Nipomo Community Services District

Water Conservation Program

Saving water now for Nipomo's future…

Nipomo Community Services District

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I. Table of Contents

II. Table of Charts, Graphs, Tables

Table of Tables

Table of Charts

Table of Text Boxes

III. Executive Summary

(The Executive Summary is a very brief overview of the proposed water conservation program. For the specifics and details of the program, please refer to the complete report.)

INTRODUCTION: The District faces several challenges in meeting the water demands of its customers, including having only groundwater as a source of water for the District, consumption of groundwater exceeding the rate of natural recharge, and years of delay before supplemental water will be delivered to the District. Reducing customers' water demands is the only way to meet the immediate short-term need to save water, and the cheapest way to moderate long-term water needs.

The water conservation program goal is to achieve an overall 15% reduction in water use by the District. Other benefits to be achieved from this conservation include the maintenance of the District's primary water source, the Nipomo Mesa Management Area groundwater; fiscal savings from decreased need to buy/produce water and decreased operating and maintenance expenses; fiscal savings from decrease, delay or deferment of water and wastewater facility upgrades, repairs and expansions; decrease in environmental damage by decreasing byproducts from energy used to obtain and deliver water; and decrease in stormwater systems pollution due to decreased fertilizer- and pesticide-laden runoff from overwatering landscapes.

WATER CONSERVATION PROGRAM: The proposed water conservation program has been designed to achieve the most savings with the least funding. The criteria for including a measure in the program were: amount of potential water savings; cost to the District (savings:cost ratio); years to pay off the initial investment in equipment or rebate; and ease of designing, promoting and administering the program or measure. Once the measures were analyzed, they were given ranking scores.

The program is divided into two basic parts: the "core measures" and the "non-core measures." The core measures are an integrated set of water conservation measures that are designed to support each other and, as a unit, support the non-core measures. The core measures include public outreach and education, advertising, workshops, technical assistance (leak detection and water audits), and a conservation-based multi-tiered water rate structure. Due to the way that the core measures amplify the impact of each other, they are an example of the whole being greater than the sum of the individual parts. The core measures are designed to be used intact; splitting them apart and only using some of them would greatly decrease the overall efficiency and savings of the program.

The non-core program contains measures that are not all essential to the success of the program. Indeed, it is not anticipated or desired for the Board to accept all of the non-core measures. For some measures (those which would be expensive and difficult to implement) it is recommended that a small pilot program be performed first. Non-core measures included rebates for plumbing retrofitting, high-efficiency clothes-washer rebates, a cash-for-turf replacement program, and rebate/provision of "smart" evapotranspiration-based irrigation system controllers. It is recommended that the latter two measures first undergo small pilot programs before launching larger programs.

RECOMMENDATIONS: The water conservation program measures recommended are as follow:

Core Program Measures: It is recommended that all of the core measures be adopted. These include:

- A multi-tiered, inclining block, conservation-based rate structure
- Public education and outreach/ advertising measures
- Technical assistance measures.

Non-Core Measures Program: It is recommended that the following four non-core measures be adopted:

- High-efficiency clothes washer rebates
- Indoor plumbing (non-toilet) retrofit and leak detection aids
- Pilot turf-replacement program
- Irrigation efficiency equipment.

SUMMARY: The NCSD and its customers are facing water challenges that can only be met with proper planning and customer support. Water conservation plays a vital role in meeting these challenges. Fortunately, there is a wealth of information and statistics compiled by those who have been down this road before us, and we are now on notice regarding the anticipated impending "permanent drought" that may affect us as early as 2050, the anticipated multi-year drought in the nearer future, and the insecurity of the provision of State water. Throughout the State of California, politicians and managers of water suppliers are taking the lead in initiating plans now for the events predicted to occur in the future.

People in the future will look back on those making water policy decisions at this crucial point. By moving forward now in a decisive manner, we can help secure the District's customer's rural way of life in a sustainable manner.

IV. Introduction

"Nothing so needs reforming as other people's habits."
--Mark Twain

The Nipomo Community Services District faces both immediate and long-term challenges to providing water to its customers. The 13% decrease in above-sea-level groundwater stored in the Nipomo Mesa aquifer from April 2006 to April 2007 dictates immediate concern for protecting the long-term viability of the aquifer. According to an article published 8/10/2007 in the journal *Science*, starting in 2009 at least five out of ten of the following years are expected to be hotter than 1998, the warmest year recorded.[1]

Water suppliers throughout California are aggressively asking for increased water conservation from their customers[2,3,4,5,6] and some are instituting new ordinances relating to amount and type of irrigation for new construction, "smart" irrigation controllers, and golf course turf and irrigation.[7] For at least one California county, a state of water emergency has been declared,[8] and another county has asked for federal disaster aid with an emergency declaration possible in the very near future.[9]

In addition, reliance on State Water may not be a prudent decision as the reliability of the source may be in question. Because of the environmental litigation regarding the Delta smelt, a 30%-to-50% reduction in water transfers going south of the Delta may be ordered by the court.[10] The condition of California's levee system makes it vulnerable to failure from flooding or earthquake, contaminating the Delta system (from which much of the State water going south is derived) with saltwater from San Francisco Bay.[11] FEMA is now questioning whether some of the Delta levees can withstand the next flood.[12]

The combination of the Delta ruling and an anticipated multi-year drought has driven California politicians and water suppliers to initiate planning to meet their responsibility to providing water to constituents and customers.

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[1] Kerr, Richard A. *Humans and Nature Duel Over the Next Decade's Climate*. Science 10, August 2007, 317:746-747.
[2] Rockenstein, Denise. *Citizens asked to reduce water use as Lower Lake faces shortage.* Lake County Record Bee, 08/28/2007
[3] *Metropolitan Launches Serious Water-Saving Message in Most Extensive Outreach, Education Effort in District. History.* Businesswire.com, 08/06/2007
[4] Halter, Reese. *California Focus: State Likely Faces a Drier Future.*
[5] Simmons, Ann. *Palmdale Water Board Orders Conservation Measures*. Los Angeles Times, 08/30/2007.
[6] Duarte, Jesse *Water shortage hurts Upvalley vineyards; St. Helena's lower reservoir at less than half its capacity.* Napa Valley Register, 08/31/2007.
[7] Atagi, Colin. *New Plans to Curb Water Usage.* Desert Sun, 08/31/2007.
[8] Abrams, Jonathan. *Water Emergency is Declared in Riverside County*. Los Angeles Times, 07/20/2007.
[9] Hearden, Tim. *Supervisors Ask for Drought Aid.* Redding Record Searchlight 08/29/2007.
[10] Dobuzinskis, Alex. *Court Could Devastate Water Supply: Half of Southland's Imported Resources from North at Risk*. Los Angeles Daily News, 08/30/2007.
[11] *If the Levees Fail in California.* Business Week (www.businessweek.com), 08/20/2007.
[12] Miller, Inga. *Will Levees Hold? FEMA Unsure.* The Modesto Bee, 08/31/2007.

According to California Governor Arnold Schwarzenegger, *"Due to climate change, we can expect a decrease in our snow pack by as much as 40 percent by the year 2050, which means more flooding in the winter and less drinking water in the summer. We can't afford to wait any longer. We need a water management strategy that tackles all our long-term water needs. That means increasing water storage, developing new conveyance systems, fixing the Delta, restoring key water resources and aggressively moving forward with conservation efforts… I want California to remain at the forefront of water conservation and be the model for the next generation of smart water users. That's why in my water infrastructure plan I've proposed California's largest investment in water conservation ever."*[13]

The recent court ruling regarding a probable significant decrease for six months of the year (June to December) of Delta water being pumped out to its water agency clients, combined with last winter's weak rainfall numbers and predictions for a multi-year drought, is causing many water agencies to put their customers on notice now: if significant voluntary conservation is not soon demonstrated, they can anticipate mandatory rationing in the future. Water managers throughout the state are leading the way in ensuring that they meet their responsibilities to their customers. Much of the San Francisco Bay area is introducing the specter of rationing, including Alameda County Water District (which gets 40% of its water from the Delta) and the Santa Clara Valley Water District (which gets 50% of its water from the Delta system).[14] Silicon Valley is also looking toward the possibility of mandatory water rationing, its first in 16 years.[15]

Despite the recent rains, water suppliers throughout California are advising their customers that there is still a water shortage, and are raising rates and imposing surcharges to cover the increased costs of water. Accourding to Bill Patzert, a climatologist with the Jet Propulsion Laboratory in La Canada-Flintridge, the recent rains are "…a drop in the bucket, We crept into this drought and we will crawl out even more slowly." [16]

At least one city is investigating the feasibility of requiring recycled water use for selected residential, commercial and industrial developments, said Santa Rosa Water Resources Planner Jennifer Burke. "Wastewater," Burke said, "is drought-proof and sustainable."[17]

The Metropolitan Water District is looking towards the possibility of rationing,[18] and that means that the water agencies supplied by MWD will have to pass that on to their customers. The general manager of Western Municipal Water District (which supplies the western half of Riverside County), John Rossi, said that some kind of mandatory conservation would be addressed. According to Tim Quinn, president of the Association of California Water Agencies, "The crisis is indefinite, and will last beyond the one-year court order."

Randy Van Gelder, general manager of San Bernardino Valley Municipal Water District, which imports Delta water for several cites, believes that the court decision will have a lasting impact, unlike the effect of a natural drought. Long before the court ruling, the Inland Empire was suffering from the effects of an eight-year drought impacting the Colorado River, with Sierra Nevada snow pack at its lowest levels since 1990, and 30% of normal snowfall in local mountains (water from which recharges the aquifers). If the worsening water situation persists, a number of Southern California areas may be adopting a rate structure that penalizes those who use over a certain level

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13 *California Governor Schwarzenegger Pushes Compehensive Water Plan."* www.allamericanpatriots.com. 05/10/2007.
14 Curiel, Jonathan. *Forced Water Conservation May Follow Dry Winter*. San Francisco Chronicle, 09/05/2007.
15 Rogers, Paul. *Water Rationing Could Be on the Horizon.* San Jose Mercury News, 09/05/2007.
16 *Water Supplies Low Despite Recent Rain*. San Gabriel Valley Tribune, 01/10/2008.
17 McCoy, Mike. Santa Rosa May Force Use of Wastewater. Santa Rosa Press Democrat, 09/10/2007
18 Dobuzinskis, Alex. *Court Could Devastate Water Supply: Half of Southland's Imported Resources from North at Risk*. Los Angeles Daily News, 08/30/2007.

of water.[19] Mr. Van Gelder also indicated that, unless there is significant and substantial rainfall this winter, authorities may turn to water rationing. Mr. Van Gelder said the anticipated decrease in rainfall and State Water deliveries might translate into less water to keep lawns green, and in a few years may produce restrictions on the amount of residential lawn allowed.[20]

The Los Angeles Department of Water and Power, faced with uncertainty about the reliability of State Water deliveries in the future, is focused on safeguarding their water supplies, and is preparing water rationing contingency plans. If rationing occurs in L.A. it will be a first for the city**.** David Nahai, president of Department of Water and Power commissioners, said "If that is what will be needed in order to safeguard our water supplies, well, so be it. But we'll have to see just what this plan is that Metropolitan Water District will be putting forward."[21]

The impact on agriculture of the uncertainty of water deliveries is predicted to be significant. Many farmers are concerned that the amount of reduction of State water delivered may make growing crops unprofitable, leading to a reduction in work force. According to Greg Zlotnick, special counsel for the Santa Clara Valley Water District, which provides Delta water to 1.7 million people in Silicon Valley, "It's our quality of life that is at stake and the regional economy as well."[22]

Another scenario worrying economists is the impact on local economies should farmers, faced with the questionable reliability of State water deliveries, decide to sell their water allotment to water-strapped cities. It is predicted that these cities will make big-money offers for the water. Fallow fields, especially in San Joaquin Valley which is already economically depressed, would decimate local economies.[23]

California is looking to its politicians to solve California's water crisis. A Chico Enterprise Record editorial claims that the water shortage has a silver lining: forcing politicians to do what it takes to definitively solve this long-standing problem: "Let's see. Perhaps the court's forced cutbacks will force the politicians' hand. Maybe they'll finally have to quit ignoring the warning signs and face up to the problem. Maybe they'll spend money on delta restoration. Maybe they'll force cities and farmers to do more in the way of recycling water and conserving water…."[24]

At least one water supplier, San Lorenzo Valley, has already implemented mandatory restrictions. After requests for voluntary conservation of 20% were not successful, San Lorenzo imposed mandatory restrictions, including banning irrigation during the daytime. The next step, said Jim Mueller, the agency's director, would be water rationing and fines.[25]

Locally, the Nipomo Mesa has been the perennial recipient of a large part of new residential development in the San Luis Obispo County. Despite the County's certification of a Level of Severity III (use exceeds resource) for water resources in the Nipomo Mesa Management Area, construction of new developments continues. Under consideration now by the County is the State affordable-housing mandate, and the County is considering targeting the Nipomo Mesa with 80% of the new multi-family, high-density affordable-housing.

Many of the District's customers, aware of the limited water availability, look at the possible large increase in new housing in the Nipomo Mesa and the requests to voluntarily conserve water, and

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[19] Bowles, Jennifer. *Ruling spurs 'great deal of uncertainty' over water supply.* Riverside Press Enterprise, 09/05/2007.

[20] Edwards, Andrew. Time to Conserve Water is Now, Officials Say. Inland Valley Daily Bulletin. 09/09/2007

[21] Contingency Plans Drawn Up for Possible SoCal Water Rationing. Associated Press. 09/06/2007.

[22] Weiser, Matt. *Less Delta Water Means Dry Times*. Sacramento Bee. 09/06/2007.

[23] *Politicians Frozen Amid Water Crisis.* Chico Enterprise Record. 09/07/2007.

[24] *Ibid.*

[25] Associated Press. *Water Restrictions: Mandatory Water Restrictions for San Lorenzo Valley Residents*. 09/06/2007.

believe their sacrifices in conserving water will be used to provide water for new development. It is recommended that Board address this issue if full public support of a water conservation program is desired.

District customers would be more enthusiastic about conserving water if they knew that their sacrifices would not simply be used to provide water for new housing.

The target water conservation goal is an overall 15% for the District's customers, using 2006's consumption figures as the starting point (.65 AF/Y per account). The year 2006 was chosen because it is the last year for which complete water consumption statistics are available. The average per-account usage in 2006 is also very close to the average per-account usage for the years 2001-2006 (.68 AF/account), and so is viewed as representative of a longer-term pattern for the District's customers.

It is believed that a goal of 15% water conservation is a reasonable goal that can be achieved with the District's support and a reasonable amount of customer effort.

In addition, 15% is:

- The stated goal in the District's *2005 Urban Water Management Plan*.
- A median average goal from the Kennedy/Jenkins report.
- Recommendation from the Resource Management Study for San Luis Obispo County, prepared by John Hand (to be achieved by 2010).

