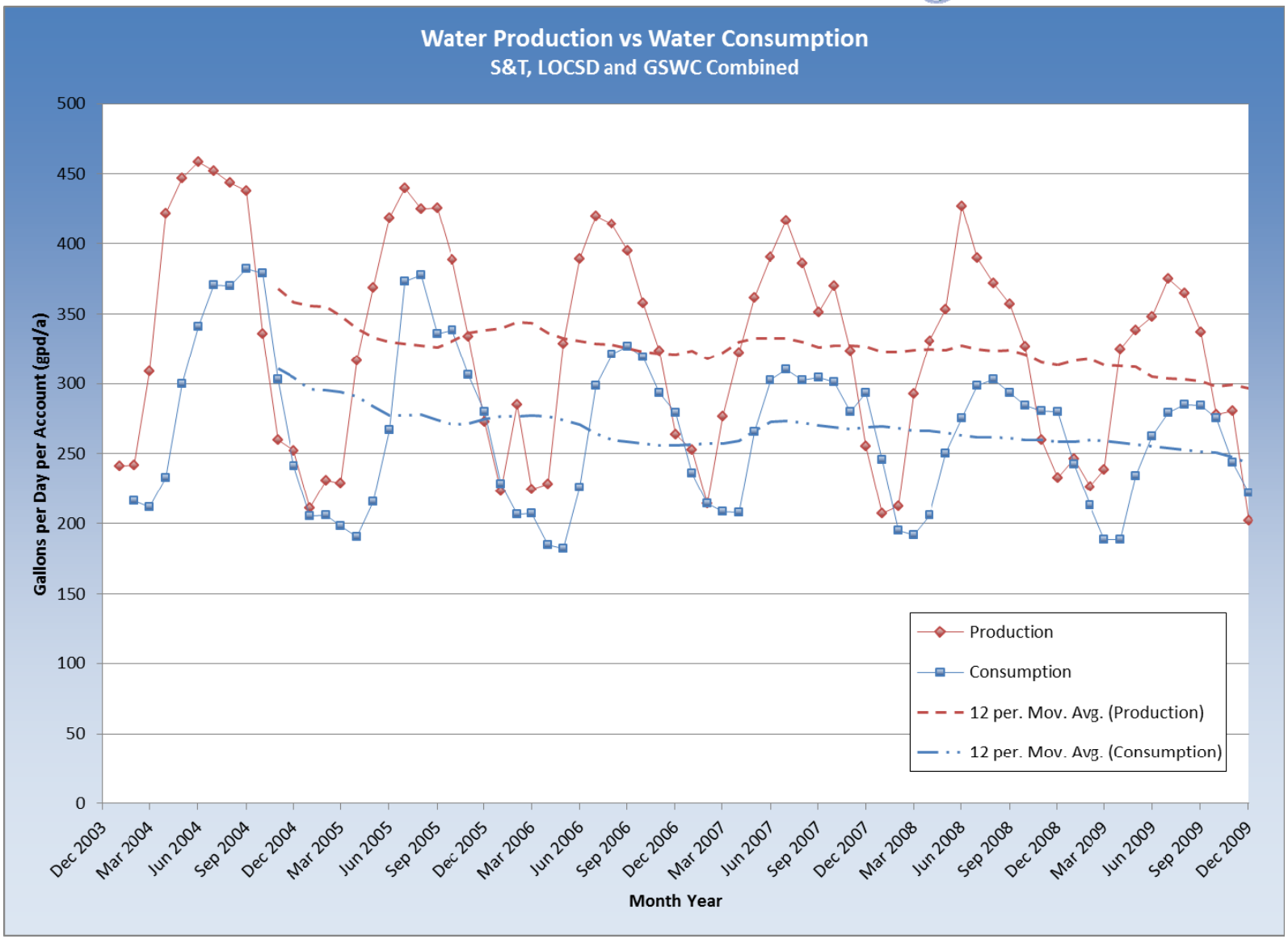
Measure Assumptions Los Osos Within Urban Reserve Line						
Measure Name	Efficient Outdoor Use Education and Training Programs	Rotating Sprinkler Nozzle Rebates	Replace Restaurant Spray Nozzles	New Dev Require Efficient Fixtures in Com, Ind and Inst Buildings	School Building Retrofit	Prohibit Water Waste and Practices
Measure No.	13	14	15	16	17	18
Applicable Customer Classes	Single Family	All	Commercial /Industrial /Institutional	Commercial /Industrial /Institutional	Commercial /Industrial /Institutional	All
Applicable End Uses	Irrigation	Irrigation	50% of Spray Valve	All	School Indoor and Outdoor use	Leaks, Irrigation
Market Penetration by End Of Program (%)	20%	20%	40%	75%	98%	100%
Annual Target	100 participants/yr., 3 classes/yr.	117 Residential Rebates per Year, 6 Commercial Rebates per Year, 1 Institutional Rebate Every Five Years	12 Spray Nozzles per Year	5 New Accounts per Year	2 Schools per Year, 4 Total	625 Residential Accounts per year, 33 Commercial Accounts per Year, 1 Institutional Account per Year
Annual Market Penetration (%)	2%	2%	20%	75%	24.5%	10%
Water Use Reductions For Targeted End Uses	5%	5%	50%	15%	15%	2%
Evaluation Start Year	2012	2012	2012	2015	2012	2012
Program Length, years	28	10	2	25	2	28
Measure Life, years	15	Permanent	Permanent	Permanent	Permanent	10
Utility Unit Cost for SF accounts, $/unit	$25	$75	$0	$0	$0	$25
Utility Unit Cost for MF accounts, $/unit	$0	$150	$0	$0	$0	$25
Utility Unit Cost for non-Res accounts, $/unit	$0	$500	$50	$25	$10,000	$50
Customer Unit Cost. $/SF unit	$300	$50	$0	$0	$0	$25
Customer Unit Cost. $/MF unit	$0	$150	$0	$0	$0	$100
Customer Unit Cost. $/CII unit	$0	$500	$0	$500	$10,000	$200
Annual Utility Admin & Marketing Cost	30%	25%	25%	15%	30%	30%
Affected Units	Account	Account	Spray Valve	Account	School	Account
Comments	Water Providers would offer, organize and sponsor a series of educational workshops or other means for educating homeowners in efficient landscaping and irrigation principals. Utilize guest speakers, Xeriscape demonstration gardens, incentives, such as a nursery plant coupon.	Provide rebate for rotating spray nozzle for existing sprinkler irrigation systems properties.	Provide free installation of 1.6 gpm (or lower) spray nozzles for the rinse and clean operation in restaurants and other commercial kitchens. Coordinate with past historical efforts through the CPUC or CUWCC.	Revise County Building Code requirements for new commercial buildings for high efficiency commercial equipment such as ice machines, food steamers, conductivity controllers, etc.	Run a program patterned after MWD of Southern California's school retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems.	Adopt or modify an existing County Ordinance that prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.

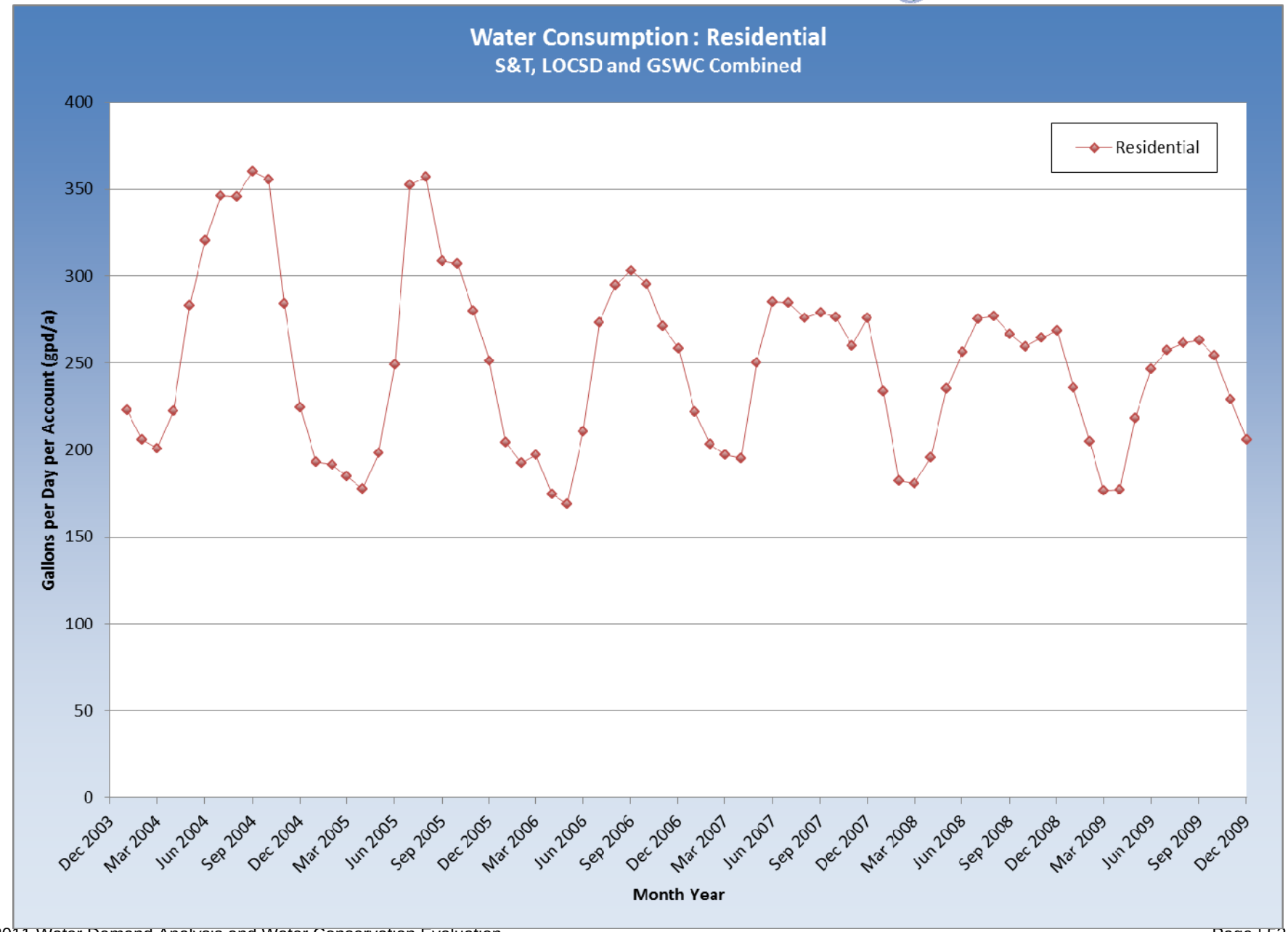
Measure Assumptions Los Osos Within Urban Reserve Line						
Measure Name	**Subsidized Partial Community Retrofit**	**Subsidized Community Retrofit (Add Washers)**	**Install Service Meters in S&T Area**	**Commercial High Efficiency Washer Rebate**	**Media Campaign: Such as the Twenty Gallon Challenge**	**Toilet Retrofit on Resale or Name Change on Water Account**
Measure No.	19	20	21	22	23	24
Applicable Customer Classes	SF,MF,COM	All	Single Family	Commercial /Industrial /Institutional	All	All
Applicable End Uses	Toilet, Shower, Faucets	Washers	All	Laundry	All	Toilet, urinal, shower, faucet
Market Penetration by End Of Program (%)	49%	32%	3.6%	100%	100%	30%
Annual Target	1,378 Residential Accounts per Year, 66 Commercial Accounts per Year	884 Residential Accounts per Year, 42 Commercial Accounts per Year	Install 100 meters per year	1 Laundromat per Year, 2 Total	NA	176 Residential Accounts per Year, 8 Commercial Accounts per Year, 1 Institutional Account Every 4 Years
Annual Market Penetration (%)	25%	16%	1.8%	50.0%	10%	3%
Water Use Reductions For Targeted End Uses	varies	varies	20%	48%	5%	varies
Evaluation Start Year	2013	2013	2012	2012	2012	2014
Program Length, years	2	2	2	2	10	7
Measure Life, years	Permanent	Permanent	Permanent	Permanent	10	Permanent
Utility Unit Cost for SF accounts, $/unit	$500	$400	$1,500	$0	$5	$25
Utility Unit Cost for MF accounts, $/unit	$0	$0	$0	$0	$5	$25
Utility Unit Cost for non-Res accounts, $/unit	$3,000	$1,400	$0	$400	$5	$25
Customer Unit Cost. $/SF unit	$500	$400	$0	$0	$25	$1,000
Customer Unit Cost. $/MF unit	$0	$0	$0	$0	$25	$6,000
Customer Unit Cost. $/CII unit	$3,000	$1,400	$0	$100	$25	$6,000
Annual Utility Admin & Marketing Cost	25%	25%	10%	25%	25%	25%
Affected Units	Account	Account	Account	Clothes Washer	Account	Dwelling unit or CII account
Comments	Subsidize the replacement of designated fixtures at the time homes and businesses are connecting to the new sewer system. Included in the retrofit would be inefficient toilets (flushing with more than 1.6 gallons) and showerheads using more than 2.0 gallons/minute (gpm) and faucets using more than 15 gpm. Subsidy would cover entire cost of fixtures (excluding installation labor).	This measure would add washing machines to list of fixtures replaced by measure 19 (Subsidized Partial Community Retrofit). Washing machines using less than 20 gal/load would be provided. Subsidy would cover entire cost of the washing machines (excluding installation labor).	Accounts without meters would be metered to comply with State law by 2025. The County plans to mandate it prior to hookup to the new wastewater project, so it will need to be done by 2014.	Provide a $400 rebate for the installation of a high efficiency washer (HEW) in two coin operated Laundromats each having 30 machines. Rebate amounts would reflect the incremental purchase cost.	The 20-Gallon Challenge is a media campaign run recently in Southern California whose message is a call for residents and businesses to reduce water use on average by 20 gallons per person, per day. Determine appropriate media campaign message with marketing study/focus groups.	Work with the real estate industry to require a certificate of compliance be submitted to the County that verifies that a plumber has inspected the property and efficient fixtures where either already there or were installed at the time of sale, before close of escrow. (Model after County of Los Angeles and San Diego or County 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.

MADDAUS WATER MANAGEMENT

Measure Assumptions Los Osos Within Urban Reserve Line							
Measure Name	**New Dev Require Smart Irrigation Controllers and Rain Sensors**	**Turf Removal**	**Conservation Pricing Modification**	**Cisterns/Rain Catchment**	**Graywater Retrofit Single Family**	**Commercial, Industrial and Institutional Surveys**	**Require Fixture Replacement by a Deadline**
Measure No.	25	26	27	28	29	30	31
Applicable Customer Classes	All	All	Single Family/ Multifamily	Single Family	Single Family	Commercial /Industrial /Institutional	All
Applicable End Uses	Irrigation	Irrigation	All	Irrigation	Irrigation	All	Toilet, urinal, shower, faucet
Market Penetration by End Of Program (%)	90%	10%	50%	10%	10%	5%	60%
Annual Target	131 Residential Rebates per Year, 6 Commercial Rebates per Year, 1 Institutional Rebate Every Five Years		NA	60 Residential Accounts per Year	60 Residential Accounts per Year	7 Accounts per Year	
Annual Market Penetration (%)	90%	1%	100%	1.0%	1.0%	3%	Gross 2%<2017 SF, 2019 MF,CII; 3%>2017/2019
Water Use Reductions For Targeted End Uses	10%	90%	Elasticity's: -0.05 indoor; -0.2 outdoor	5%	15%	15%	varies
Evaluation Start Year	2015	2012	2012	2012	2012	2012	2014
Program Length, years	25	10	28	10	10	2	10
Measure Life, years	Permanent	Permanent	Permanent	Permanent	Permanent	Permanent	Permanent
Utility Unit Cost for SF accounts, $/unit	$25	$1,000	$2-$5	$100	$1,000	$0	$25
Utility Unit Cost for MF accounts, $/unit	$25	$0	$0	$0	$0	$0	$25
Utility Unit Cost for non-Res accounts, $/unit	$25	$2,000	$0	$0	$0	$3,000	$25
Customer Unit Cost. $/SF unit	$500	$2,000	$0	$300	$1,000	$0	$1,000
Customer Unit Cost. $/MF unit	$1,000	$0	$0	$0	$0	$0	$6,000
Customer Unit Cost. $/CII unit	$1,000	$4,000	$0	$0	$0	$3,000	$6,000
Annual Utility Admin & Marketing Cost	25%	30%	10%	25%	30%	25%	25%
Affected Units	Account	Account	Account	Account	Account	Account	Account
Comments	Require developers for all properties of greater than two residential units and all commercial development to provide the latest state of the art SMART irrigation controllers and rain sensors. These SMART controllers have on-site temperature sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly.	Provide a 50¢ per square foot incentive for turf removal. The replacement of irrigated vegetation with synthetic turf or low water use landscaping may significantly reduce your outdoor watering needs.	Goal of this measure is to change current water rate structure to reduce discretionary water use. For example with a single family inclining block rate structure, the number of tiers, volume in each tier, or water rates within each tier could be changed so that more customers are encouraged to conserve. Could also consider seasonal rates. Would require a water rate study.	Provide a rebate ($100) to assist a certain percentage of single family homeowners per year with installation of rain barrels or cisterns.	Provide a rebate (up to $1,000) to assist a certain percentage of single family homeowners per year to install graywater systems.	Top 5% of CII customers would be offered a free water survey that would evaluate ways for the business to save water and money. The CII surveys (accounts that use more than 5,000 gallons of water per day) would be for CII accounts such as hotels, restaurants, stores and schools.	County would pass an ordinance that requires homeowners and businesses to bring fixtures up to efficient standard by a fixed date at their own expense. Deadline could be the date residences and businesses are required to connect to new sewer system. Should follow SB 407.

APPENDIX B: WATER USE DATA GRAPHS FOR PRODUCTION AND CUSTOMER CATEGORIES


Water Production vs Water Consumption
S&T, LOCSD and GSWC Combined
Gallons per Day per Account (gpd/a)
500
450
400
350
300
250
200
150
100
50
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
Sep 2006
Dec 2006
Mar 2007
Jun 2007
Sep 2007
Dec 2007
Mar 2008
Jun 2008
Sep 2008
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Dec 2009
Month Year
Production
Consumption
12 per. Mov. Avg. (Production)
12 per. Mov. Avg. (Consumption)