Much of what humans do on a daily basis, including how they use water, is done by habit. For the NCSD to meet the challenges we face, we must convince our customers to use less water, which will require a multi-faceted approach by the District to help them change their water-use habits.

While the District's customers use only a portion of the Nipomo Mesa's groundwater, the District, by taking the leadership role in responsible stewardship of this limited resource, stands a better chance for setting a responsible course for the future of the Nipomo Mesa aquifer.

Water saved by conservation practices can be a dependable, cost-effective source of supplemental water.[26,27] It saves considerably for utilities in capital and operating costs, and for customers in the amount they pay for water.[28]

By implementing a goal-oriented, cost-effective Water Conservation Program, which is practical in design, the District can not only best serve its customers, but place itself at the forefront of resource stewardship by protecting Nipomo's water resource—and, therefore, Nipomo's economic viability—for future generations.[29]

BASICS OF THE PROGRAM:

All statistics and analyses of District water production and consumption are based on the annual California Department of Water Resources Public Water System Statistics which the District must file with the State each year.

[26] G. Henderson. *City of San Luis Obispo 2006 Water Resources Status Report*. 2006
[27] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.
[28] Ibid.
[29] Troxel, Wyatt. *Saving Water Now a Critical Issue.* www.dailybulletin.com. 08/26/2007.

The excerpts of referenced sources at the end of this document are provided as examples of information given in the sources, and not meant to provide detailed information of all referenced sources in this document.

Projections of costs and benefits over years reflect an annual 3% increase. Projections of number of meters and estimated population are based on the average percent-change (increase) from 2003 to 2006, a 3.22% average annual increase.

Estimates on amount of savings to anticipate from a measure are based on existing studies, adjusting for Nipomo's climate when necessary (i.e., when using the estimates from a landscape study based in southern Nevada, proportional analysis was used to arrive at figures that would reflect Nipomo's much lower evapotranspiration rate). In all cases, the estimates based on other studies were actually lower than could have been justified, with the desire to be more conservative in estimations of savings.

The FY2008 budget for the water conservation program is based on previous budgets for water conservation and current estimates of amount of resources needed to provide the support the District's water customers need in meeting the program's conservation goals. For all measures presented, costs for the initial year of the program are much greater than the costs of subsequent years. For some measures (toilet and other hardware installations), the costs are required only at the initiation of the program, when the actual costs for promoting the measure to customers, and purchase/rebates, are provided to the customers. After the initial installation of the hardware, subsequent years until the end of the expected life of the hardware (up to 20 years) are profit.

There are two basic categories of water-conservation measures recommended:

1. **Core program measures.** A grouping of measures which are the bedrock support upon which rests the success of the other program measures. The non-core water conservation measures are designed based on the core program measures remaining intact. The core program measures are meant to be implemented together and intact. The core program measures depend upon each other, and the other program measures depend on the Core program measures. Public education, advertising, conservation-based rate pricing and technical assistance to customers are all part of the Core program measures.
2. **Non-core-program measures ("stand-alone" measures).** These are measures that are not dependent on each other, but are dependent upon the core program measures. It is not recommended, desired, or anticipated that all of the non-core measures will be implemented. This is a category where analysis and study will help the District select which measures will be implemented, and when they will be implemented.

The core elements support all other measures; therefore, costs for the core elements are apportioned to each of the non-core elements. The percentage of each non-core element's share-of-core-elements costs is based on an estimation of the amount of support services each non-core element will require. For some non-core elements (e.g., showerhead replacement), all costs are in the very beginning of that element's program, and follow-up over the years of the program is not required. For other non-core elements (i.e., those that involve changing of habits or behaviors), yearly follow-up is required as reinforcement of the gains of the element.

A voluntary conservation goal of an average15% decrease of overall water consumption has been chosen by the District. This goal is reasonable, and it is believed that it can be obtained with reasonable effort by the District and its customers.

The non-core elements of the program have been selected based on the following criteria:

1. The amount of potential water savings.
2. Cost to district (savings:cost ratio).
3. Years to pay off initial investment in equipment or rebates.
4. Ease of designing, promoting and administering the program for the measure.

To attain this goal, non-core elements have been proposed and rated as to benefit to the District. The non-core elements were chosen for their ability to make it easier for the District's customers to conserve water. See *Comparison and Ranking of Measures*, page 89.

Rebates or outright purchase of equipment for customers reap many benefits.

- Rebates encourage customer participation in the program. Designing, launching and administering a water conservation program requires a great deal of staff time and effort, as well as funds for public-education and advertising support of the program. Programs without rebates, or has rebates but in amounts that aren't sufficient to generate enough customer interest to get ensure participation, end up spending staff time and effort, and supportive funding, with very little return.
- A well-designed and planned water conservation program produces water savings sufficient to warrant the water supplier's funding of customer rebates. The rate of return of a strong rebate program has inspired water suppliers all over the country to invest in these measures.
- Rebates communicate to all customers, even those not participating in the program, the value and efficacy of the recommended measure (i.e., the District would not be offering a rebate if the measure was not believed to be of value in saving water and funds).
- Rebates are a strong focal point of advertisements. Even a small pilot program, especially of a measure that has not previously been used in the region, can generate media interest and publicity. This, in turn, communicates to customers the value of the program.
- The amount of the rebate influences customers' willingness to participate in the rebate program. Since the majority of shared program costs (public education, advertisement, etc.) occur in the initial years of the measure, it is important for the amount of the rebate to be sufficient to encourage participation; otherwise, the shared program costs are not efficiently used, and the non-core program measure will not be optimally utilized.

A total of 13 core measures and 8 non-core measures are presented. It is not anticipated nor desired of the Board that they approve all of these measures. With adoption of the intact core program measures, it is anticipated that with only the high-efficiency clothes-washer rebate program, non-toilet hardware retrofit measures, small-item irrigation efficiency items, and turf-replacement program, the District will be able to come close to meeting the goal of 15% water conservation.

While the selection or omission of non-core elements can be flexible, core elements cannot be omitted without crippling the results of the non-core measures chosen and funded by the District. Without the core elements of the program, the District will have to spend more on its programs to get less.

If the core program is not accepted intact, then other non-core measures will need to be chosen to accomplish enough water conservation savings to justify the water conservation program. Some of these non-core measures will require a great deal of staff time to accomplish. Funding for extra staff has not been included in the projected costs, but can be provided at the Board's request.

If the Board decides to omit portions of the recommended program, the Board is respectfully requested to select other measures to provide the needed savings and serve the same role in the overall program as the omitted core measures.

V. PROGRAM GOALS

1. **Maintain the long-term health of the District's primary water source, the Nipomo Mesa sub-area of the Santa Maria Groundwater Basin.**

2. **Staff-recommended water use reduction of 15% for the District.**

3. **Gain support of Nipomo residents for the water conservation program.**

4. **Share the burden and costs of water conservation equitably across all customer types.**

5. **Educate the community on Nipomo's unique water balance, the link between use and supply, and the consumers' responsibility for protecting groundwater quality.**

6. **Promote awareness regarding Nipomo's limited water sources, the dependence on the Nipomo Mesa aquifer for 100% of water delivered to customers, and the risk of contamination by seawater should saltwater intrusion occur.**

7. **Keep the community informed regarding the status of the multifactorial conditions that impact water supply in the Nipomo Mesa.**

8. **Provide education and support for the public in water-efficiency measures for indoor and outdoor water use.**

9. **Provide leadership by example by demonstrating practical and attractive water-efficient devices and landscapes on District property.**

10. **Avoid, defer or decrease of expansion and costs of water and wastewater facilities.**

11. **Reduce energy combustion byproducts that play a role in air pollution and climatary change.**

12. **Reduce costs and impact on the environment.**

13. **Enforce existing ordinances, and implement new ordinances as required.**

14. **Comply with all regulations and ordinances.**

15. **Accurately assess success of program by program monitoring, economic analysis, and revision, as necessary.**

16. **Increase the District's credibility as a resource steward.**

VI. OVERVIEW OF BENEFITS FROM WATER USE EFFICIENCY

BENEFIT RECIPIENT	TYPE OF BENEFIT	DESCRIPTION OF BENEFIT
Water Utility	Supply System O&M	Short- and long-term O&M costs reduced secondary to lower energy expenses related to reduced pumping and use of chemicals in water treatment and disposal.*
Water Utility	Supply System Capital Invest.	Capital facilities can be deferred or downsized.
Water Utility	System Reliability	Less water purchased from other water purveyors/sources, and more reliability of supply yields, depending on available capacity.
Wastewater Utility	System O&M	Short- and long-term reductions in O&M costs resulting from lower energy expenses because of reduced loading on collection systems, pumping volume, aeration, and chemical use in wastewater treatment.
Wastewater Utility	Disposal System Capital Investment	Capital facilities for land disposal can be deferred or downsized. There are additional benefits when wastewater discharge restrictions are present.
Environment	Quality Enhancement	Decreased need for dams and reduced construction disturbance in natural waterways of third-party suppliers who provide supplemental water.
Environment	Quality Enhancement	Decreased in pollution entering stormwater systems secondary to decreased fertilizer- and pesticide-laden runoff from overwatering landscapes.
Environment	Quality Enhancement	Reduced green solid waste to landfill with reduction of overwatering and excessive growth of plants/turf; reduced pollution from trucking; reduced landfill space.
Environment	Quality Enhancement	Higher stream flows for fish and wildlife habitat of third-party suppliers who provide supplemental water.
Environment	Quality Enhancement	Reduced pollution, less addition to landfill due to deferred or downsized of construction of capital facilities.
Environment	Quality Enhancement	Deferment or downsizing of desalination plant, deferring or limiting impact on ocean wildlife and habitat.
Community	Aesthetic Quality	Diminished aesthetic effects on waterways from avoided or deferred capital projects.
Community	Environmental Justice	Fewer social equity issues with facility concerns.
Community	Public Health	Leakage reduction programs lower risk of contamination in the distribution system; water supply reliability supports health and hygiene.
Community	Economic	Increased economy on the same resource, creation of water conservation jobs, customer savings in utility bills.
Community	Economic/Political	Fiscal savings from avoided or delayed new capital expenditures or debt.

*The Electric Power Research Institute estimates that 4 to 5% of all electricity used in the U.S. is used for pumping water[30]

[30] *AWWA M50 Water Resources Planning Manual of Water Supply Practices.* American Water Works Association. June 2001.

VII. Water Use Characteristics

1. PRODUCTION:

1.1. Production, Non-Revenue Water, and "Unaccounted Losses."

For the years 2001-2006, the District produced a total of 16,197.78 acre-feet of water (average of 2699.63 acre-feet/year), delivered a total of 15,202.42 AF (average of 2533.74), and percentage of loss was a total of 995.36 AF (average of 165.89). The percent losses averaged 6.21% per year (Table 1).

Table 1: PRODUCTION and LOSSES 2001 - 2006

Year	Total Produced	Total Delivered	System Losses	Losses as %of Prod	% Change
Yr.2001	2395.02	2238.07	156.95	6.55%	
Yr.2002	2630.79	2340.53	290.26	11.03%	9.84%
Yr.2003	2743.33	2567.08	176.25	6.42%	4.28%
Yr.2004	2907.83	2810.24	97.59	3.36%	6.00%
Yr.2005	2794.04	2638.51	155.53	5.57%	-3.91%
Yr.2006	2726.77	2607.99	118.78	4.36%	-2.41%
TOTALS	**16,197.78**	**15,202.42**	**995.36**		**13.80%**
AVERAGE	**2699.63**	**2533.74**	**165.89**	**6.21%**	**2.76%**

For accurate financial planning, projections and estimations of cost are made by the marginal (next-increment) cost.[31,32] Using the $2000/AF estimated next-increment cost of water, the yearly average monetary loss from non-revenue water and "unaccounted-for losses" in the production-distribution system is $331,780.00.

The total percentage increase in production from 2001-2006 was 13.85%, and the average production increase each year was 2.31%.

1.2. Status and reliability of water source.

The District's sole source of water is groundwater from the Nipomo Mesa aquifer. The District currently uses eight active wells, one active well in Nipomo Valley, and one standby well. The cost for the District to pump and deliver groundwater to District customers is approximately $500/AF.

The aquifer under the Mesa has been in a steady pattern of consumption-greater-than-recharge for several years. Over the years the level of groundwater stored in the aquifer has dropped 58 feet. The District, along with approximately 800 other parties, has been involved since July 1997 in litigation over the Santa Maria Groundwater Basin pumping rights. A majority of parties, including the District, have entered into a Stipulated Agreement which, among other things, requires the District to import 2500 acre-feet/year of supplemental water toward mitigation of a long-term consumption-greater-than-discharge of the aquifer. The District's plans are actually for 3000 AF/Y of supplemental water, with the excess going to meet the demands of current customers.[33] Currently it is estimated that the time to deliver this supplemental water to the

[31] HDR Engineering, Inc. *"Utility Billing System Enhancements, City of San Luis Obispo, Volume 1 – Utility Rate Structure Evaluation."* March 2006

[32] Stavins, Robert. *As Reservoirs Fall, Prices Should Rise, an Economic Perspective.* Environmental Law Institute (The Environmental Forum, November/December 2006.

[33] *Nipomo Community Services District Draft Ordinance, Chapter 3.24, Emergency Water Shortage Regulations (Third Draft)*. April 2007.

Nipomo Mesa is three-plus years for Santa Maria City water, and 10 years for construction of a desalination plant.

To meet the District's long-term needs, and to establish a long-term reliable source of potable water, the District is investigating the construction of a desalination plant. It is estimated to take 10 years for water from desalination to be available.[34]

Nipomo's summer temperatures average 75 degrees, and winter temperatures 38 degrees. The average rainfall for Nipomo is 16.82" per year. In the 2006-2007 rain season, Nipomo received only 6" of rain (35.6% of normal). California may be entering a multi-year drought. It is predicted that in the decade starting in 2009 that five of the following ten years will have temperatures higher than current record temperatures.[35] In addition, it is predicted that the American Southwest may enter a "permanent drought" as early as the year 2050[36]. In a Department of Water Resources hearing on 08/23/2007, experts testified that in Southern California last winter's rainfall was the lowest since rainfall records were started in 1877. Global climate change will have a dramatic impact on California's water resources, reduce the Sierra snowpack by at least 25% by 2050, decrease spring runoff into the Sacramento-San Joaquin Delta, and contribute to more severe droughts. The consensus of opinion of experts who testified 08/23/2007 at a hearing of the State Water Resources Control Board was that increased conservation and better use of local groundwater and reclaimed water were the best strategies to deal with these challenges.[37]

Table 2: CONSUMPTION CHANGE FROM 2002 TO 2007 (MEAN DIFFERENCE)

Categories	2002 AF/Y Consumption	2007 AF/Y Consumption	2002-2007 Difference	Mean Difference (AF)
SFR	1,839.45	2205.89	366.44	73.29
MFR	85.19	106.65	21.46	4.29
CI	85.70	101.64	15.94	3.19
Landsc	233.95	321.63	87.68	17.54
Other	79.09	97.78	18.69	3.74
AG	17.15	15.81	-1.34	-0.27
TOTALS:	**2,340.53**	**2849.40**	**508.87**	**101.77**

►There is a two-month delay in the bimonthly billing cycle. Example: Consumption billed in March is actually for January.
►Based on increased rate of consumption from January-April 2007.
SFR= Single-family residence
MFR=Multi-family Residence
CI=Commercial, Institutional (businesses, schools)
Landsc=Large landscape accounts
Other=NCSD facilities, construction hydrant-water use
AG=Agriculture

[34] *Evaluation of Supplemental Water Alternatives-Technical Memorandum No. 1, Constraints Analysis*. Boyle Engineering, June 2007.
[35] Kerr, Richard A. *Humans and Nature Duel Over the Next Decade's Climate*. Science 10, August 2007, 317:746-747.
[36] Alan Zeremba, B. Boxall. *Permanent Drought Predicted for the Southwest*. Los Angeles Times, 04/06/2007.
[37] Herdt, Timm. *Changes in climate tied to water supply*. Ventura County Star, 08/24/2007.