Water Consumption : Residential
S&T, LOCSD and GSWC Combined
Residential
Gallons per Day per Account (gpd/a)
400
350
300
250
200
150
100
50
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
Sep 2006
Dec 2006
Mar 2007
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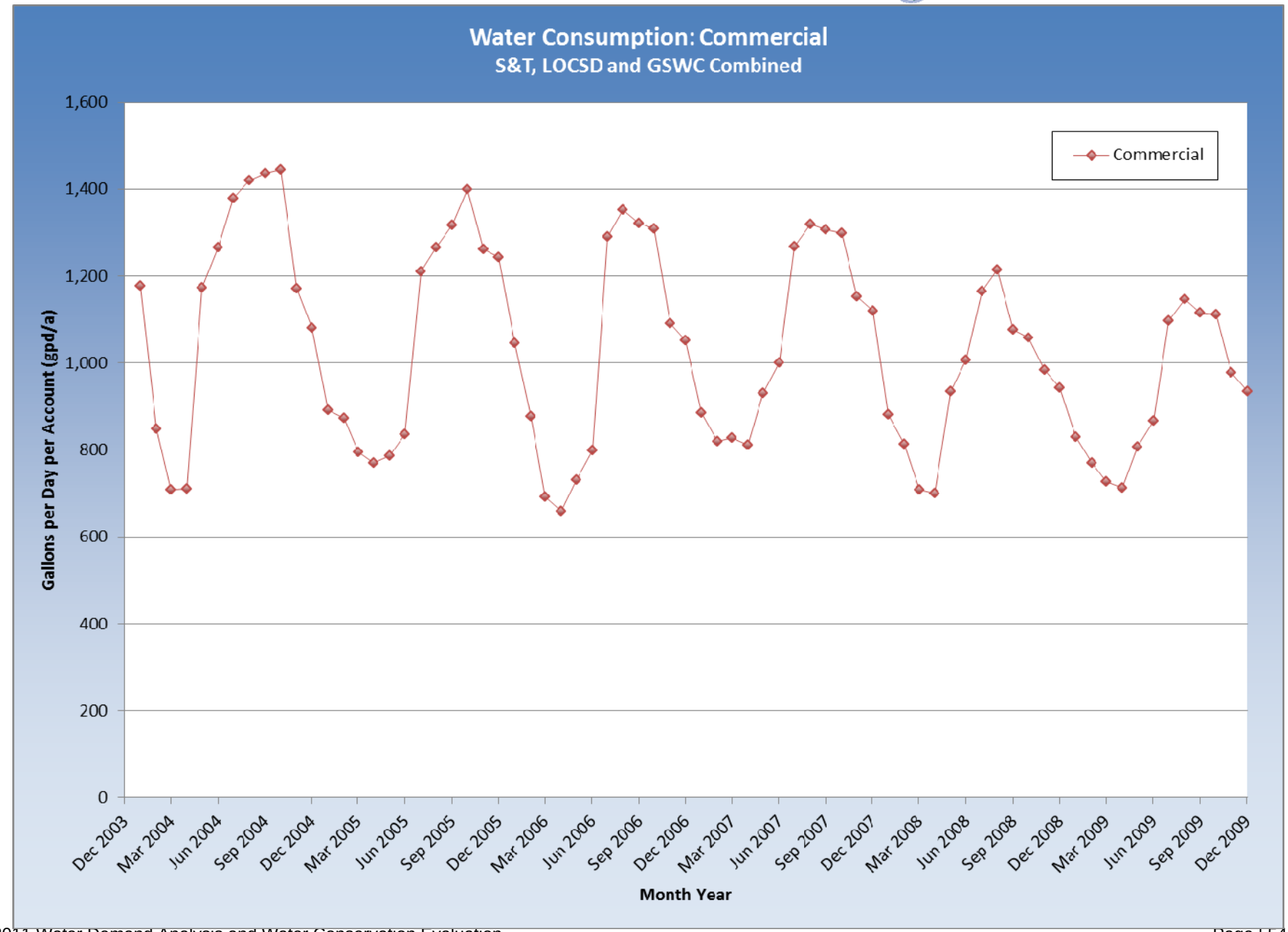
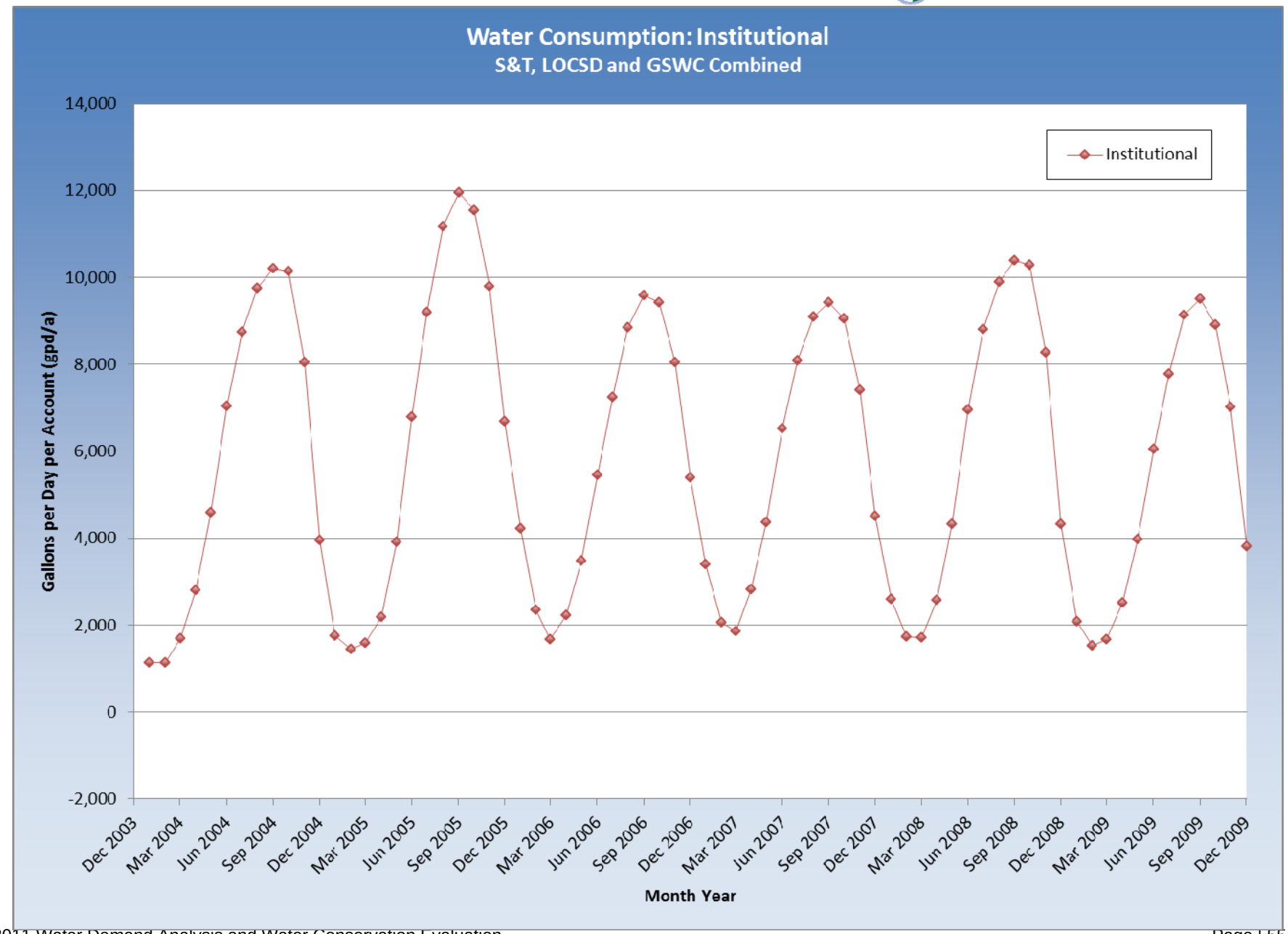
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Dec 2009
Month Year


Water Consumption: Commercial
S&T, LOCSD and GSWC Combined
Commercial
Gallons per Day per Account (gpd/a)
1,600
1,400
1,200
1,000
800
600
400
200
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
Sep 2006
Dec 2006
Mar 2007
Jun 2007
Sep 2007
Dec 2007
Mar 2008
Jun 2008
Sep 2008
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Dec 2009
Month Year


Water Consumption: Institutional
S&T, LOCSD and GSWC Combined
Institutional
Gallons per Day per Account (gpd/a)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
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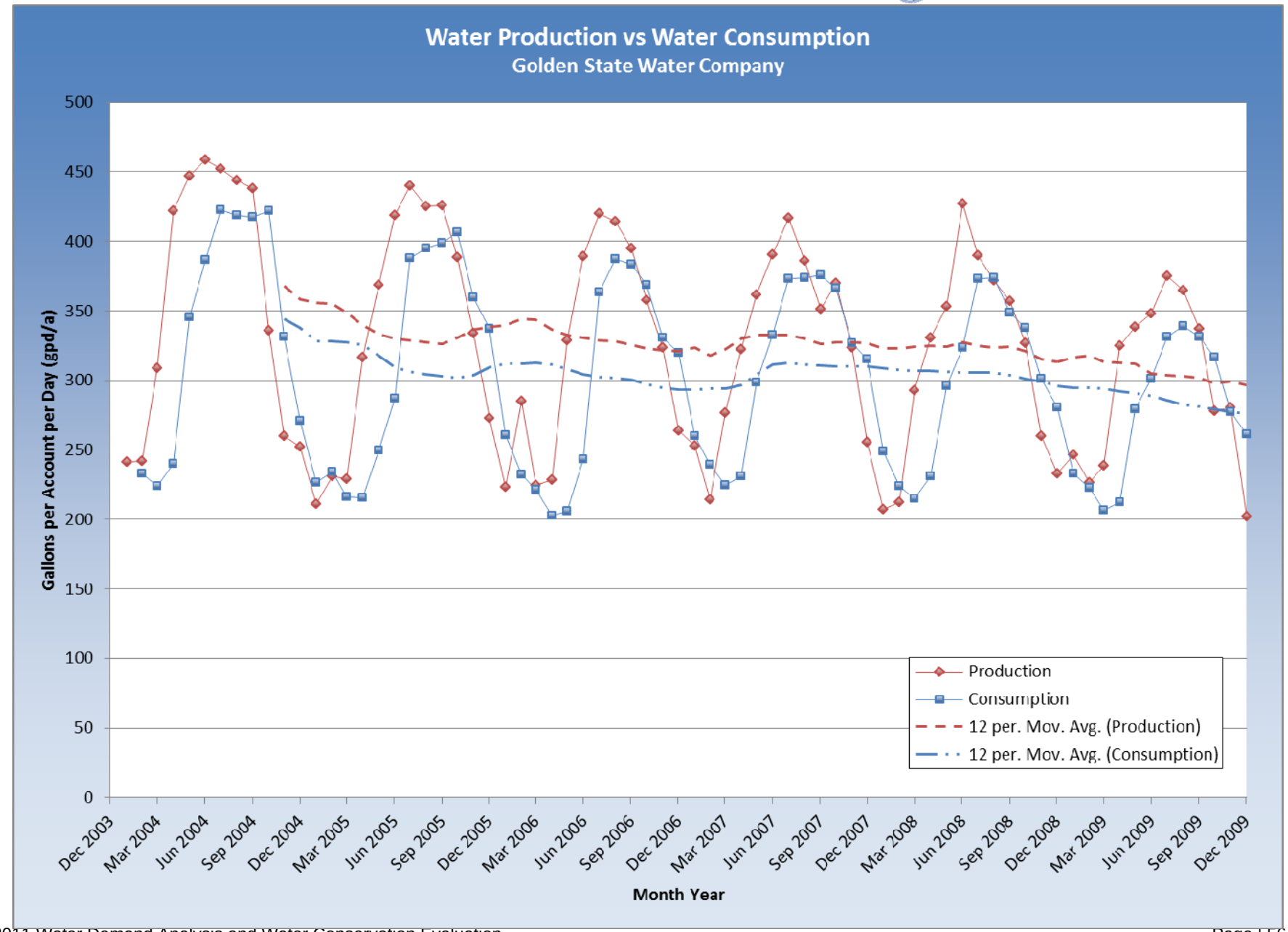
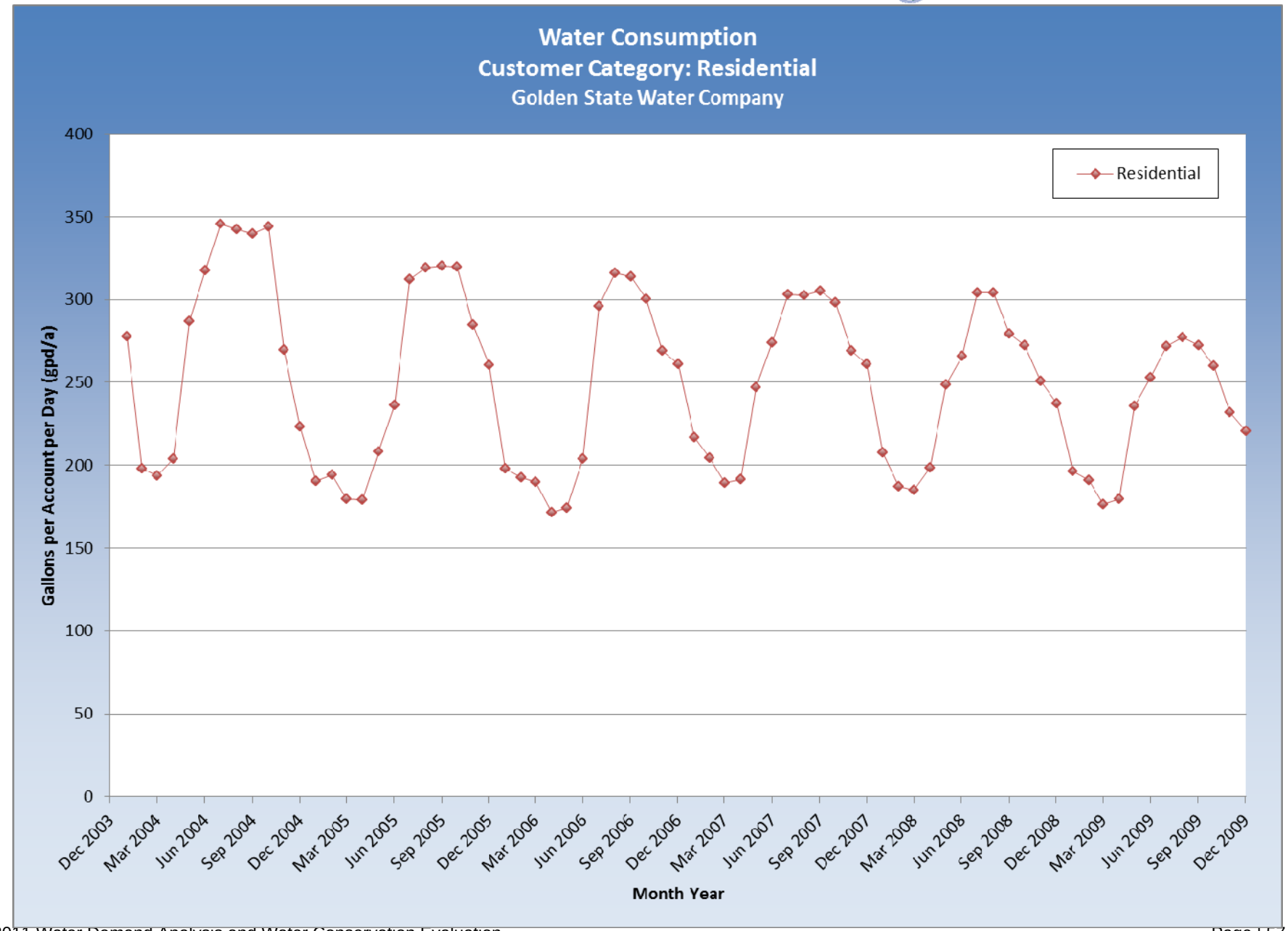
Jun 2009
Sep 2009
Dec 2009
Month Year


Water Production vs Water Consumption
Golden State Water Company
Gallons per Account per Day (gpd/a)
500
450
400
350
300
250
200
150
100
50
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
Sep 2006
Dec 2006
Mar 2007
Jun 2007
Sep 2007
Dec 2007
Mar 2008
Jun 2008
Sep 2008
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Dec 2009
Month Year
Production
Consumption
12 per. Mov. Avg. (Production)
12 per. Mov. Avg. (Consumption)


Water Consumption
Customer Category: Residential
Golden State Water Company
Residential
Gallons per Account per Day (gpd/a)
400
350
300
250
200
150
100
50
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
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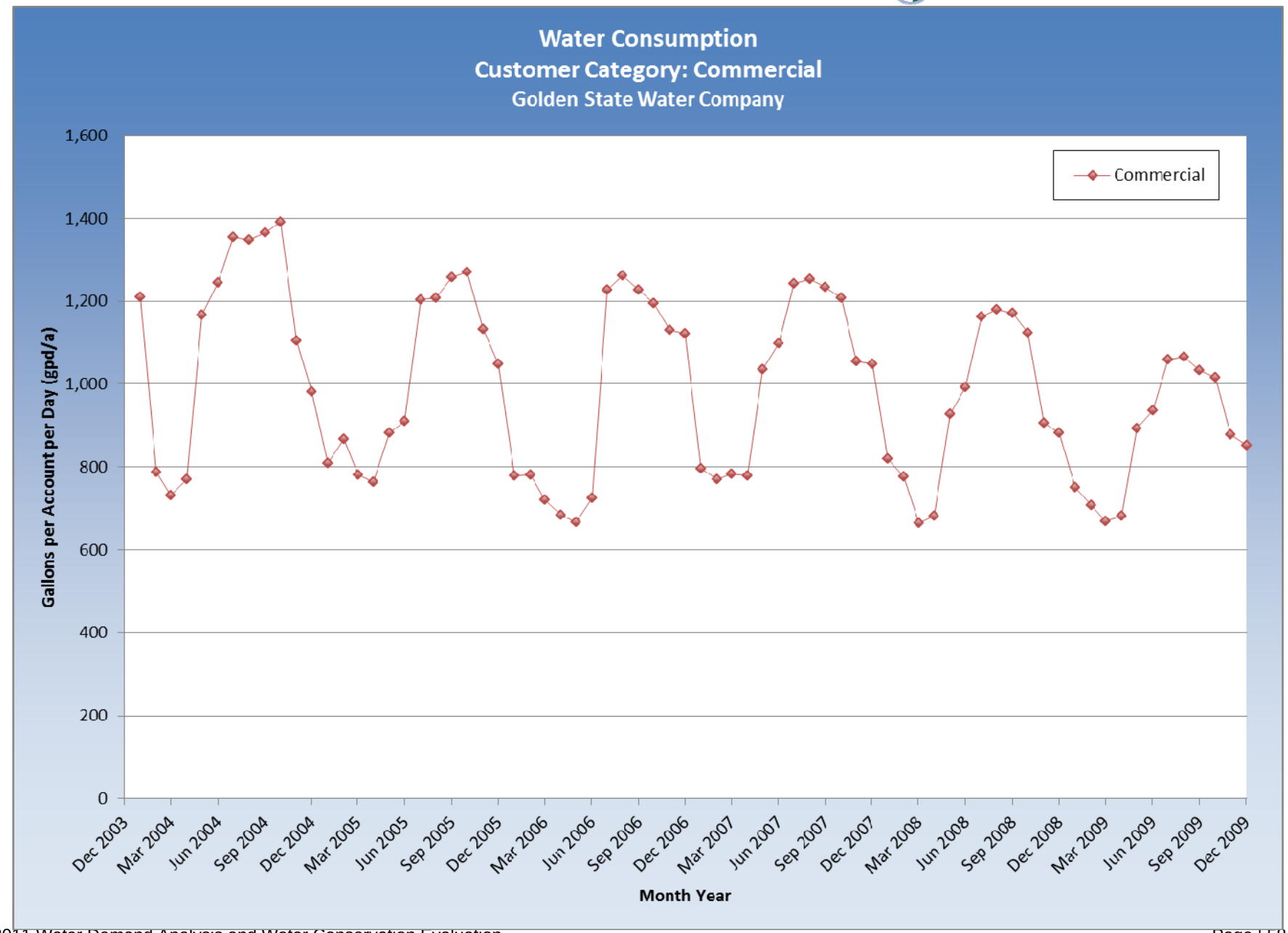
Mar 2009
Jun 2009
Sep 2009
Dec 2009
Month Year