The District has contracted with Boyle Engineering to assess the supplemental water options available. At this time, the original eight supplemental-water options have been narrowed down to two: obtaining, through an agreement with the Santa Maria Intertie Project by which Santa Maria will sell 3000 AF to the District, (short-term solution), and building a desalination plant (long-term sustainable solution).

The estimated cost for desalination is $2000 to $4000 per AF, plus the cost of purchase or lease of the land for the desalination facility, and time to completion of the project is estimated at between 8 and 10 years. The estimated cost for the Santa Maria/State Water allocation option is approximately $2000/AF,[38] and time to completion of project is estimated as three-plus years.

The District has contracted with Science Applications International Association (SAIC) for geohydrological study of the Nipomo Mesa. As part of this study it was ascertained that, between April 2006 and April 2007, the Nipomo Mesa aquifer had a 13% decrease in above-sea-level groundwater storage. Some wells were found to be pumping below sea level.

This puts the Nipomo Mesa aquifer at risk for saltwater intrusion and collapse. As the rate of consumption-greater-than-recharge continues and increases, the risk to the aquifer also continues and increases.

If the aquifer beneath the Nipomo Mesa was to experience collapse or saltwater contamination, it would force the District to import all of the water necessary to satisfy the demand of District customers until a desalination plant, or other long-term source of water, was completed.

Depending on State Water for a water source is problematic. The amount of water delivered from the Colorado River has decreased 30% due to the decreased Sierra snow-pack last winter,[39] an average of 25% reduction in snow-pack is predicted by the year 2050,[40] and a major source of State Water, the Delta system, is at risk due to litigation over the Delta smelt (which may reduce by as much as 50% the amount of water sent south) and a degraded levee system which, if it fails, could result in saltwater contamination from saltwater intrusion from San Francisco Bay.[41]

1.3. Wastewater Recycling. Water recycling, also known as “water reclamation” or “water reuse,” is the process of treating wastewater, and then storing, distributing, and using the recycled water. Recycled water, as a result of treatment of wastewater, is suitable for a controlled beneficial use that otherwise would not occur. Recycled non-potable water is recycled in semi-arid areas, such as California, where public policy emphasizes water recycling. Recycled non-potable water frees up large amounts of potable water previously used for activities such as landscape irrigation. In California, an average of 525,000 AF/Y of recycled water is used annually. In 2002, uses for recycled water included agriculture irrigation (46%), landscape irrigation and impoundment (21%), seawater barrier (5%), groundwater recharge (5%), and industrial use (5%). California State law encourages the development of water recycling projects to meet California’s water needs (Water Reclamation Law, Water Code Sections 13500-13556).

Recycled water use has many benefits, including restoration of wetlands and marshes; defer or delay the impact of a drought by conserving potable water; improvement of soil by providing

[38] *Evaluation of Supplemental Water Alternatives-Technical Memorandum No. 2.* Boyle Engineering, June 2007
[39] Dobuzinskis, Alex. *Court Could Devastate Water Supply: Half of Southland’s Imported Resources from North at Risk.* Los Angeles Daily News, 08/30/2007.
[40] Herdt, Timm. *Changes in climate tied to water supply*. Ventura County Star, 08/24/2007.
[41] *If the Levees Fail in California.* Business Week (www.businessweek.com), 08/20/2007.

additional sources of water, nutrients and organic matter; provision of drought protection; and the social benefits of providing more jobs.[42]

Drawbacks of recycled water use include negative public perception, possibility of excessive salts applied to soil, and the unintended use of recycled water for potable-water purposes due to human error.

Recycling of water requires tertiary treatment of wastewater. The District's wastewater treatment facility currently treats to only a secondary treatment level. Therefore, an additional drawback for the District for recycling wastewater would be the costs of upgrading the facility to the tertiary level of treatment, and adding wastewater recycling functions to the facility.

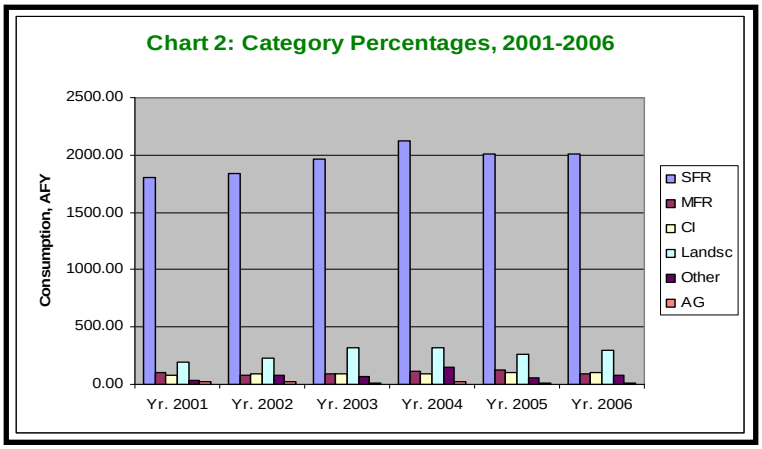
Currently, in California, approximately 5 million AF/Y is being collected for recycling, and out of this amount approximately 14% ends up as recycled water.[43]

Translating California's figures to District-relevant figures, projected for the years 2008-2027, over that period of time, if wastewater recycling were possible for the District, a total of 882.704 AF of the District's potable water would be saved (average 44.135 AF per year), saving approximately $2,518,629.54 in total (average $125,931.47 per year). The percentage of potable water freed up by the use of recycled water would be approximately 1.37%.

1.4. Summary: Comparing the amount of water produced to the amount of water delivered, over the last six years the District has had a yearly average of 6.21% in losses.

The District continues a long-term trend to draw more water from the aquifer than can be replenished by nature. In the last year, the amount of groundwater stored in the aquifer above sea-level has decreased by 13%. The District customers' water consumption increased between January-April 2006 and January-April 2007, and if the rate of increase persists throughout 2007, it is projected that the District's customers will use 3511.09 AF in 2007, an increase of 472.04 AF from that which would be expected based on the average increase per year from 2001 to 2006.

The District currently has one source of water, groundwater from the Nipomo Mesa aquifer. It will take at minimum three-plus years to get supplemental water to the District. Currently the plans for supplemental water are accessing Santa Maria City water (short-term) and construction of a desalination plant (long-term). The reliability of State water as a source of supplemental water is questionable due to a possible 30% to 50% reduction in delivery of contracted amounts secondary to the impact of a combination of climatary and legal problems. The District does not have the current capabilities to recycle wastewater into water suitable for non-potable uses.



The District's only current source of water, the Nipomo Mesa aquifer, because of consumption greater than

[42] *Water Facts (No. 23): Water Recycling.* California State Department of Water Resources. http://www.owue.water.ca.gov/recycle/docs/WaterFact23.pdf.
[43] Karajeh, Fawzi. State of California Department of Water Resources. Telephone call on 09/05/2007. (916) 651-9669.

discharge, is at risk of contamination and collapse.

At this time the only option available for achieving a decrease in consumption-greater-than-recharge of the aquifer is to decrease consumption. This can only be achieved by water conservation.

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2. CONSUMPTION:

2.1. Categories of Consumption.

The District's customers are split up into six categories:

Table 3: METERS AND USAGE BY CATEGORY (2006)

Category	# of Meters	AFY Usage	Avg. AFY/Meter
SFR	3423	2010.23	0.587
MFR	390	93.83	0.241
CI	96	104.19	1.085
Landsc	83	298.38	3.595
Other	varies	84.92	varies
AG	3	16.44	5.480
TOTALS	**3995**	**2607.99**	**.65**

Single-Family Residence (SFR): SFRs are residences that traditionally have one house per lot, and one meter per parcel, although this is changing with the addition of secondary units to some residences. The SFR category has the largest number of meters (85.7%) in the District. The average use per meter is 0.587 acre-feet/year (AFY). This category in 2006 used 77% of the total District metered water consumed, 2010.23 AF/Y.

Multiple-Family Residences (MFR): Residences that have more than one residential unit per parcel (apartments, duplexes, etc.). Usually there is one meter for the entire parcel; individual units are not billed by the District. MFR meters are 9.8% of total District Meters. MFR category in 2006 used 3.6% of all metered water consumed by the District, 93.83 AF/Y.

Commercial / Industrial (CI): There are only 96 CI meters (2.4% of all meters) in the District. There are no Industrial meters and relatively few Commercial businesses. CI category in 2006 consumed 104.19 AF (4%) of all District water used.

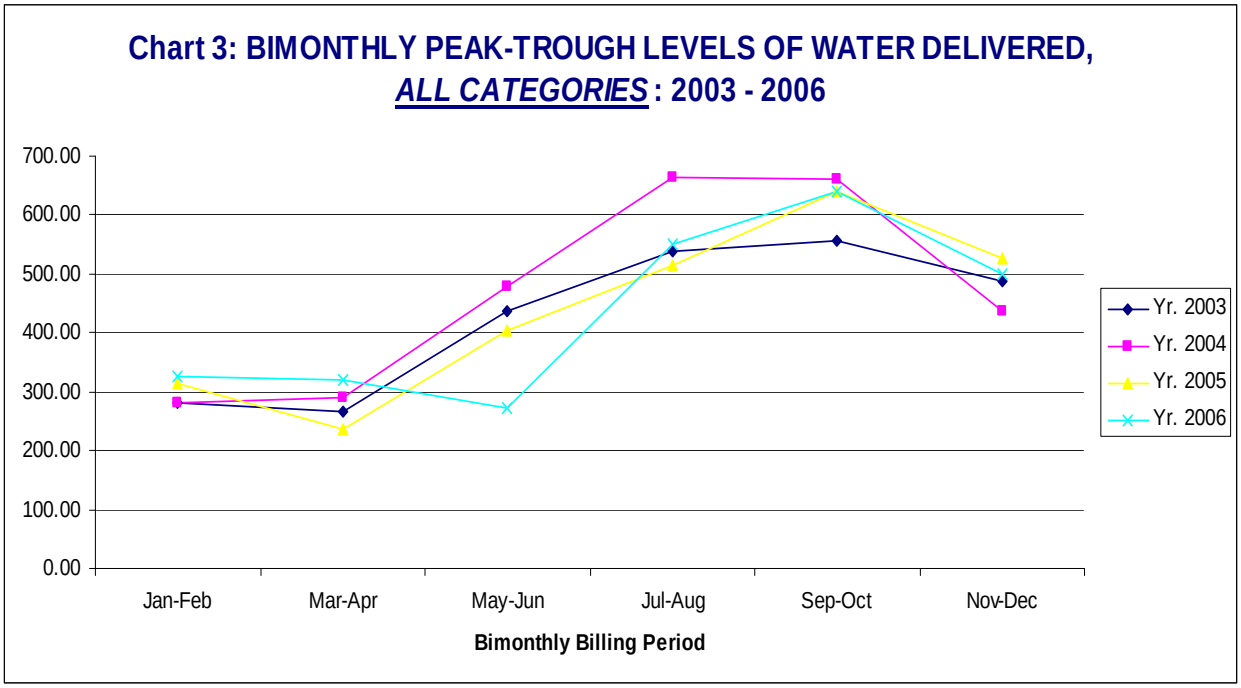
Landscape (LANDSC): Landscape meters are for large areas of landscape (parks and landscape/turf areas of homeowners associations). There are 83 landscape meters (2.1%) in the District. In 2006 this category consumed 298.38 AF (11.4%) of all metered water used in the District.

Other: The Other category includes the NCSD facilities and hydrant water used by construction projects, sprayed on bare soil during construction to decrease the amount of airborne dust. The number of Other meters constantly changes, due to the variability and temporary nature of the construction hydrant-water use. The hydrant water is metered and charged at a flat rate. This category used 84.92 AF in 2006 (3.3% of metered water used in the District).

Agriculture (AG): The District only has 3 AG accounts (0.008% of all District meters). This category used 16.44 AF in 2006, or 0.63% of all metered water consumed in the District.

For the years 2001-2006, by far, the "single-family residence" (SFR) customer category used the highest percentage of the total used by all categories (77.8%). The "landscape" category was the next-highest percentage of total use (11.45%). (Table 3, Chart 1)

The District's water delivery (consumption) from 2001 to 2006 showed little relative



change in the percentage-of-total figures for the customer categories. The largest increase over the six-year period was in the "Other" category (water for NCSD and Blacklake facilities, and hydrant water used for construction), which demonstrated a 136.28% increase over the six years (48.98 AF over six years, and a 22.71% average increase per year). The "agriculture" category showed a decrease of 12.79% from 2001 to 2006 (a decrease of 2.41 AF over six years, with an average decrease per year of 2.13%). The SFR category showed an 11.45% increase from 2001-2006 (206.59 AF over six years, and an average increase per year of 1.91%). (Table 3; Chart 1,2)

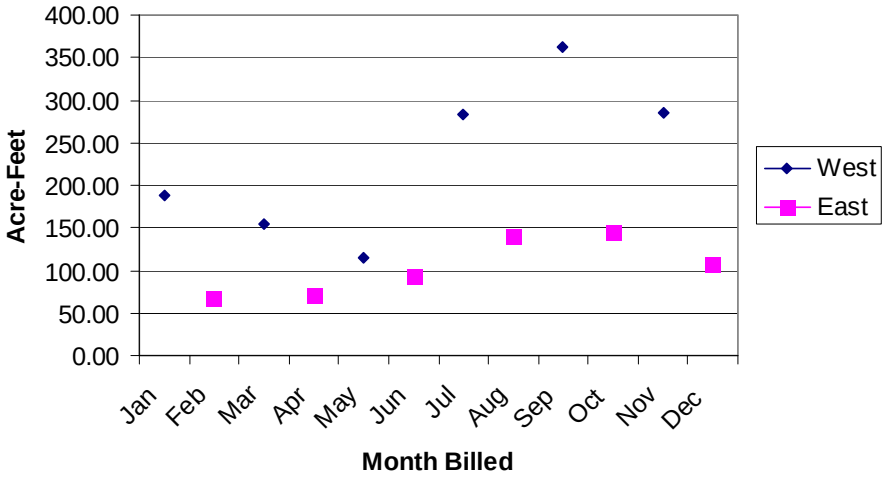
All categories, combined: For all categories, combined, the average per-meter usage was .684 AF/Y for the years 2001-2006.