Water Consumption
Customer Category: Commercial
Golden State Water Company
Commercial
Gallons per Account per Day (gpd/a)
1,600
1,400
1,200
1,000
800
600
400
200
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
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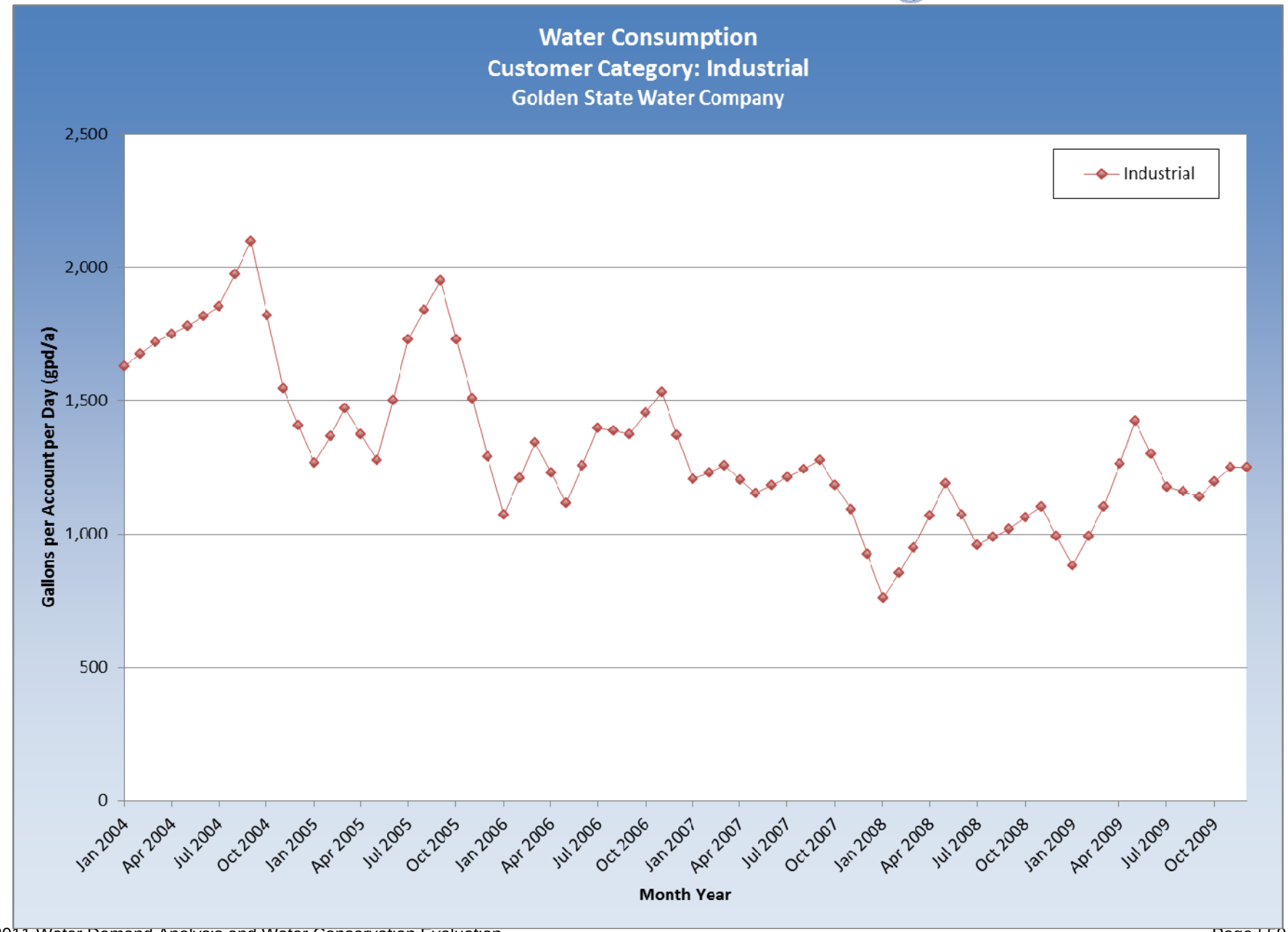
Jun 2009
Sep 2009
Dec 2009
Month Year


Water Consumption
Customer Category: Industrial
Golden State Water Company
Industrial
Gallons per Account per Day (gpd/a)
2,500
2,000
1,500
1,000
500
0
Jan 2004
Apr 2004
Jul 2004
Oct 2004
Jan 2005
Apr 2005
Jul 2005
Oct 2005
Jan 2006
Apr 2006
Jul 2006
Oct 2006
Jan 2007
Apr 2007
Jul 2007
Oct 2007
Jan 2008
Apr 2008
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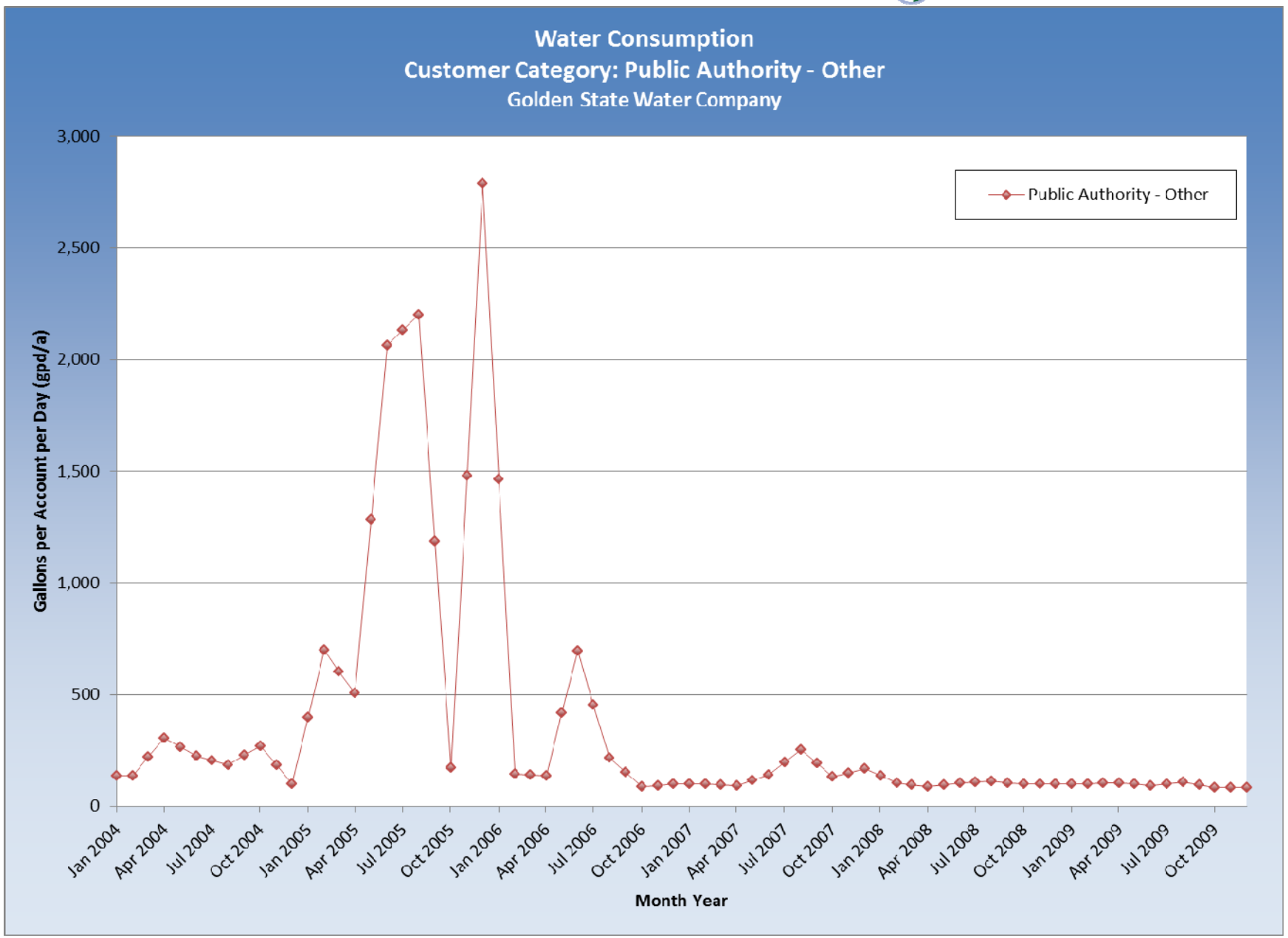
Oct 2008
Jan 2009
Apr 2009
Jul 2009
Oct 2009
Month Year


Water Consumption
Customer Category: Public Authority - Other
Golden State Water Company
Public Authority - Other
Gallons per Account per Day (gpd/a)
3,000
2,500
2,000
1,500
1,000
500
0
Jan 2004
Apr 2004
Jul 2004
Oct 2004
Jan 2005
Apr 2005
Jul 2005
Oct 2005
Jan 2006
Apr 2006
Jul 2006
Oct 2006
Jan 2007
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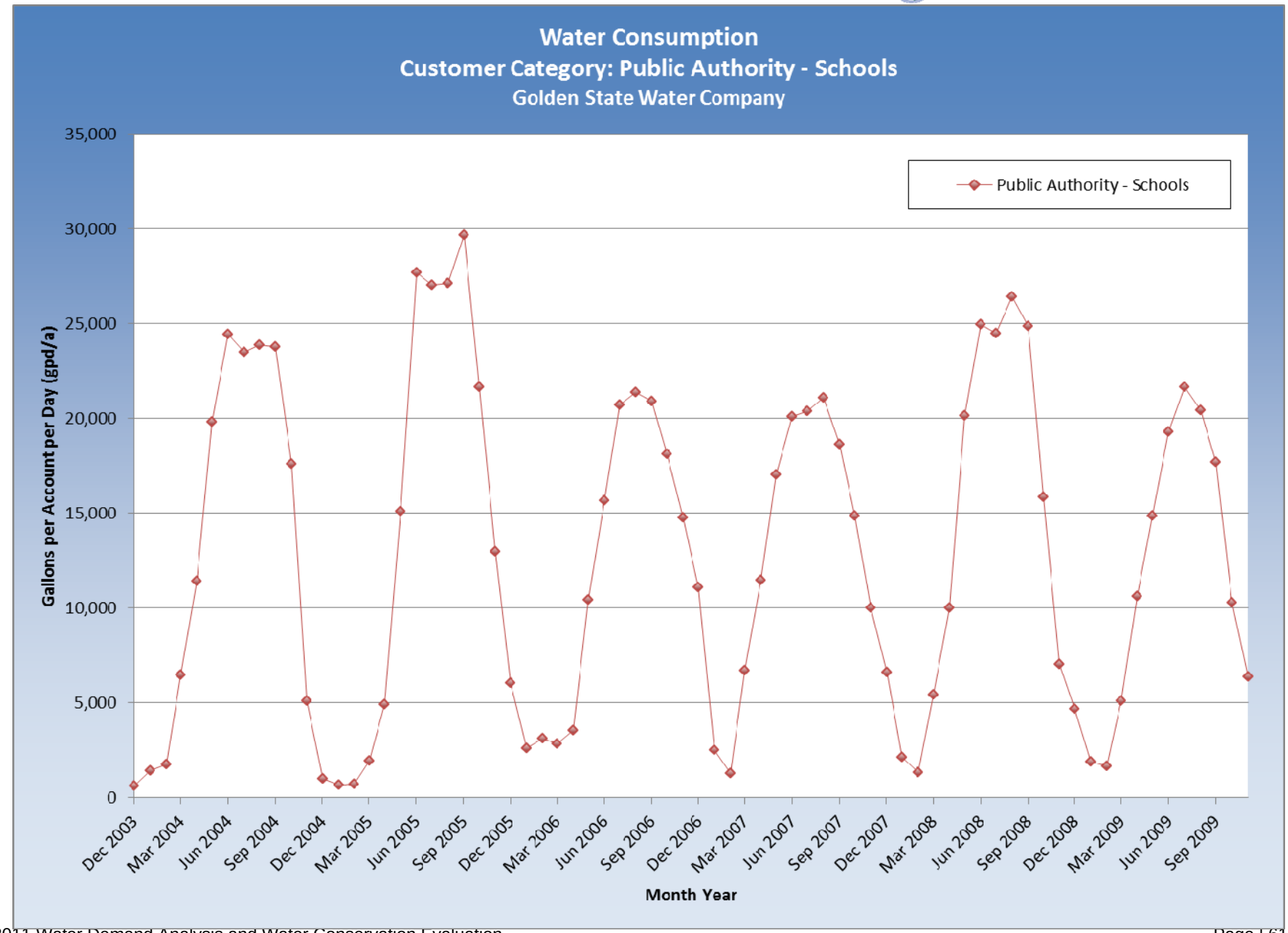
Oct 2008
Jan 2009
Apr 2009
Jul 2009
Oct 2009
Month Year


Water Consumption
Customer Category: Public Authority - Schools
Golden State Water Company
Public Authority - Schools
Gallons per Account per Day (gpd/a)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
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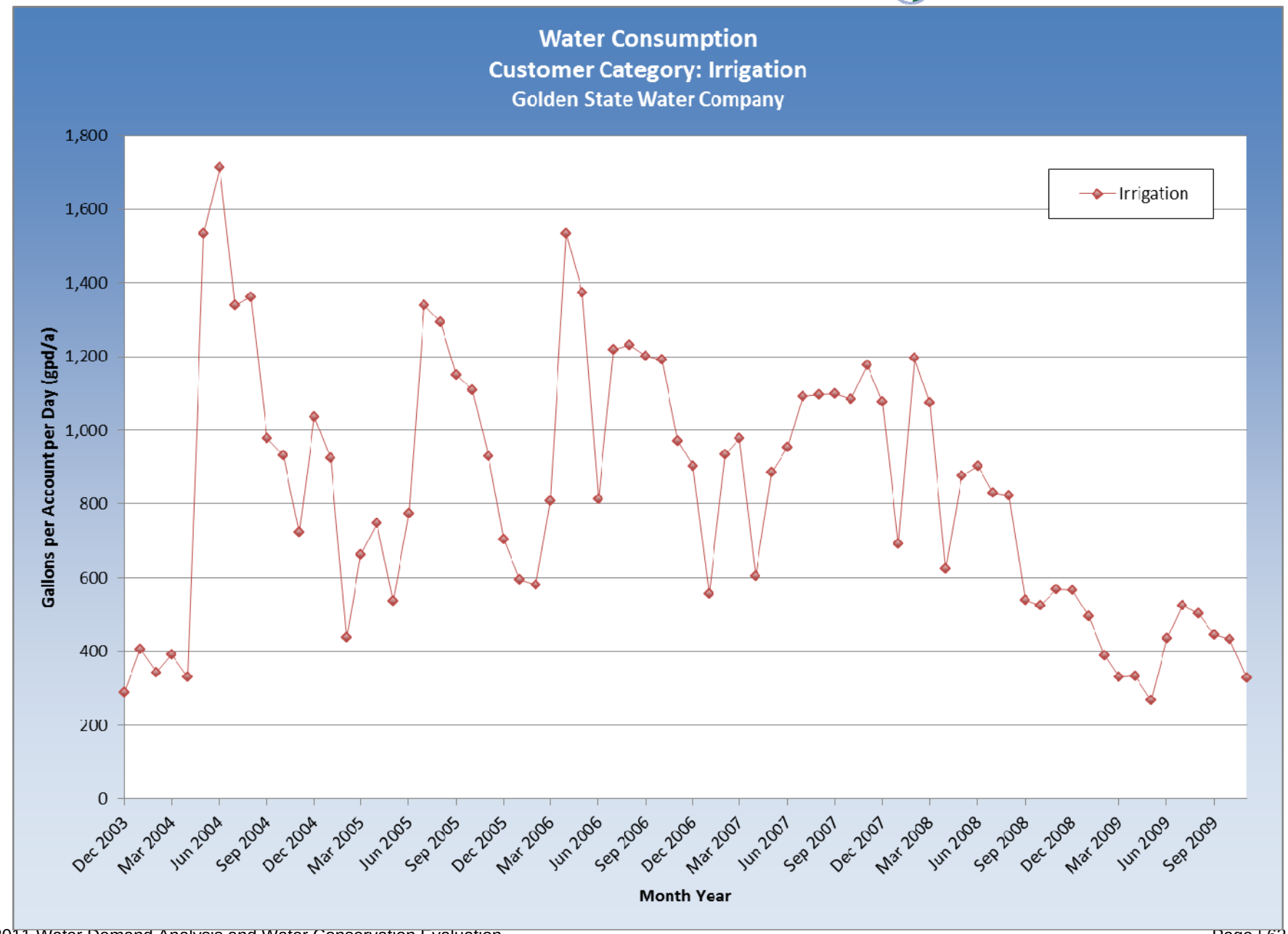
Sep 2009
Month Year


Water Consumption
Customer Category: Irrigation
Golden State Water Company
Irrigation
Gallons per Account per Day (gpd/a)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
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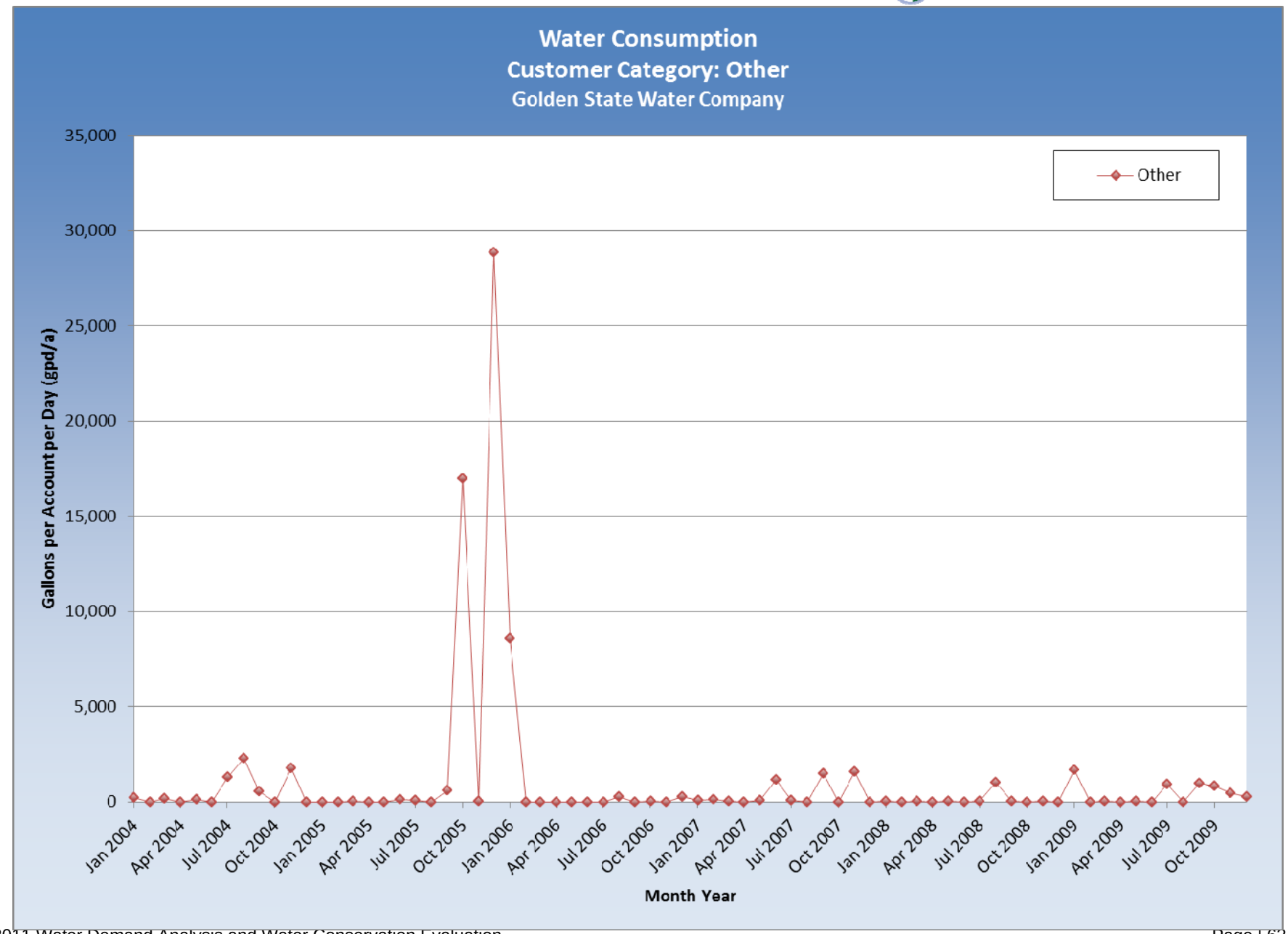
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Month Year