2.2 Seasonal Patterns of Consumption.

Note: Because of the nature of the billing cycle, amounts billed in one billing cycle actually were for the previous two months. Example: A customer's bi-monthly bill sent in March is actually for water consumed in January and February.

The Nipomo Mesa is charac-terized by typical Mediter-ranean climate patterns, with the majority of the rainfall occurring in the cool winter months; summer months are generally warm and dry. The average annual precipitation is approximately 16.82" The warmest month of the year is September, and the coldest month of the year is December. (Table 4, Chart 3)

Chart 4: MONTHLY CONSUMPTION PATTERN OF USE THROUGHOUT THE YEAR
Single-Family Residence, 2006



The District's customers are billed for their water and sewer use on a bi-monthly billing cycle. One-half of the customers are billed each month: West side of town, except for Blacklake and Summit, on odd months; East side, Blacklake, Summit on even months.

Table 4: AVERAGE SEASONAL WATER USE, (% OF ANNUAL USE) 2003-2006 (AF)

Category	Avg.Lowest BiMonth	Avg.Highest BiMonth	Average, Total Use	Seasonal Use (%)
SFR	212.04	482.20	2045.88	62.18
MFR	15.21	20.79	105.6	86.42
CI	12.3	20.80	97.62	75.60
LANDSC	24.23	74.76	301.26	48.26
OTHER	12.74	22.72	89.47	85.44
AG	1.59	3.66	16.13	59.14
		TOTAL:	**2655.96**	**417.04**
		AVG.SEASONAL USE TOTAL:	**442.66**	**69.51**
Formula[44]: Average % Change =		100 x (lowest bimonthly period x 6). / annual use		

California water purveyors estimate the amount of a SFR's water consumption due to irrigation by assuming no irrigation is occurring during the lowest-use (trough, winter) months, when it tends to be cold and rainy. Therefore, the difference between the consumption in peak and trough months, or billing periods, is considered to be due to irrigation.

From 2003-2006, the average peak (high-use) bi-monthly billing period was September-October. The average trough (low-use) billing period was March-April. As would be expected, all categories showed an increase in use when comparing the winter bimonthly billings periods with the summer bi-monthly billing periods. For the years 2003-2006, for all categories combined, the average seasonal use (peak-season use as a percentage of total annual use)

[44] *Water Conservation Programs—A Planning Manual (M52).* American Water Works Association. 2006.

was 69.51%. Refer to Tables 5 and 7 for a breakdown of average seasonal water use by individual category. Refer to Table 5 for the formula used to determine seasonal use.

The average percent change—comparing peak (summer) use with trough (winter) use—for all categories combined, for the years 2003-2006, for all categories (both combined and individually) showed an increase (Table 6). The average %increase for all categories was 108.38%. The three highest-increase categories were landscape-irrigation (208.54% increase), agriculture (130.19% increase), and single-family residence (127.41% increase).

Table 5: AVERAGE % CHANGE IN SEASONAL USE, 2003-2006

Category	Avg.Lowest BiMonth	Avg.Highest BiMonth	Average, Total Use	%Change
SFR	212.04	482.20	2045.88	+127.41
MFR	15.21	20.79	105.6	+36.69
CI	12.3	20.80	97.62	+69.11
LANDSC	24.23	74.76	301.26	+208.54
OTHER	12.74	22.72	89.47	+78.34
AG	1.59	3.66	16.13	+130.19
			Total:	+650.27
			Average %Change:	+108.38

Formula:

$$\text{Average \% Change} = \frac{100 \times (\text{Highest} - \text{Lowest})}{\text{Lowest}}.$$

For SFR, MFR and Landscape categories, both the average seasonal water use and the %increase figures indicate that there are large potentials to save water used in the landscape. Because of the variables involved in customers in the other categories, further analysis would be necessary to discern where water savings could be made. However, there are sizeable seasonal percentages in all categories; therefore, it is estimated that the other categories could realize some savings due to seasonal use.

Table 6: SEASONAL WATER USE, PEAKS AND TROUGHS, 2003 - 2006

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	SFR	152.89	68.38	129.42	76.85	205.25	116.77	280.13	138.74	280.27	133.54	278.30	103.93	1,964.47
2004	SFR	143.34	74.71	144.07	83.08	215.89	130.03	332.61	157.36	335.38	156.86	270.62	75.92	2,119.87
2005	SFR	170.34	81.08	119.33	70.62	181.89	119.49	288.09	126.06	364.29	151.33	309.02	107.40	2,088.94
2006	SFR	188.84	68.16	153.99	70.79	114.46	92.55	282.78	139.92	361.93	145.19	284.22	107.40	2,010.23
2003-2006 Total		655.41	292.33	546.81	301.34	717.49	458.84	1,183.61	562.08	1,341.87	586.92	1,142.16	394.65	8,183.51
Bi-Month Subtotal		947.74		848.15		1,176.33		1,745.69		1,928.79		1,536.81		
Bi-Month Average		**236.94**		**212.04**		**294.08**		**436.42**		**482.20**		**384.20**		

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	MFR	4.92	7.35	4.20	8.57	5.56	11.37	6.80	11.15	7.89	13.83	6.97	7.37	95.98
2004	MFR	4.99	9.49	5.33	9.10	7.48	12.27	9.17	12.53	8.51	12.07	11.80	8.01	110.75
2005	MFR	8.92	11.66	9.02	10.99	8.80	13.5	9.44	11.04	13.98	8.81	10.65	5.03	121.84
2006	MFR	9.38	4.11	9.54	4.91	9.51	4.86	10.98	5.82	11.91	6.17	11.79	4.85	93.83
2003-2006 Total		28.21	32.61	28.09	33.57	31.35	42.00	36.39	40.54	42.29	40.88	41.21	25.26	422.40
Bi-Month Subtotal		60.82		61.66		73.35		76.93		83.17		66.47		
Bi-Month Average		**15.21**		**15.42**		**18.34**		**19.23**		**20.79**		**16.62**		

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	CI	7.24	4.14	5.15	4.38	12.63	7	11.71	6.14	10.66	7.27	10.02	6.16	92.50
2004	CI	7.14	4.67	7.24	6.03	9.18	7.15	11.21	8.34	10.68	8.47	9.06	5.11	94.28
2005	CI	6.98	4.39	6.01	5.90	6.90	7.74	7.26	8.21	14.18	12.42	13.44	6.08	99.51
2006	CI	7.71	6.94	8.79	6.74	7.80	7.1	12.88	8.75	11.41	8.10	10.84	7.13	104.19
2003-2006 Total		29.07	20.14	27.19	23.05	36.51	28.99	43.06	31.44	46.93	36.26	43.36	24.48	390.48
Bi-Month Subtotal		49.21		50.24		65.50		74.50		83.19		67.84		
Bi-Month Average		**12.30**		**12.56**		**16.38**		**18.63**		**20.80**		**16.96**		

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	Landsc	15.86	15.92	16.28	14.48	34.03	35.06	35.03	31.80	36.17	36.20	32.41	21.47	324.71
2004	Landsc	14.85	7.92	12.78	11.12	27.70	41.88	42.92	37.08	43.23	42.11	27.28	12.34	321.21
2005	Landsc	19.52	7.78	7.67	5.25	37.07	19.39	26.32	18.32	32.84	26.14	36.70	23.73	260.73
2006	Landsc	18.41	9.54	19.08	10.25	6.43	23.98	39.33	28.30	49.33	31.83	38.59	23.31	298.38
2003-2006 Total		68.64	41.16	55.81	41.10	105.23	120.31	143.60	115.50	161.57	136.28	134.98	80.85	1,205.03
Bi-Month Subtotal		109.80		96.91		225.54		259.10		297.85		215.83		
Bi-Month Average		**27.45**		**24.23**		**56.39**		**64.78**		**74.46**		**53.96**		

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	Other	1.02	2.53	5.03	0.79	3.53	2.19	7.20	7.02	9.12	17.36	10.30	6.62	72.71
2004	Other	9.52	1.87	5.63	3.21	3.89	21.03	18.68	29.04	25.23	15.26	8.12	4.81	146.29
2005	Other	2.05	0.83	0.44	0.38	2.70	2.8	2.24	14.66	7.09	5.94	11.46	3.37	53.96
2006	Other	9.83	0.96	3.18	32.31	0.81	1.89	13.75	4.33	5.56	5.30	5.03	1.97	84.92
2003-2006 Total		22.42	6.19	14.28	36.69	10.93	27.91	41.87	55.05	47.00	43.86	34.91	16.77	357.88
Bi-Month Subtotal		28.61		50.97		38.84		96.92		90.86		51.68		
Bi-Month Average		**7.15**		**12.74**		**9.71**		**24.23**		**22.72**		**12.92**		

Year	Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL (AFY)
2003	AG	2.08	0	1.69	0.00	2.92	0	2.93	0.00	3.61	0.00	3.48	0.00	16.71
2004	AG	2.11	0	1.52	0.00	3.15	0	4.33	0.08	3.20	0.23	3.17	0.05	17.84
2005	AG	1.70	0.05	1.50	0.00	2.32	0.12	2.86	0.13	3.77	0.42	0.53	0.13	13.53
2006	AG	3.42	0.02	1.60	0.03	1.60	0.04	3.14	0.16	2.83	0.58	2.76	0.26	16.44
2003-2006 Total		9.31	0.07	6.31	0.03	9.99	0.16	13.26	0.37	13.41	1.23	9.94	0.44	64.52
Bi-Month Subtotal		9.38		6.34		10.15		13.63		14.64		10.38		
Bi-Month Average		**2.35**		**1.59**		**2.54**		**3.41**		**3.66**		**2.60**		

Table 7: SEASONAL USE PER CATEGORY AND IMPACT OF 15% CONSERVATION FOR ONE YEAR (BASELINE YEAR 2006, SEASONAL USE PERCENT BASED ON 2003-2006 AVERAGES)											
Year	Type	TOTAL (AFY)	Meters	Avg. AFY/ Meter	Seasonal Use (%)	Seasonal Use (AF/Meter/Yr)	Seasonal Use (Gal/Meter/Day)	SeasonalUse (G/M/D) w/15%consrv	SeasonalUse Savings(G/M/D) w/15%consrv	Total Savings AF/Yr	$$Savings @$2000/AF
2006	SFR	2010	3423	0.587	62.18	0.365	326	277	49	187.508	$375,016.84
2006	MFR	94	390	0.241	86.42	0.208	186	158	28	12.163	$24,326.49
2006	CI	104	96	1.085	75.60	0.820	732	623	110	11.815	$23,630.06
2006	Landsc	298	83	3.595	48.26	1.735	1,549	1,316	232	21.599	$43,197.06
2006	Other*	85			85.44	0.000				10.883	$21,765.79
2006	AG	16.44	3	5.480	59.14	3.241	2,893	2,459	434	1.459	$2,917.00
TOTALS:		**2608**	**3995**	**10.988**		**6.370**	**5,686**	**4,833**	**853**	**245.427**	**$490,853.25**

Table 8 demonstrates the water and money savings the District would obtain by a 15% conservation for all categories, individually and combined. Water usage is based on the water usage in 2006, and the seasonal use % is based on the 2003-2006 averages.

If all District categories saved an average of 15% of seasonal water consumption, it would translate to a decrease of 245.427 AF/Y and a financial savings of $490,853.25.

If the SFR, MR and Landscape categories showed a15% average seasonal water conservation, it would mean a total savings of 221.270 AF/Y, or $442,540.39.

Projected out until year 2026, with 3.22% increase in meters and population each year, and 3% increase in cost of water per year (baseline marginal cost of water of $2000), by the year 2026 a total of 7,716.141 acre-feet of water (385.807 average per year) will have been saved, translating to a savings of $83,885,673.82 over the 20 years, and an average savings per year of $8,388,567.38.(Table 9)

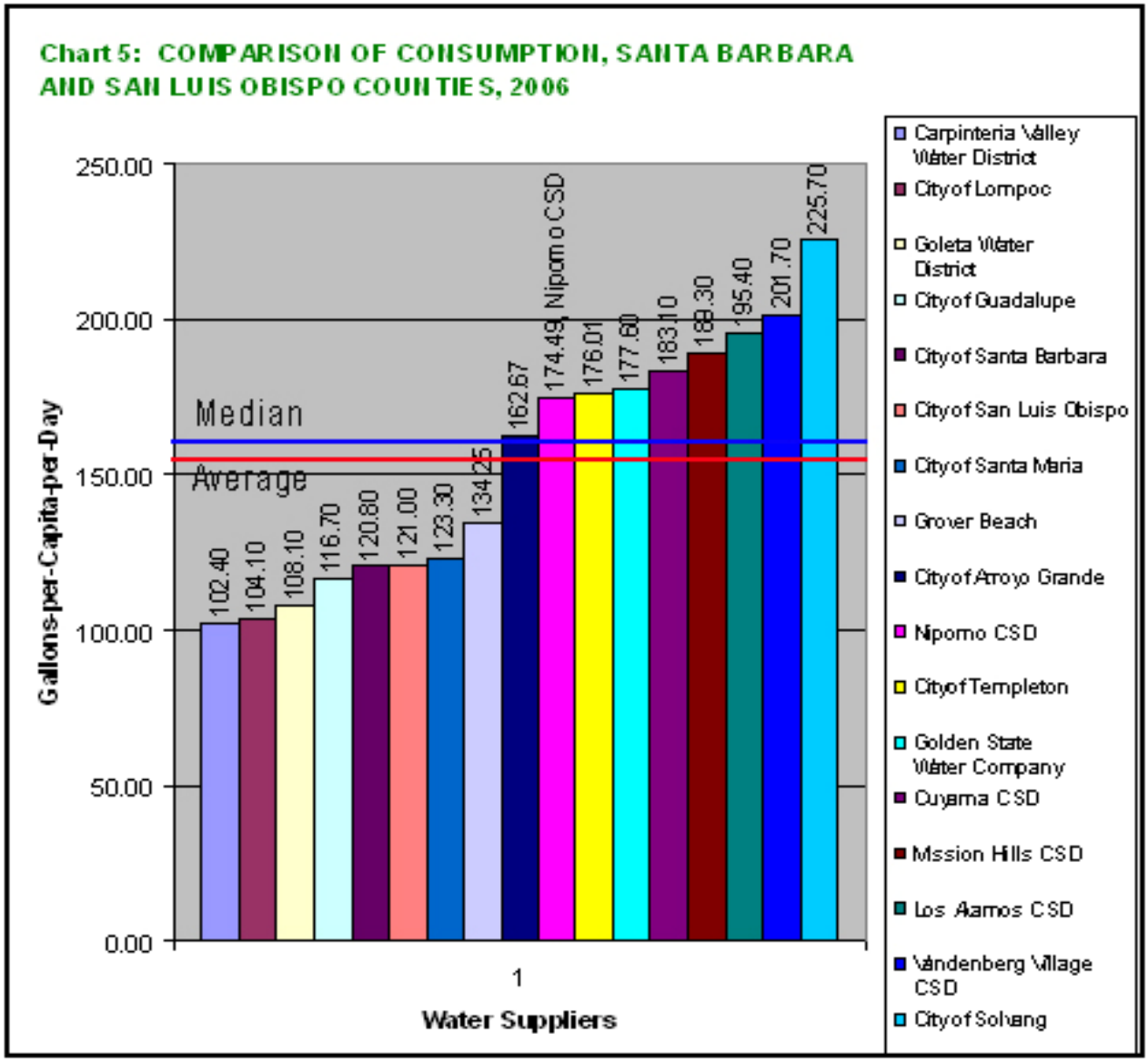
(Tables 11, 12) With 15% conservation of seasonal water use, wastewater inflow would be reduced a total of 3858.071 AFY (1257.156 MGY) over 20 years, with an average of 192.904 MGY (million gallons per year). (Table 9)

In summary, with a 15% decrease in water used during the seasonal, peak (summer), months, a total of close to $84million dollars in marginal cost of water can be saved over 20 years.