Water Consumption
Customer Category: Other
Golden State Water Company
Other
Gallons per Account per Day (gpd/a)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan 2004
Apr 2004
Jul 2004
Oct 2004
Jan 2005
Apr 2005
Jul 2005
Oct 2005
Jan 2006
Apr 2006
Jul 2006
Oct 2006
Jan 2007
Apr 2007
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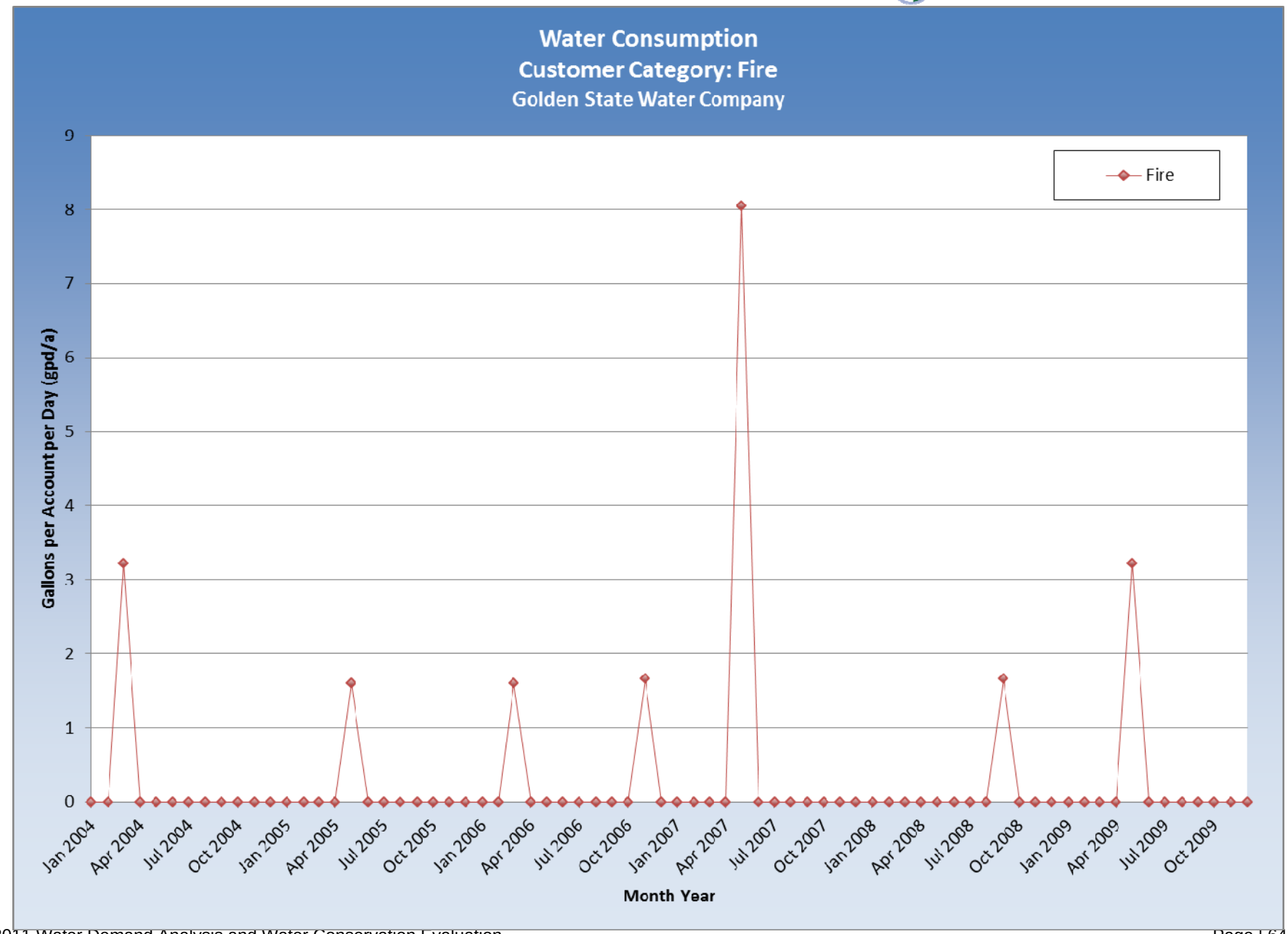
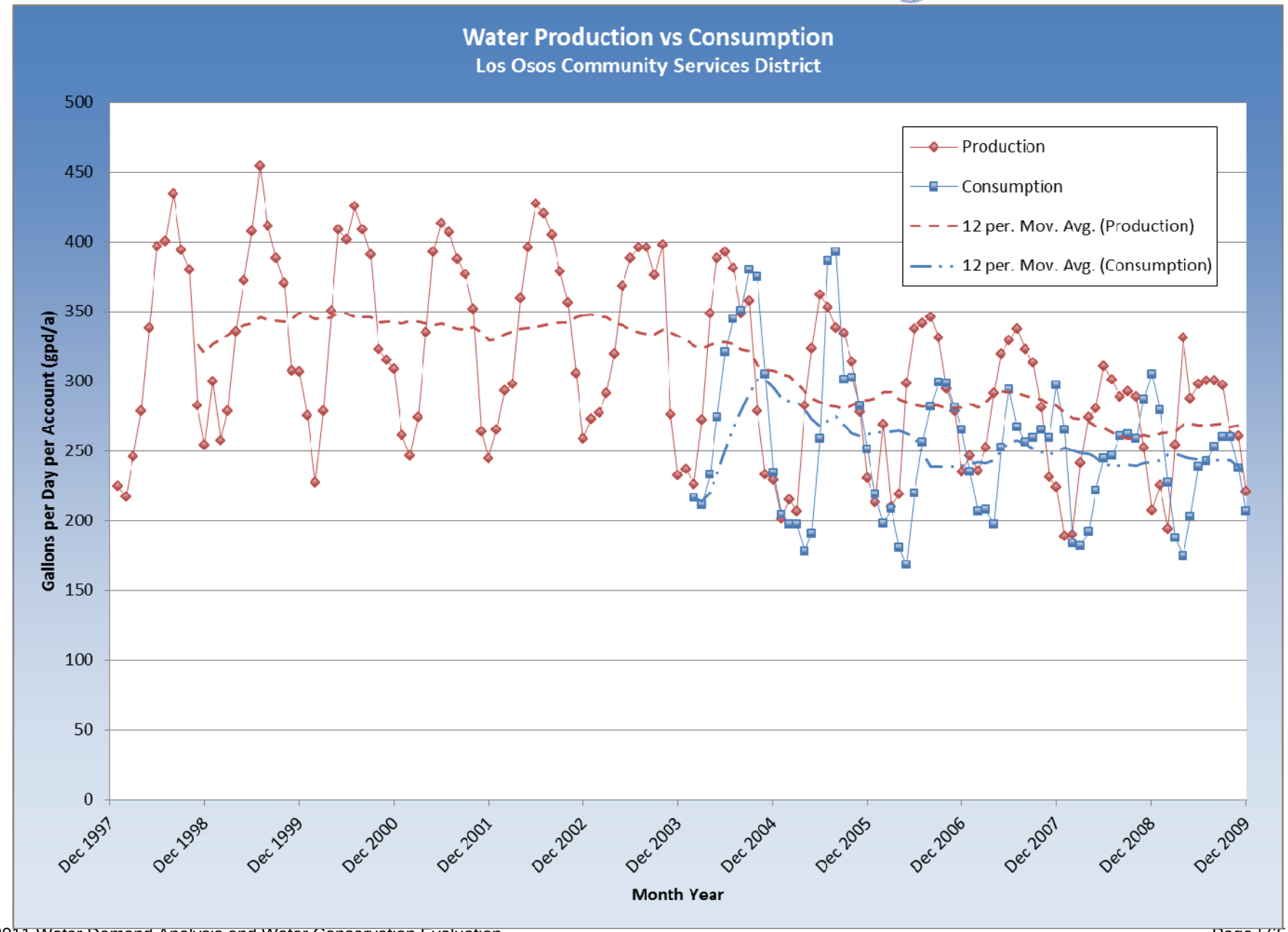
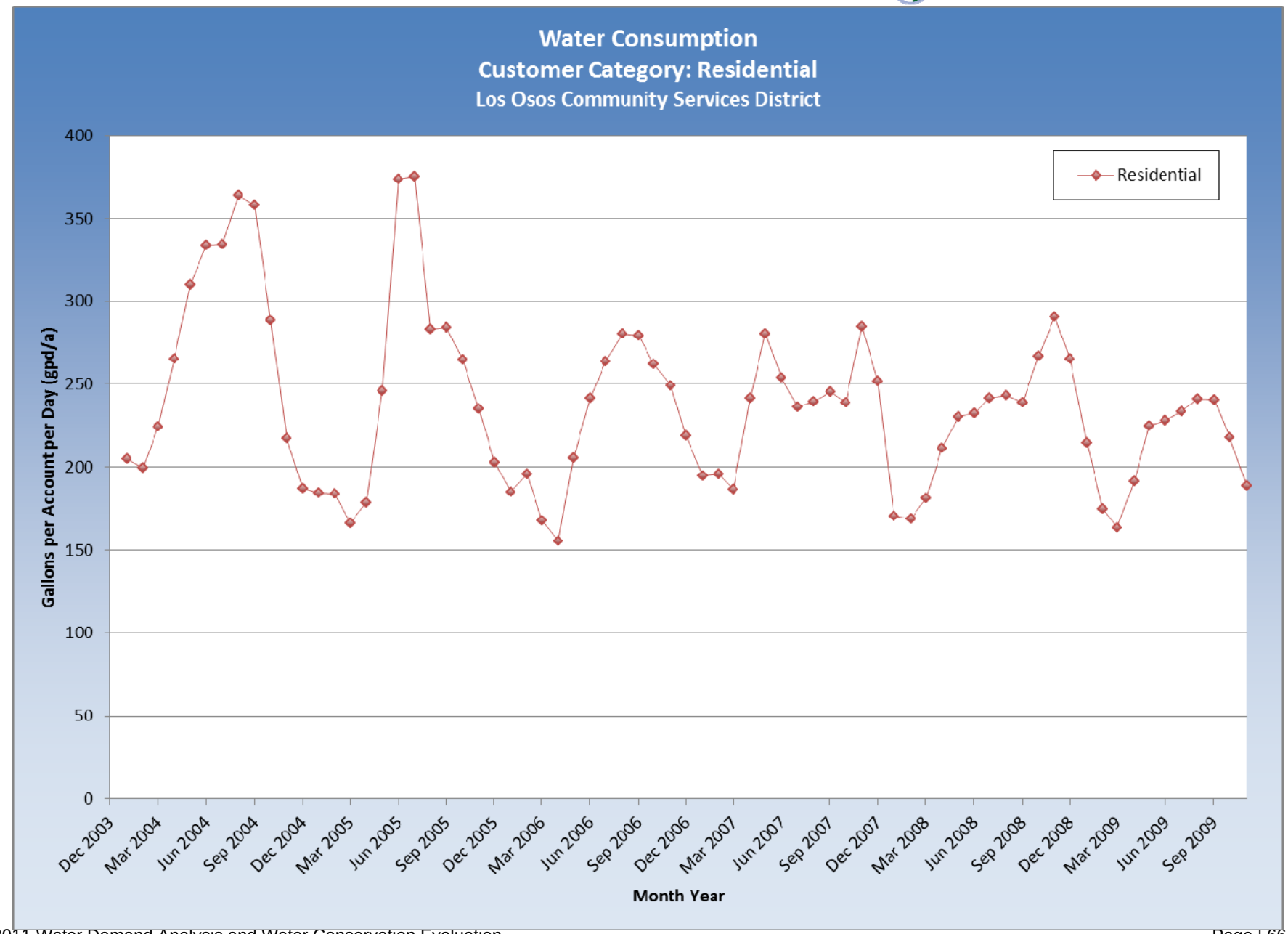
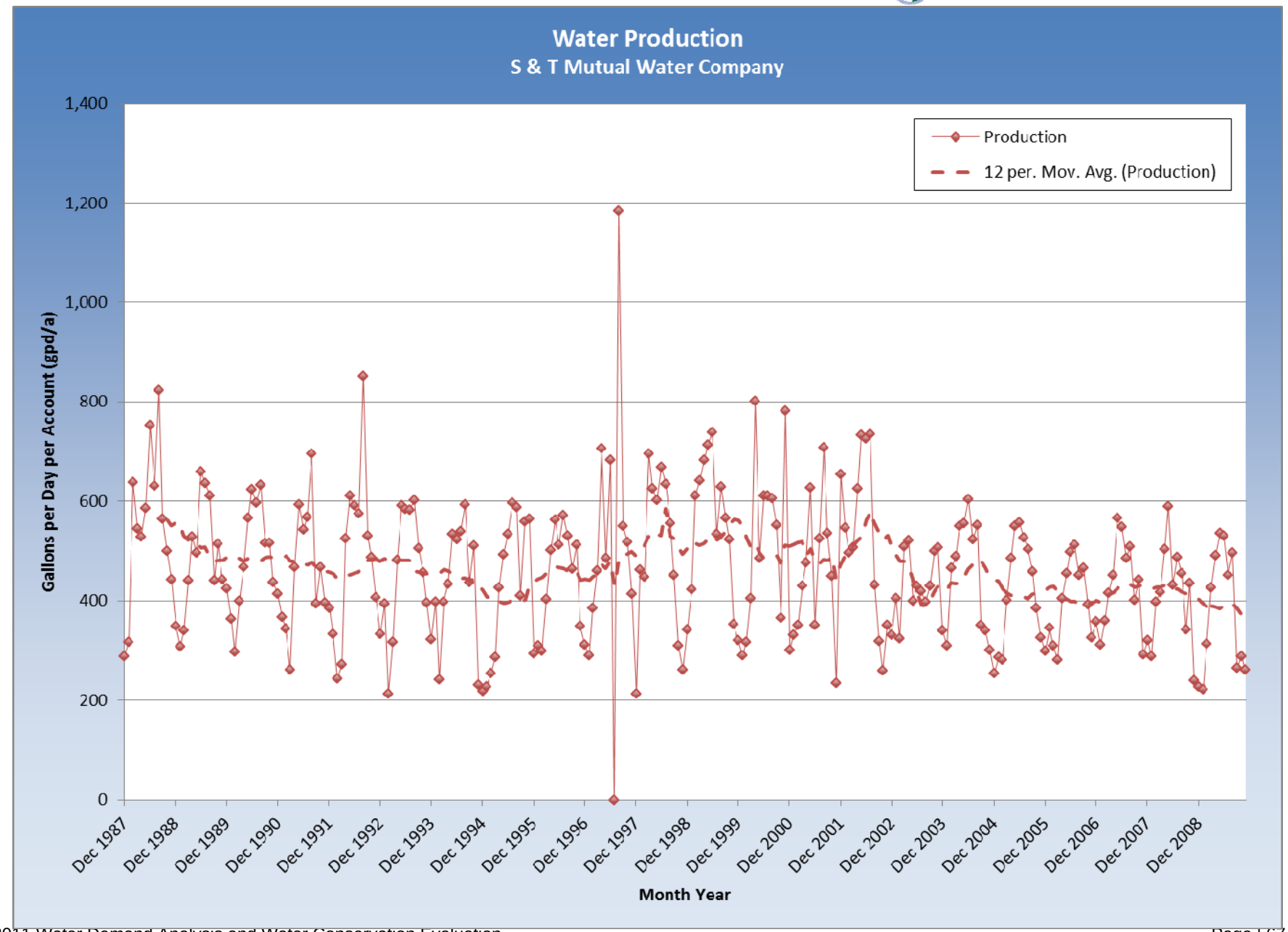
Jul 2008
Oct 2008
Jan 2009
Apr 2009
Jul 2009
Oct 2009
Month Year