Table 8: PROJECTIONS OF SAVINGS FOR ALL CATEGORIES COMBINED WITH 15% CONSERVATION OF SEASONAL INCREASE, 2007 - 2026 (Base Year Water Use and Meters=2006; Avg.Seas %= Avg. 2003-2006)

Year	Pro-jected Popula-tion	Pro-jected # of Meters	Total Annual AFY Reqd	Avg. Sea. Use%, All Categ.	Avg.Seas Use AF/Y	Avg.Seas Use w/ 15%Cnsv	AFY Seas Use Saved w/15% Cnsv	Cost of H2O/AF w/3% inflat.	Cost of Seasonal Increase H2O Reqd/Yr	Cost of Seasonal Increase H2O Reqd/Yr 2/ 15% consv.	$$ Saved w/15% Seas.Conserv.	Sewage InFlow Saved (AFY) w/15% Seas. Consv.	Sewage InFlow Saved (MGY) w/15% Seas. Consv.
2007	13,773	4124	2,691.978	69.510	1,871.194	1590.515	280.679	$2,000.00	$5,383,955.35	$3,181,029.26	$2,202,926.09	140.340	45.730
2008	14,217	4257	2,778.766	69.510	1,931.520	1641.792	289.728	$2,060.00	$5,724,257.90	$3,382,091.92	$2,342,165.98	144.864	47.204
2009	14,675	4394	2,868.352	69.510	1,993.792	1694.723	299.069	$2,121.80	$6,086,069.87	$3,595,863.09	$2,490,206.78	149.534	48.726
2010	15,148	4535	2,960.827	69.510	2,058.071	1749.360	308.711	$2,185.45	$6,470,750.83	$3,823,146.06	$2,647,604.76	154.355	50.297
2011	15,637	4682	3,056.283	69.510	2,124.422	1805.759	318.663	$2,251.02	$6,879,746.22	$4,064,794.86	$2,814,951.36	159.332	51.918
2012	16,141	4833	3,154.816	69.510	2,192.913	1863.976	328.937	$2,318.55	$7,314,592.91	$4,321,717.50	$2,992,875.41	164.468	53.592
2013	16,661	4988	3,256.526	69.510	2,263.611	1924.070	339.542	$2,388.10	$7,776,924.86	$4,594,879.40	$3,182,045.46	169.771	55.320
2014	17,199	5149	3,361.515	69.510	2,336.589	1986.101	350.488	$2,459.75	$8,268,479.33	$4,885,306.99	$3,383,172.35	175.244	57.103
2015	17,753	5315	3,469.889	69.510	2,411.920	2050.132	361.788	$2,533.54	$8,791,103.38	$5,194,091.57	$3,597,011.82	180.894	58.944
2016	18,325	5487	3,581.757	69.510	2,489.679	2116.227	373.452	$2,609.55	$9,346,760.82	$5,522,393.43	$3,824,367.39	186.726	60.845
2017	18,916	5664	3,697.231	69.510	2,569.946	2184.454	385.492	$2,687.83	$9,937,539.59	$5,871,446.20	$4,066,093.38	192.746	62.806
2018	19,526	5846	3,816.429	69.510	2,652.800	2254.880	397.920	$2,768.47	$10,565,659.58	$6,242,561.48	$4,323,098.10	198.960	64.831
2019	20,155	6035	3,939.469	69.510	2,738.325	2327.576	410.749	$2,851.52	$11,233,481.02	$6,637,133.76	$4,596,347.26	205.374	66.921
2020	20,805	6229	4,066.476	69.510	2,826.607	2402.616	423.991	$2,937.07	$11,943,513.32	$7,056,645.69	$4,886,867.63	211.996	69.079
2021	21,476	6430	4,197.577	69.510	2,917.736	2480.076	437.660	$3,025.18	$12,698,424.48	$7,502,673.63	$5,195,750.85	218.830	71.306
2022	22,168	6637	4,332.905	69.510	3,011.803	2560.032	451.770	$3,115.93	$13,501,051.15	$7,976,893.56	$5,524,157.59	225.885	73.605
2023	22,883	6851	4,472.597	69.510	3,108.902	2642.567	466.335	$3,209.41	$14,354,409.28	$8,481,087.40	$5,873,321.87	233.168	75.978
2024	23,621	7072	4,616.791	69.510	3,209.132	2727.762	481.370	$3,305.70	$15,261,705.43	$9,017,149.73	$6,244,555.70	240.685	78.427
2025	24,382	7300	4,765.635	69.510	3,312.593	2815.704	496.889	$3,404.87	$16,226,348.87	$9,587,094.83	$6,639,254.03	248.444	80.956
2026	25,168	7535	4,919.277	69.510	3,419.390	2906.481	512.908	$3,507.01	$17,251,964.32	$10,193,064.34	$7,058,899.98	256.454	83.566
		TOTALS:	**74,005.096**	xxxxx	**51,440.942**	**43,724.801**	**7,716.141**	**n/a**	**$205,016,738.52**	**$121,131,064.70**	**$83,885,673.82**	**3858.071**	**1257.156**
		AVERAGE YEARLY SAVINGS:	**3,700.255**		**2,572.047**	**2186.240**	**385.807**		**$10,250,836.93**	**$6,056,553.24**	**$8,388,567.38**	**192.904**	**62.858**

Table 9: TOTAL WATER DELIVERED, NCSD, PER CAPITA: 2001-2006						
Year	Total Meters	Pop. Est.	Total AFY	AFY Capita	Gallons/ Yr/Capita	Gallons/ Cap/Day
2001	3412	11,396	2,238.07	0.20	63,993.70	175.33
2002	3472	11,596	2,340.53	0.20	65,766.86	180.18
2003	3709	12,388	2,567.08	0.21	67,523.53	185.00
2004	3751	12,528	2,810.24	0.22	73,091.85	200.25
2005	3879	12,956	2,638.51	0.20	66,360.79	181.81
2006	3995	13,343	2,607.99	0.20	63,688.60	174.49

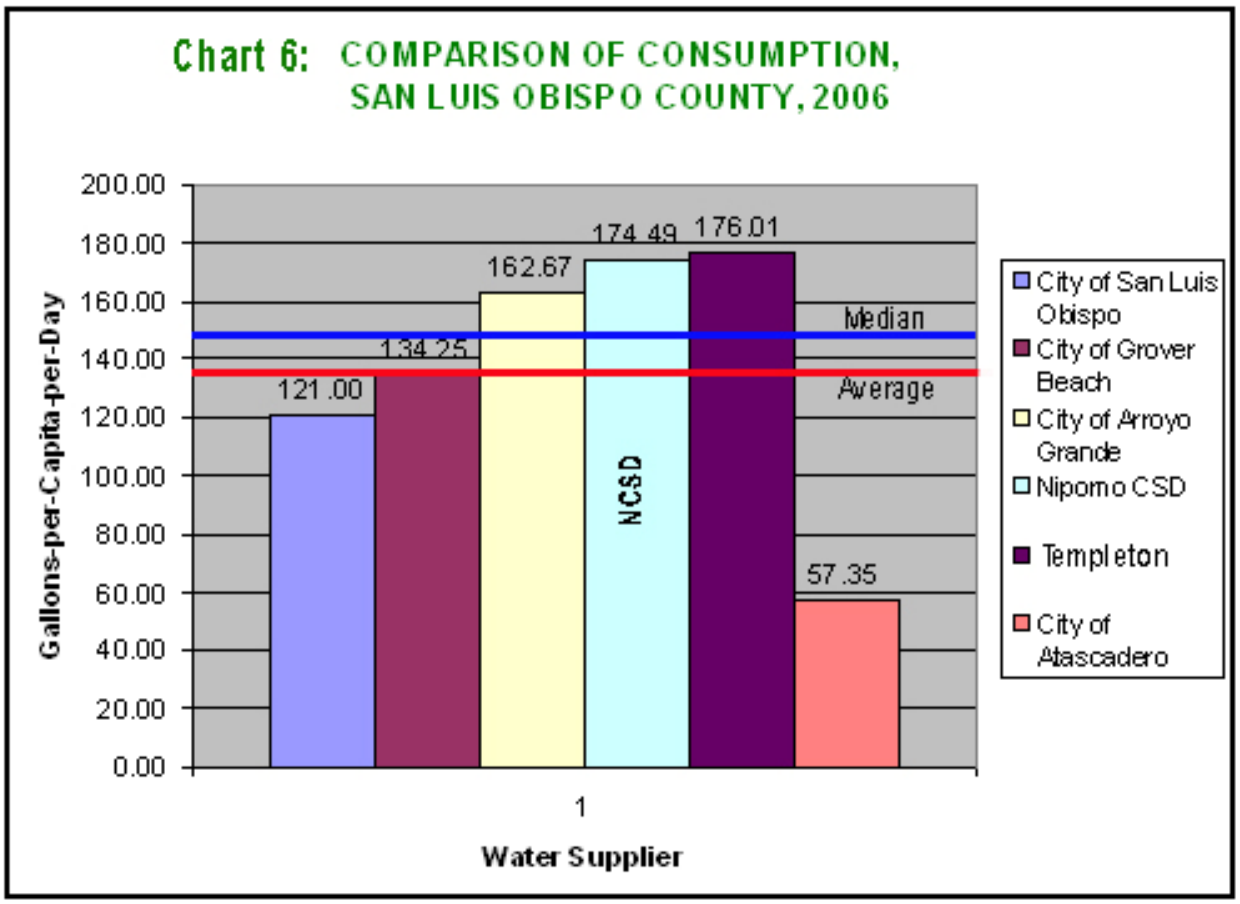


2.3. Per-Capita Consumption.

The District's gallons-per-capita-per-day (G/C/D) consumption from 2001 – 2006 began in 2001 at 175.33, and ended in 2006 at 174.49, demonstrating a less-than 1-G/C/D difference. The highest yearly G/C/D was in 2004 (200.25). The average G/C/D over six years was 184.85. (Table 10)

Comparing available per-capita consumption rates for customers of Santa Barbara and San Luis Obispo Counties, the District's use is above the average (153.92 G/C/D) and the median (162.67). (Chart 5). The lowest use was in the Carpinteria Valley Water District (102.4), 70% less than the District's G/C/D; the highest use was in the City of Solvang (225.7, 29% more than the District. Note that six water suppliers' figures were considered outliers and were not included.

Comparing available per-capita consumption rates for customers of only San Luis Obispo County, the District's use is above both the average (137.63) and the median (148.46). The District's consumption (174.49) was only 1.5 GPCD below the top consumer, Templeton (176.01). When Atascadero's consumption figures are considered an outlier and not included, the average rises to 153.68 and the median rises to 162.67.(Chart 6)



A 2003 study of California water usage for typical single-family residences (SFR) assumed an average monthly water usage to be 1,500 cubic feet,[45] or 15 hcf[46]. For comparison, NCSD's 2003 monthly SFR use was 21.4 hcf, or 42.7% more than the average California residence.

[45] Black and Veatch. *California Water Charge Survey 2003.* Black and Veatch Management Consulting Division, Irvine, California.

SUMMARY: The District's costumers have steadily over the years used water at a rate greater than the rate nature can recharge the aquifer. Recently the rate of consumption has increased 41.45% for single-family residents and 31.3% for all customer categories combined. If this increased rate of consumption continues, in 2007 the District's customers will have consumed 472 AF than would have been expected based on the average yearly increase from 2001 to 2006 (11.45% for SFR, 16.53% for all customer categories combined).

As is expected, during the summer (peak) months the District's customers use more water than in the trough (winter) months. For the SFR category, 62.18% of the average account's annual use of water is due to landscape irrigation. For all categories combined, an average of 69.18% of an account's annual use of water is dedicated to landscape irrigation.

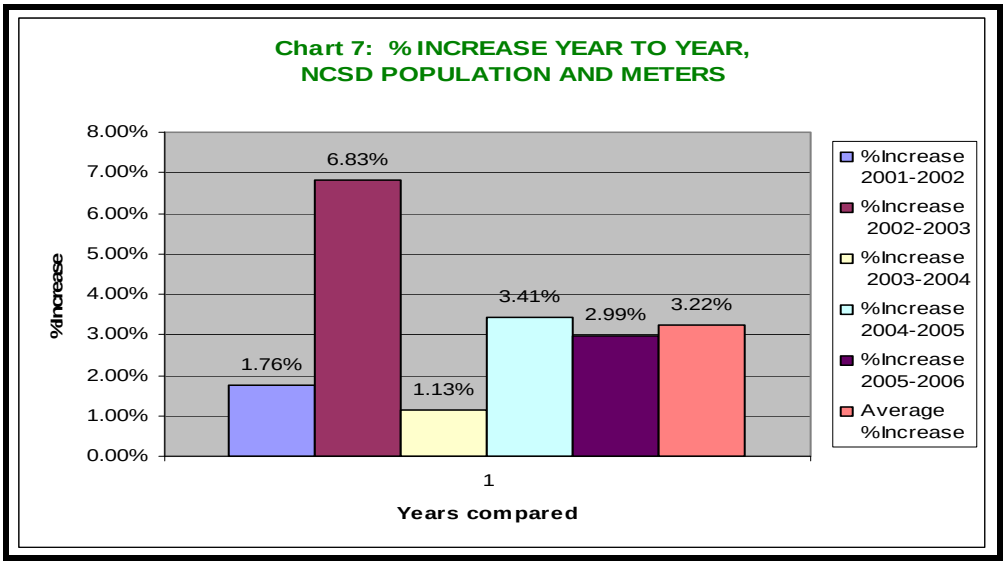
From 2001 to 2006, there was an overall decrease of less than 1 G/C/D (175.33 to 174.49), with an average for those years of 182.84 G/C/D. Comparing the District's G/C/D consumption in 2006 with available numbers from water purveyors in Santa Barbara and San Luis Obispo Counties showed the District to be above both the median and mean. When comparing the District's G/C/D consumption with that of San Luis Obispo County water suppliers alone, the District was again above the median and the mean, and also only 1.5 gallons less than the top supplier (Templeton). In general, an area's climate (and, where water charges are high, the wealth of the community) is considered to have the most impact on rate of water consumption. Templeton's average rainfall (15") is similar to the District's, but has average seasonal temperatures which are more extreme. Templeton's summer temperatures average 92 degrees (compared to Nipomo's 75 degrees), and winter temperatures average 31 degrees (Nipomo's is 38 degrees). In general, more extreme temperatures (both high and low) translate to higher water consumption, especially during the summer when a landscape's evapotranspiration rate rises to meet the heat challenge.