Water Consumption
Customer Category: Fire
Golden State Water Company
Fire
Gallons per Account per Day (gpd/a)
0
1
2
3
4
5
6
7
8
9
Jan 2004
Apr 2004
Jul 2004
Oct 2004
Jan 2005
Apr 2005
Jul 2005
Oct 2005
Jan 2006
Apr 2006
Jul 2006
Oct 2006
Jan 2007
Apr 2007
Jul 2007
Oct 2007
Jan 2008
Apr 2008
Jul 2008
Oct 2008
Jan 2009
Apr 2009
Jul 2009
Oct 2009
Month Year


Water Production vs Consumption
Los Osos Community Services District
Production
Consumption
12 per. Mov. Avg. (Production)
12 per. Mov. Avg. (Consumption)
Gallons per Day per Account (gpd/a)
500
450
400
350
300
250
200
150
100
50
0
Dec 1997
Dec 1998
Dec 1999
Dec 2000
Dec 2001
Dec 2002
Dec 2003
Dec 2004
Dec 2005
Dec 2006
Dec 2007
Dec 2008
Dec 2009
Month Year


Water Consumption
Customer Category: Residential
Los Osos Community Services District
Residential
Gallons per Account per Day (gpd/a)
400
350
300
250
200
150
100
50
0
Dec 2003
Mar 2004
Jun 2004
Sep 2004
Dec 2004
Mar 2005
Jun 2005
Sep 2005
Dec 2005
Mar 2006
Jun 2006
Sep 2006
Dec 2006
Mar 2007
Jun 2007
Sep 2007
Dec 2007
Mar 2008
Jun 2008
Sep 2008
Dec 2008
Mar 2009
Jun 2009
Sep 2009
Month Year


Water Production
S & T Mutual Water Company
Production
12 per. Mov. Avg. (Production)
Gallons per Day per Account (gpd/a)
1,400
1,200
1,000
800
600
400
200
0
Dec 1987
Dec 1988
Dec 1989
Dec 1990
Dec 1991
Dec 1992
Dec 1993
Dec 1994
Dec 1995
Dec 1996
Dec 1997
Dec 1998
Dec 1999
Dec 2000
Dec 2001
Dec 2002
Dec 2003
Dec 2004
Dec 2005
Dec 2006
Dec 2007
Dec 2008
Month Year