The District's customers use water at a higher rate than the majority of other local water suppliers' customers. In addition, a large part of the District's customer's water bills is due to landscape irrigation. Therefore, it appears that there is a good potential for water conservation, especially in the amount of water used for landscape irrigation.

[46] Black and Veatch. *California Water Charge Survey 2003.* Black and Veatch Management Consulting Division, Irvine, California

PROJECTIONS

(Refer to Chart 7, Table 11, 12)



AVERAGE %INCREASE IN POPULATION AND METERS, 2001 – 2006: 3.22%
PROJECTIONS BASED ON 3.22% AVERAGE INCREASE,

BASELINE YEAR 2006:

- Projected Population in Year 2026 (20 years): 25,169
- Projected Number of Meters in Year 2026 (20 years): 7,536
- Projected Water Needs in the Year 2026
  if Consumption Rate Remains the Same: 4,919.47 AFY
- Projected Total Water Needed Over 20 Years: 74,007.94 AF
- Projected Total Water Needed Over 20 Years w/15% Conservation: 62,906.75 AF
- Projected Water Savings Over 20 Years w/15% Conservation: 11,101.19 AF
- Projected Cost of Water over 20 Years (with 3%/year inflation): $205,024,604.62
- Projected Cost of Water w/15% Conserv. Over 20 Years
  (with 3%/year inflation) $174,270,913.93
- Projected Savings in Cost of Water w/15% Conserv. Over 20 Years: $ 30,753,690.53

Looking to the future globally, "In 25 to 30 years, there could be 9 billion people on Earth—and one-third of them are projected to be 'suffering a severe water shortage.'"[47]

[47] Bistany, Andrea S. *Navigating the Rising Currents of U.S. Water Reuse*. Environment & Technology. 2006.

Table 10: ANNUAL WATER DEMAND PROJECTIONS, 2007 – 2026 (WITH AND WITHOUT CONSERVATION)									
Year	Projected Population	Projected # of Meters	AFY Reqd	AFY Reqd w/ 15% Cnsv.	AFY Saved	Cost of Water/AF w/3% inflat.	Cost of Water Reqd/Yr	Cost of Water Reqd/yr w/15% Conserv.	$ Saved w/15% Conserv.
2007	13,773	4124	2,692.081	2288.269	403.812	$2,000.00	$5,384,161.93	$4,576,537.64	$807,624.29
2008	14,218	4257	2,778.873	2362.042	416.831	$2,060.00	$5,724,477.53	$4,865,805.90	$858,671.63
2009	14,676	4394	2,868.462	2438.193	430.269	$2,121.80	$6,086,303.39	$5,173,357.88	$912,945.51
2010	15,149	4536	2,960.940	2516.799	444.141	$2,185.45	$6,470,999.10	$5,500,349.23	$970,649.86
2011	15,637	4682	3,056.400	2597.940	458.460	$2,251.02	$6,880,010.19	$5,848,008.66	$1,032,001.53
2012	16,142	4833	3,154.937	2681.697	473.241	$2,318.55	$7,314,873.56	$6,217,642.52	$1,097,231.03
2013	16,662	4989	3,256.651	2768.153	488.498	$2,388.10	$7,777,223.25	$6,610,639.76	$1,166,583.49
2014	17,199	5149	3,361.644	2857.398	504.247	$2,459.75	$8,268,796.58	$7,028,477.09	$1,240,319.49
2015	17,754	5315	3,470.022	2949.519	520.503	$2,533.54	$8,791,440.68	$7,472,724.58	$1,318,716.10
2016	18,326	5487	3,581.894	3044.610	537.284	$2,609.55	$9,347,119.44	$7,945,051.52	$1,402,067.92
2017	18,917	5664	3,697.373	3142.767	554.606	$2,687.83	$9,937,920.87	$8,447,232.74	$1,490,688.13
2018	19,527	5846	3,816.575	3244.089	572.486	$2,768.47	$10,566,064.96	$8,981,155.22	$1,584,909.74
2019	20,156	6035	3,939.620	3348.677	590.943	$2,851.52	$11,233,912.03	$9,548,825.23	$1,685,086.80
2020	20,806	6229	4,066.632	3456.637	609.995	$2,937.07	$11,943,971.57	$10,152,375.83	$1,791,595.74
2021	21,477	6430	4,197.738	3568.078	629.661	$3,025.18	$12,698,911.69	$10,794,074.94	$1,904,836.75
2022	22,169	6638	4,333.072	3683.111	649.961	$3,115.93	$13,501,569.16	$11,476,333.78	$2,025,235.37
2023	22,884	6851	4,472.768	3801.853	670.915	$3,209.41	$14,354,960.03	$12,201,716.02	$2,153,244.00
2024	23,622	7072	4,616.969	3924.423	692.545	$3,305.70	$15,262,291.00	$12,972,947.35	$2,289,343.65
2025	24,383	7300	4,765.818	4050.945	714.873	$3,404.87	$16,226,971.44	$13,792,925.73	$2,434,045.72
2026	25,169	7536	4,919.466	4181.546	737.920	$3,507.01	$17,252,626.25	$14,664,732.31	$2,587,893.94
		TOTALS:	**74,007.936**	**62,906.75**	**11,101.19**	n/a	**$205,024,604.62**	**$174,270,913.93**	**$30,753,690.69**
		AVERAGES:	**3,700.397**	**3,145.337**	**555.060**	n/a	**$10,251,230.23**	**$8,713,545.70**	**$1,537,684.53**

Wastewater Treatment Estimations:

Table 11: 2006: AMOUNT OF WATER DELIVERED THAT FLOWS INTO SEWER AND IMPACT OF 5% INDOOR WATER CONSERVATION ON SEWER INFLOW										
MG Water Dlvd. To Town	# of Town Meters	# of Sewer HookUps	% Meters w/Sewer HookUps	MG Dlvd to Meters w/ Sewer HUps	MG InFlow Sewer	%MG Dlvd to Meters that Inflows to Sewer	Sewer Inflow from 5% Indoor H2O Conserv.	Decrease in Sewer Inflow w/5% Indoor H_2O Consv.	%Sewer Inflow from 5% Indoor Conserv.H_2O	%Change in Sewer Inflow from 5% Indoor H_2O Consv.
631.825	3,352	2,281	68.05%	429.95	215.3500	**50.09%**	204.23	11.12	94.83%	-5.45%

Based on 2006 figures for the District, an estimated 50% of water delivered to residents with sewer hookups ends up in wastewater treatment at Southland Wastewater Treatment Facility. A water conservation of 5% of water used indoors would result in a 5.45% (11.12 MG/yr) decrease in the amount of inflow entering Southland.

SUMMARY: Using the District's consumption figures for 2001-2006, the average per-year increase was 3.22%. Projected over 20 years, using a marginal price of water of $2000/AF, in the year 2026 the District's projected 25,169 customers, using 7,536 meters, will (without water conservation) consume 4,919.47 AF; with 15% water conservation, they will consume 4,181.57 AF, a savings of 737.92 AF.

During the 2007-to-2026 time period, without water conservation, they will have consumed 74,007.94 AF, and the District will have spent a total of $205,024,604.62 over the years (incorporating 3% annual inflation).

With 15% water conservation, during the same time period, they will have consumed only 62,906.75 AF (a savings of 11,101.19 AF) and the District will have only spent $174,270,913.93 (a savings of $30,753,690.69).

In addition, if a 5% water conservation can be achieved in the District's customers' homes, it will translate to 5.45% (11.12 MG/yr) decrease in sewer inflow.

With water conservation, there can be substantial savings in money spent on purchase/production of water, water and wastewater treatment facilities, and delivery infrastructure. In addition, expansions in both water and wastewater systems can be deferred or delayed.[48]

[48] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: WaterPlow Press. 2001

VIII. Water Conservation Program: Core Program Measures

Criteria for conservation measure's inclusion in the water conservation program:

- A benefit-cost ratio greater than 1.0.
- Reasonable cost.
- Reasonable water savings.
- Nonquantifiable but positive effects (community benefits).

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1. CORE (SHARED-COSTS) WATER CONSERVATION PROGRAM MEASURES

- **1.1. Conservation-based rate structure**
- **1.2. Public outreach materials and efforts**
  - **1.2.1. Printed materials, bill stuffers, direct mailings**
  - **1.2.2. Communication through the media (advertisement, press releases)**
  - **1.2.3. Customer promotional/giveaway items**
- **1.3. Public outreach events**
  - **1.3.1. Workshops**
  - **1.3.2. School outreach program**
  - **1.3.3. Community events**
- **1.4. NCSD landscape/demonstration garden**
- **1.5. Technical Assistance**
  - **1.5.1. Water audits, assist in leak detection**
  - **1.5.2. Provision of free, small-area landscape designs (i.e., design for an 8' shady border)**
  - **1.5.3. Provision of a list of xeriscape-knowledgeable landscapers, landscape designers, and nurseries**
  - **1.5.4. High-use letters offering assistance (water audit, information) and explaining rate schedule**
  - **1.5.5. Low-use letters congratulating water efficiency**

The core of the water conservation program is comprised of the interconnected, integrated measures which support the success of the other core measures and the success of the other non-core measures. The core measures are the bedrock upon which the other, non-core measures are built, and the glue which holds together the water conservation program.

The core measures are designed to work together, providing mutual support and support for the entire water conservation program. Removing any of the core measures will weaken the water conservation program and detract from the maximum benefits realized from the funds invested by the District in the water conservation program.

1.1. CONSERVATION-BASED WATER RATE STRUCTURE (BMP 4, 11)

> *"One of the most effective tools for water conservation is the rate structure. Rate structures and practices that promote the efficient use of water should be the goal to ensure sufficient resources to meet competing uses."*

-- *Water Conservation Measures.* Municipal Research and Services Center of Washington (http://www.mrsc.org/)

Refer to "Water Use Characteristics, Consumption," page 21, for details of the District's customers' consumption specifics and potential for savings.

Summary and comparison of usage**.** Analysis of DWR *Public Water System Statistics* reports from 2001 to 2006 indicates that the lion's share of NCSD's water use is consistently in the SFR category (77% in 2006), with the irrigation category being a far-distant runner-up (11% in 2006) (refer to Chart 1, 2 and Table 3, 4). In the SFR category, the element which has the most potential for conservation savings is the seasonal landscape-irrigation portion.[49] In the years 2003 to 2006, the average SFR highest bi-monthly billing period was September-October (482.20 AF), and the lowest was March-April (212.04 AF). The amount of the usage calculated to be due to SFR irrigation is the difference between the peak (summer) amount used and the trough (winter) amount used.

(Table 5). The average seasonal (peak summer) water use (percentage of annual use) for years 2003-2006, for all categories, is 69.15%, and for SFR category alone is 62.18%.

From 2001 through 2006, the SFR water usage increased each year until 2004, and then decreased in 2005 and 2006 (refer to Chart 2).

A 2003 study of California water usage for typical SFRs assumed an average monthly water usage to be 1,500 cubic feet, or 15 hcf.[50] For comparison, NCSD's 2003 monthly SFR use was 21.4, or 42% more than the average California residence.

When the District's per-capita water consumption is compared with other local water suppliers, the District is consistently above both the mean and median. When comparing the District with only San Luis Obispo County water suppliers, the District was a very close second (1.5 G/C/D less) to the #1 supplier (Templeton), with the highest per-capita consumption (Chart 5, 6).

The City of San Luis Obispo has a well-established water conservation program, and is a model of what can be achieved in water conservation, while maintaining the beauty of the residential landscapes. In 2005, the average daily per-capita use by NCSD's customers was 181.81 gallons, and 122 gallons by the City of San Luis Obispo's (SLO) customers. NCSD's daily per-capita water use was 49% more than SLO's use. As an example of how this translates into usage, for a SFR it would cost $144.30 to fill an average swimming pool in SLO, and only $65.98 for NCSD's (Town Division) SFR customers.

SLO City's program includes both conservation-based rate water and wastewater pricing and incentives in the forms of rebates, as well as public education and outreach. Over the years these measures have produced changes in customer choices and habits such that efficient use of the City's water resources is a way of life. The majority of landscaping in single-family residences in the City is certainly not barren or cactus-dominated.

At a time when the Nipomo Mesa is experiencing the immediate need for supplemental water, water conservation is the cheapest and most immediate source available. The minimum time until other supplemental water approaches would deliver wet water to our District is greater than

[49] A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. March 2005. The California Urban Water Conservation Council.

[50] Black and Veatch. *California Water Charge Survey 2003.* Black and Veatch Management Consulting Division, Irvine, California

three years. Conserved water is available immediately, and without the cost of building a delivery system.

Water conservation pricing as an integral part of a water conservation program**.** Pricing of water can be a powerful incentive for conservation, can increase revenue, and can defer expansion of water and wastewater facilities.[51,52] More importantly, at a time when demand for water is rapidly increasing, and water supplies are remaining static or decreasing, conservation pricing of water, reflecting the complete costs involved in obtaining, treating and distributing it, can send a clear message to the consumers regarding the worth and availability of water.[53,54]

Conservation water pricing (inclining block rate structure) can stimulate customers to use less water and use it more wisely, and to fix leaks and address other water-wasting conditions. The water saved will translate into decreased wastewater sent for treatment, and a delay in the need to upgrade facilities and/or fund other improvements or expansions. To achieve the maximum water-conservation impact, conservation water pricing should be accompanied by a program of public education, water accounting and audits, plumbing retrofits, and other water conservation measures.[55,56,57]

In 2005 four Florida water management districts funded and published the largest study ever conducted regarding the impact water rates have on single-family residential water use. This study demonstrated that water use decreases with increases in water price. Changes triggered by increases in water price vary depending on property value and access to other sources of water. Water providers can decrease water use—without decreasing revenues—by using increasing block rates. Fixed charges do not encourage conservation. Water providers can stimulate water conservation by decreasing charges for fixed rates and increasing charges related to the amount of water used. To gain maximum impact from water-conservation pricing, customers need pricing and water use information included with the bill (i.e., how their use compares with the provider's average residential customer use).[58]

A study of water rate structures in New Mexico found that increasing block structures were most effective in encouraging efficient water use.[59]

The Irvine Ranch Water District was stated in one reference (published in 1997) to have saved 43% of landscape water use by implementing an increasing block rate structure, public education, and separate metering[60]. In another reference (published in 2001), they were said to have, by implementing a increasing block rate structure, been able to decrease outdoor irrigation by nearly 50%. IRWD determines the indoor use to be, on average, 80 G/C/D, and above that amount is considered to be outdoor irrigation.[61]

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51 A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* March 2005.
52 Stallworth, Holly. *Conservation Pricing of Water and Wastewater.* April 2000. Environmental Protection Agency.
53 Ibid.
54 Whitcomb, John B. 2005. *Florida Water Rates Evaluation of Single-Family Homes.* July 2005.
55 Stallworth, Holly. *Conservation Pricing of Water and Wastewater.*
56 Hutchins-Cabibi, Taryn (Western Resource Advocates). *Better Water Rate Structures Can Encourage New Mexicans to Conserve.* February 2006
57 Whitcomb, John B. 2005. *Florida Water Rates Evaluation of Single-Family Homes.* July 2005.
58 Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: WaterPlow Press. 2001.
59 Hutchins-Cabibi, Taryn (Western Resource Advocates). *Better Water Rate Structures Can Encourage New Mexicans to Conserve.* February 2006
60 Highlights of Irvine Ranch Water District's landscape conservation program*. Water Conservation News.* July 1997
61 Vickers, Amy. *Handbook of Water Use and Conservation.*

The Utah State Water Plan, *Utah Water Resources: Planning for the Future*, published in 2001 by the State Department of Natural Resources, indicates that incentive pricing of water is crucial to conserving water. One city in Utah planned to implement an increasing block structure, and considered it a "key element in reaching its goal to reduce water demand 15 percent in five years."[62] To achieve results, implementation of incentive pricing must be done carefully. Identified elements of a successful program must include clearly identifying on customers' bills the fixed rates and the rated charges for water. The program should be implemented in such a manner that decrease in water usage does not cause a revenue shortfall. Efficient water use should be rewarded by low commodity rates, and excessive water should be discouraged by higher rates. Staff should be available to help customers with steps to conserve water.[63]

In 1995 Albuquerque, New Mexico, instituted an integrated water conservation program which included incentive rate structure, and by 2003 had reduced the per-capita use by 23%. [64]

Short-run elasticity estimates. Short-run estimates are used for estimates of customer water use response (short-term) to change in rates charged for water. Long-range estimates are made for long-range planning. Estimate of demand response to changes in the real price of water can be made by: (DeltaP x ETA_{price}=Decrease in use), where DeltaP is the change in price, x ETA_{price} is the price elasticity.[65]

Table 12: Short Run Elasticity Estimates for Conservation Rate Design	
Single Family Residential Customers	Range of Estimates
Winter Season	-.00 to -.10
Summer Season	-.10 to .20
Multiple Family Residential Customers	
Winter Season	-.00 to -.05
Summer Season	-.05 to -.10

Source: Designing, Evaluating, and Implementing Conservation Rate Structures. July 1997

For example, using the tabled figures, a 10% rate increase in the summer for SFR would be expected to produce a 1% decrease in water consumption.[66]

SUMMARY AND RECOMMENDATIONS: We are faced with both short- and long-term pressures to conserve water, and our per-capita usage has shown little end-result conservation since 2001. The current two-tier-rate billing categories appear to be too generous (the lower-tier range being too large), and have not produced conservation results. There is much evidence to indicate that incentive water pricing, if done with the right support measures, inspires consumers to use less water.

A strong, conservation-based rate structure is a cornerstone of a successful water conservation program. Like public outreach and education, it is the support structure by which all other measures can succeed or fail. The finest plumbing-retrofit program in the country will fail if customers don't know about it (public outreach) and if there is no real pocketbook incentive to

[62] *Utah's Water Resources: Planning for the Future.* May 2001. State of Utah Division of Natural Resources
[63] *Utah's Water Resources: Planning for the Future.* May 2001. State of Utah Division of Natural Resources
[64] *Albuquerque, New Mexico: Long-range planning to address demand growth. Cases in water conservation: how efficiency programs help water utilities save water and avoid costs*. Environmental Protection Agency. July 2002. (http://www.epa.gov/owm/water-efficiency/utilityconservation.pdf *)*
[65] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices*
[66] Ibid.

participate in the program (conservation-based rate structure). Without a strong conservation-based rate structure, the true potential of the funding invested in the other measures will not be realized, and more money will have to be spent on the other measures to get less of a return.

Based on the savings of other water agencies with the implementation of a strong, multi-tiered conservation-based rate structure, and a strong public-outreach/media effort, it is believed that the District has a large potential for water and money savings.

While some water suppliers have experienced 15% and greater water use savings after the implementation of a strong conservation-based rate structure, the expected water use savings is related to the amount of "pocketbook incentive" the rate structure supplies.

If the District was to experience a 15% decrease in seasonal water use alone, it would translate to significant saving.

(Table 13) SFR Savings from 15% decrease in seasonal water use:

Total AF (SFR) savings over 20 years:	4769.21
Average AF savings:	256.13
Total NET $$$ savings over 20 years:	$14,754,153.56
Average AF/Y savings:	737,707.68
% Water Savings (AF/Y)	6.92%
Savings:Cost ratio	1109.7:1
Years to pay off initial investment:	<0.5

In addition, with 15% of the SFR category's seasonal water use, over 20 years, the total decrease in in-flow to the wastewater treatment facility would be approximately 2600 AF (847 MG), and a yearly average of approximately 130 AFY (42 MG/Y).

Table 13: *PROJECTED COSTS* AND SAVINGS OF CONSERVATION-BASED RATE PRICING, WITH A 100% MARKET PENETRATION, SINGLE-FAMILY RESIDENCE CATEGORY, SEASONAL USE, OVER 20 YEARS (SAVINGS: 5% 2008, 10% 2009, 15% 2010)

Year	#SFR Meters	#SFR Meters w/100% MP	Estimd. Popul. w/100% MP	SFR AFY (Seasonal) Required w/o Measure	Saved: AFY, SFR Meters (5-10-15%)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Rebate ($0.00 ea)	5% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008 - 5%	3647	3647	12,545.65	1290.210	64.51	$2,060.00	$132,891.61	$0.00	$3,445.00	$344.50	$3,789.50	**$129,102.11**	**<0.5**
2009 - 10%	3764	3764	12,949.62	1331.755	133.18	$2,121.80	$282,571.67	$0.00	$344.50	$34.45	$378.95	**$282,192.72**	
2010 - 15%	3886	3886	13,366.59	1374.637	206.20	$2,185.45	$450,630.89	$0.00	$354.84	$35.48	$390.32	**$450,240.57**	
2011 - 15%	4011	4011	13,797.00	1418.900	212.84	$2,251.02	$479,095.44	$0.00	$365.48	$36.55	$402.03	**$478,693.42**	
2012 -15%	4140	4140	14,241.26	1464.589	219.69	$2,318.55	$509,357.99	$0.00	$376.44	$37.64	$414.09	**$508,943.90**	
2013 - 15%	4273	4273	14,699.83	1511.749	226.76	$2,388.10	$541,532.09	$0.00	$387.74	$38.77	$426.51	**$541,105.58**	
2014 - 15%	4411	4411	15,173.16	1560.427	234.06	$2,459.75	$575,738.51	$0.00	$399.37	$39.94	$439.31	**$575,299.20**	
2015 - 15%	4553	4553	15,661.74	1610.673	241.60	$2,533.54	$612,105.61	$0.00	$411.35	$41.14	$452.49	**$611,653.12**	
2016 - 15%	4699	4699	16,166.05	1662.536	249.38	$2,609.55	$650,769.87	$0.00	$423.69	$42.37	$466.06	**$650,303.81**	
2017 - 15%	4851	4851	16,686.60	1716.070	257.41	$2,687.83	$691,876.40	$0.00	$436.40	$43.64	$480.04	**$691,396.36**	
2018 - 15%	5007	5007	17,223.90	1771.328	265.70	$2,768.47	$735,579.46	$0.00	$449.49	$44.95	$494.44	**$735,085.02**	
2019 - 15%	5168	5168	17,778.51	1828.364	274.25	$2,851.52	$782,043.08	$0.00	$462.98	$46.30	$509.28	**$781,533.80**	
2020 - 15%	5335	5335	18,350.98	1887.238	283.09	$2,937.07	$831,441.61	$0.00	$476.87	$47.69	$524.56	**$830,917.05**	
2021 - 15%	5506	5506	18,941.88	1948.007	292.20	$3,025.18	$883,960.45	$0.00	$491.17	$49.12	$540.29	**$883,420.16**	
2022 - 15%	5684	5684	19,551.81	2010.732	301.61	$3,115.93	$939,796.70	$0.00	$505.91	$50.59	$556.50	**$939,240.20**	
2023 - 15%	5867	5867	20,181.38	2075.478	311.32	$3,209.41	$999,159.89	$0.00	$521.09	$52.11	$573.20	**$998,586.70**	
2024 - 15%	6056	6056	20,831.22	2142.308	321.35	$3,305.70	$1,062,272.83	$0.00	$536.72	$53.67	$590.39	**$1,061,682.44**	
2025 - 15%	6251	6251	21,501.99	2211.291	331.69	$3,404.87	$1,129,372.35	$0.00	$552.82	$55.28	$608.10	**$1,128,764.25**	
2026 - 15%	6452	6452	22,194.35	2282.494	342.37	$3,507.01	$1,200,710.29	$0.00	$569.41	$56.94	$626.35	**$1,200,083.94**	
2027 - 15%	6660	6660	22,909.01	2355.991	353.40	$3,612.22	$1,276,554.35	$0.00	$586.49	$58.65	$645.14	**$1,275,909.22**	
			TOTALS:	**36,704.737**	**4769.21**	**n/a**	**$14,767,461.09**	**$0.00**	**$12,097.76**	**$1,209.78**	**$13,307.54**	**$14,754,153.56**	
			AVERAGES:	**1747.845**	**256.13**	**n/a**	**$738,373.05**	**$0.00**	**$604.89**	**$60.49**	**$665.38**	**$737,707.68**	

It is uncertain what percentage savings the District would get from conservation in the other customer categories, based on conservation-based rate structure alone.

(Table 14). However, the average seasonal (peak summer) water use (percentage of annual use) for years 2003-2006, for all categories is 69.15%. If all categories decreased an average of 15%, it would translate to:

(Table 14) All-category savings from 15% decrease in seasonal water use:

Total AF (all categories) savings over 20 years:	7102.51
Average AF/Y savings:	381.44
Total NET $$$ savings over 20 years:	$21,979,026.77
Average AF/Y savings:	$ 1,098,951.34
% Water Savings (AF/Y)	10.31%
Savings:Cost ratio	1652.6:1
Years to pay off initial investment	<0.5

In addition, with 15% of the all-category's seasonal water use, over 20 years, the total decrease in in-flow to the wastewater treatment facility would be approximately 3351 AF (1157 MG), and a yearly average of approximately 177 AFY (57 MGY).

Table 14: *PROJECTED COSTS* AND SAVINGS OF CONSERVATION-BASED RATE PRICING, WITH A 100% MARKET PENETRATION, ALL CATEGORIES, SEASONAL USE, OVER 20 YEARS (SAVINGS: 5% 2008, 10% 2009, 15% 2010)

Year	SFR #Meters	(SFR) #Meters w/100% MP	Estimd. Popul. w/100% MP	SFR AFY (Seasonal) Required w/o Measure	Saved: SFR AFY/SFR Meters (5%)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Rebate ($0.00)	5% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008 - 5%	4256	4256	14,642.09	1921.436	96.072	$2,060.00	$197,907.86	$0.00	$3,445.00	$344.50	$3,789.50	**$194,118.36**	**<0.5**
2009 - 10%	4393	4393	15,113.56	1983.306	198.331	$2,121.80	$420,817.81	$0.00	$344.50	$34.45	$378.95	**$420,438.86**	
2010 - 15%	4535	4535	15,600.22	2047.168	307.075	$2,185.45	$671,098.79	$0.00	$354.84	$35.48	$390.32	**$670,708.47**	
2011 - 15%	4681	4681	16,102.54	2113.087	316.963	$2,251.02	$713,489.41	$0.00	$365.48	$36.55	$402.03	**$713,087.39**	
2012 -15%	4832	4832	16,621.05	2181.128	327.169	$2,318.55	$758,557.69	$0.00	$376.44	$37.64	$414.09	**$758,143.60**	
2013 - 15%	4987	4987	17,156.24	2251.361	337.704	$2,388.10	$806,472.74	$0.00	$387.74	$38.77	$426.51	**$806,046.23**	
2014 - 15%	5148	5148	17,708.67	2323.855	348.578	$2,459.75	$857,414.40	$0.00	$399.37	$39.94	$439.31	**$856,975.09**	
2015 - 15%	5314	5314	18,278.89	2398.683	359.802	$2,533.54	$911,573.84	$0.00	$411.35	$41.14	$452.49	**$911,121.35**	
2016 - 15%	5485	5485	18,867.47	2475.920	371.388	$2,609.55	$969,154.31	$0.00	$423.69	$42.37	$466.06	**$968,688.25**	
2017 - 15%	5661	5661	19,475.01	2555.645	383.347	$2,687.83	$1,030,371.91	$0.00	$436.40	$43.64	$480.04	**$1,029,891.87**	
2018 - 15%	5844	5844	20,102.10	2637.937	395.690	$2,768.47	$1,095,456.38	$0.00	$449.49	$44.95	$494.44	**$1,094,961.94**	
2019 - 15%	6032	6032	20,749.39	2722.878	408.432	$2,851.52	$1,164,651.98	$0.00	$462.98	$46.30	$509.28	**$1,164,142.70**	
2020 - 15%	6226	6226	21,417.52	2810.555	421.583	$2,937.07	$1,238,218.39	$0.00	$476.87	$47.69	$524.56	**$1,237,693.83**	
2021 - 15%	6427	6427	22,107.16	2901.055	435.158	$3,025.18	$1,316,431.69	$0.00	$491.17	$49.12	$540.29	**$1,315,891.40**	
2022 - 15%	6633	6633	22,819.02	2994.469	449.170	$3,115.93	$1,399,585.41	$0.00	$505.91	$50.59	$556.50	**$1,399,028.91**	
2023 - 15%	6847	6847	23,553.79	3090.891	463.634	$3,209.41	$1,487,991.62	$0.00	$521.09	$52.11	$573.20	**$1,487,418.43**	
2024 - 15%	7068	7068	24,312.22	3190.417	478.563	$3,305.70	$1,581,982.10	$0.00	$536.72	$53.67	$590.39	**$1,581,391.71**	
2025 - 15%	7295	7295	25,095.07	3293.149	493.972	$3,404.87	$1,681,909.59	$0.00	$552.82	$55.28	$608.10	**$1,681,301.48**	
2026 - 15%	7530	7530	25,903.13	3399.188	509.878	$3,507.01	$1,788,149.09	$0.00	$569.41	$56.94	$626.35	**$1,787,522.74**	
2027 - 15%	7772	7772	26,737.22	3508.642	526.296	$3,612.22	$1,901,099.31	$0.00	$586.49	$58.65	$645.14	**$1,900,454.17**	
			TOTALS:	**54,662.263**	**7102.51**	**n/a**	**$21,992,334.31**	**$0.00**	**$12,097.76**	**$1,209.78**	**$13,307.54**	**$21,979,026.77**	
			AVERAGES:	**2602.965**	**381.44**	**n/a**	**$1,099,616.72**	**$0.00**	**$604.89**	**$60.49**	**$665.38**	**$1,098,951.34**	

The following is recommended:

Single-Family Residence, multi-family residence categories: It is requested that the Board adopt a multi-tiered, inclining block rate structure to provide District customers with the "pocketbook incentive" to stimulate water conservation.

All other categories: It is requested that the Board adopt an inclining block rate structure for all non-residential customers.

Results of this tier system will be tracked for results and modified as necessary to meet the goals.

SUMMARY: The NCSD and its customers are facing water challenges that can only be met with proper planning and customer support. Water conservation plays a vital role in meeting these challenges. Fortunately, there is a wealth of information and statistics compiled by those who have been down this road before us. We can gain the benefit of their experience in designing a rate structure that provides customers incentive to use water efficiently, and make choices and change habits that are in line with the reality of California's limited water supply.

A conservation-based rate structure has been shown to induce significant water savings, and is considered to be the cornerstone of water conservation programs. Without the monetary incentive to save water, other elements of a conservation program will produce less benefit and more money will have to be spent in public outreach, advertising, and other support measures.

The water-use savings following the implementation of a multi-tiered conservation-based rate structure will depend on the strength of the rate structure, and the amount of "pocketbook incentive" the rate structure provides to customers.

The District's adoption of a strong conservation-based rate structure will communicate to our customers both the scarcity and value of water, and give them the feedback they need when making budgetary choices which are impacted by the costs of water.

1.2. PUBLIC OUTREACH MATERIALS AND EFFORTS

- **1.2.1. Informative statements, printed materials, bill stuffers, direct mailings**
- **1.2.2. Communication through the media (advertisement, press releases)**
- **1.2.3. Customer promotional/giveaway items**

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1.2.1. Informative statements, printed materials, bill stuffers, direct mailings.

To produce sustainable water conservation and reduction in demand, a well-organized water conservation education program, complementing the implementation of specific conservation measures, is crucial. An effective conservation program helps water customers change their water use habits. If customers do not permanently change how they use water, many conservation successes can be easily erased as customers revert to old habits. Evidence of this is the immediate rebound of water consumption occurring after the effects of a drought resolve and media attention to local water scarcity disappears.

Statements: To help provide customers with the tools they need to achieve water conservation goals, an informative water use statement (bill), going beyond simply providing the basic information and

use, is an important part of the public outreach program.[67] Ideally, meter reading should be done on a monthly basis. This not only enables easier customer budgeting for their water bills, but also provides more immediate feedback to habit changes that result in increases or decreases in customer water use. Water bills should be part of the education/outreach process, and assist customers in reducing their use. By making the customer's water bill part of a public education program, customers are provided another habit-changing reminder or trigger, at little to no extra cost.

Each customer's bill should provide a comparison of current year versus prior years water usage, the fixed charges and commodity charges for water, the amount of water used and the costs incurred at each step of the rate schedule, the customer's use relative to other customers' water use (i.e., "During this billing cycle you used 20% more [or less] than the average water customer"), reminders of seasonal programming changes needed for irrigation systems, internet websites and other references for saving water.[68]

Currently the customer statements are sent out on a bi-monthly basis. The information on the statement includes a history of charges and payments, a comparison between the current and previous year's usage, and a figure representing the average usage.

Printed Material: To accomplish the change in habits necessary to produce long-term water conservation success, frequent prompts and reminders must be part of the water conservation program.

To provide integration and cohesiveness to the multi-method approach to public education, the "Water Use It Wisely" logo will be featured on materials and in advertisement. This colorful yet simple logo provides a simple message: use water wisely. Materials will be focused on informing the customers of the tools available to them for water conservation. However, out of all the water conservation tools available, the number-one, most important element is the person using the tool, and this will also be communicated to customers.

A variety of printed materials, delivered in a variety of ways, will provide the periodic prompts and reminders necessary to produce long-term water conservation habits. These materials will be provided as bill stuffers, direct mailings, at events, at schools, in the District's office lobby, and distributed to businesses.

RECOMMENDATIONS: To take full advantage of low- or no-cost opportunities to present water conservation reminders to customers, the following is recommended:

- Conversion to monthly billing cycle when feasible.
- Include on the statement:
    - Comparison between the customer's current and past years' usage;
    - The costs incurred for each step of the tiered rate structure;
    - Delineation of fixed charges and commodity charges;
    - Reminder of seasonal programming changes needed for irrigation systems;
    - Internet websites and other references for water conservation information.

See *Appendix III* for the proposed customer water billing statement.

COST: The estimated costs for changing the information on the customer water statements are unknown at this time, but are estimated to be less than $500.

[67] *Fact Sheet: Water Conservation Measures.* National Drinking Water Clearinghouse. December 1998.
[68] *Utah's Water Resources: Planning for the Future.* May 2001. State of Utah Division of Natural Resources.

The budgeted funding for brochures, mailings, and other printed public-outreach materials is **$28,600.**
ONE-TIME COST: One-time cost for rights to use the "Water Use It Wisely" logo is **$2500.**

1.2.2. Communication through the media (advertisement, press releases).

Communication through the media, in the form of advertisements and press releases, also successfully communicate the message to our customers. Press releases are free; advertisement is not. It is believed that regular advertisements in the Adobe Press will be a strong reinforcement of the District's water conservation message.

RECOMMENDATION: Regular advertising in the *Adobe Press* and *Times Press-Recorder*, with special-event-linked advertising approximately four times a year.

COST: **$12,000.**

1.2.3. Customer promotional/giveaway items.

Educational promotional items can provide another prompt to remember the need for water conservation, and impart information. Imprinted with the District's name and contact information, they also can serve as a link between the District and its customers. At events, it is the promotional items that draw event attendees to the booths. For an informational "vendor" like the NCSD, event booths really need the promotional items to draw the attendees to the booth.

RECOMMENDATIONS: Educational promotional items for use at events and other public functions.

COSTS: **$8000.**

1.3. PUBLIC OUTREACH AND EDUCATIONAL EVENTS

- 1.3.1. Workshops
- 1.3.2. School outreach program
- 1.3.3. Community events

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1.3.1. Workshops.

To assist our customers in saving water and money by efficient use of water in the landscape, two sets of workshops are planned. Each set of workshops will have four workshops each. The topics will be:

- **Irrigation.** Basics on irrigation, including assessing landscape for water needs, choosing emitters/heads, timing and duration of irrigation cycles, need for monthly maintenance and reprogramming to fit climatary needs.
- **Soil/Compost**. Basics of soil physics and biology, composting as a way to increase soil fertility and water-holding capacity, assessing for needs for amendments, fertilizer basics.
- **Drought-tolerant/Xeriscape Plants.** Use and selection of drought-tolerant plants in the landscape, grouping for hydrozones.
- **Principles of Landscaping**. Following the 7 principles of xeriscape (see *Appendix II*).

To assist our customers in basic water conservation measures, one set of workshops is planned. The topics will be:

- **Water conservation in the home.**

- **Water conservation in the landscape.**

To assist our customers in making fire-resistant landscaping choices, one workshop is planned. The topic will be:

- **Fire-resistant landscaping.**

The workshops will serve both as education and outreach, but some workshops will also be required as a condition of some water-conservation measure rebates.

RECOMMENDATIONS: Two sets of four workshops (a total of eight workshops), scheduled two to four weeks apart.

COSTS: Budgeted funds for eight workshops (speaker stipends, hospitality, giveaways) is **$6700.**

1.3.2. School outreach program.

Included in the school outreach program will be funding for the yearly student art contest (prizes, publicity/ads, reception, and production of winners' art-work into calendars for distribution to school classrooms), and materials for classroom support (financial support of the Nipomo High School Envirothon, student books and other materials, the initiation of a District lending library of DVDs, available for use by teachers for classroom activities, and provision of Science Discovery demonstrations/classes for selected elementary school classrooms).

RECOMMENDATIONS: Provision of education/outreach school support measures.

COSTS: Budgeted funds for these outreach efforts is **$6900.**

1.3.3. Community events.

The District's participation in events serves to both inform and educate those who attend the events, and are a good opportunity to build connections in the community.

The majority of the "hardware" for events (canopy, tables, etc.) has been purchased. Funding will be for entry fees, costs of the events, and banners as needed.

RECOMMENDATIONS: Participation in community events.

COSTS: Budgeting for events is **$1500.**

1.4. NCSD LANDSCAPE/DEMONSTRATION GARDEN.

The current NCSD facility landscaping was not designed to be water-efficient, and includes an invasive species of groundcover (*Hedera helix*). Some of the trees have been planted in areas near buildings or sidewalks that will suffer damage as the trees mature.

In order to provide both an example and an inspiration to our customers, and to "practice what we preach," a redesign of the District's landscape to a water-efficient landscape is in process.

The new landscaping will be designed to demonstrate landscaping approaches to different landscape needs (sunny slope, bordering a walkway, under a shady tree, etc.). It will be installed in phases, with the first phase to incorporate the front of the District facility and the area near the back exit driveway.

The project is currently out for landscape-design proposals. Once the decision has been made on the design, removal of existing plant material and installation of new plant material and irrigation system elements will begin.

RECOMMENDATIONS: Continue District landscape redesign, with the initiation of Phase I of the project.

COSTS: This will be part of the landscape redevelopment program.

1.5. TECHNICAL ASSISTANCE

- **1.5.1. Water audits, assist in leak detection**
- **1.5.2. Provision of free, small-area landscape designs (i.e., design for an 8' shady border)**
- **1.5.3. Provision of a list of xeriscape-knowledgeable landscapers, landscape designers, and nurseries**
- **1.5.4. High-use letters offering assistance (water audit, information) and explaining rate schedule**
- **1.5.5. Low-use letters congratulating water efficiency**

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1.5.1. Water audits, assist in leak detection. (BMP 1)

The California Urban Water Conservation Council's Best Management Practice 1 recommends water survey programs (including water audits) for 15% of single-family residential and multi-family residential customers within 10 years.

Water audits are very important to any water conservation program. Water audits identify leaks and water use inefficiency, educate customers, serve as a public-outreach measure, and sometimes include installation of water-efficiency devices or plumbing retrofits. Some water-conservation measures, such as provision of irrigation controllers to customers, have been demonstrated to be unsuccessful without first accomplishing a water audit and bringing the existing system up to optimum performance and uniformity.

According to the California Department of Water Resources, most water audits of residential landscapes find a distribution uniformity of 50% or less (recommended uniformity is >70%).[69]

Most irrigation inefficiency occurred during the fall. Sites maintained by contract landscapers were irrigated less efficiently. Sites less than two acres achieved the highest percentage water savings. Water audit savings diminished over time (20.1%, 7.6%, and 6.5% over three years.)[70]

Water audits are performed to assess for leaks and inefficiency of water use (i.e., absence of distribution uniformity of landscape irrigation systems, where the amounts of water delivered to areas of the landscape are unintentionally without uniformity).[71]

Residential. Studies show that home water audits can result in water savings when plumbing retrofit devices are installed and customers are given practical guidance about more efficient outdoor water-use practices, particularly for lawn irrigation. Results of water audits vary, but those that involve

[69] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.
[70] Whitcomb, J.B. *Landscape Water Audit Evaluation.* Contra Costa Water District. August 1994.
[71] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.

installing some kind of efficiency device and spending time with the customer to educate them about reduced outdoor water use have reported savings for combined indoor and outdoor use ranging from 20 to 30 G/D per SFR. A trained technician can accomplish an indoor water audit in less than an hour (excluding follow-up analysis and paperwork). The cost of contracting a water auditor varies from $40 to $75 per home.

An indoor water audit should contain an explanation of the purpose of the audit, a determination of the water use, test and repair leaks, provision of retrofit devices, follow-up analysis and recommendations, with education of the customer.[72]

Residential landscape. A residential landscape water audit takes about 1.5 hours. The highest yield of water savings usually occurs for both residential and nonresidential customers who rely on irrigation controllers that are incorrectly programmed or who have malfunctioning or poorly designed irrigation systems. Audits that educate customers one-on-one about water efficiency concepts, recommend site-specific conservation measures, and provide or install an efficiency device along with back-up technical support should result in a 10% to 15% reduction in landscape water demand. The most successful water audits should require an explanation of the purpose of the audit, review of outdoor water use, evaluation of lawn, landscape and irrigation features, measurement of water use of the irrigation equipment (distribution uniformity), provide landscape water-efficiency recommendations, leaving information and installation of conservation devices, and post-audit follow-up[73].

Large landscape. Water audits of large landscapes can take up to 8 hours. The Cachuma Resource Conservation District (USDA Service Center in Santa Maria) performs these specialty water audits for free. The service provides the audit and detailed recommendations, but does not do follow-up to verify that the recommended changes and fixes have been accomplished.

DISCUSSION: Water audits are staff-time-intensive, and current staff is not sufficient to perform the anticipated requests for water audits. At this time staff is researching options for accomplishing this important part of the water conservation program. Options include temporary contracting of students, who will need to be trained before they can perform the audits, and contracting for the audits. The Atascadero Mutual Water Company hires two temporary staff each year to perform the audits in spring and summer, and this program has worked well for them. The City of San Luis Obispo has two full-time staff performing water audits and other services for the city's water conservation program.

Estimates for two scenarios were prepared:

Contracting with a part-time intern, 4 hours/day, for 12 weeks. This intern would have their own vehicle. Pay would be $12/hour for 240 hours, over 12 weeks. Car stipend would be $10/day. This intern in three months would be expected to perform 180 water audits over the 12-week period. Included is administrative cost of 20% of total intern costs. Audits would be restricted to landscape audits because of issues of having an intern enter resident's home. Contracting with a part-time intern would cost $23.20 per audit.
Benefits. Lower cost.
Drawbacks. Utilizing an intern would require considerable staff effort for training, support and supervision. It would also place more liability on the District because, unlike a contractor with their own business, the intern would not have their own liability insurance. The public perception of the credibility of the work done by an intern-in-training might be less than that for a professional contractor with their own business. Finally, an intern would be restricted to landscape audits only.

[72] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press, 2001.
[73] *Ibid.*

Contracting with a professional certified water auditor. This contractor would contract per audit, and all costs (including for vehicle and appropriate insurance) would be covered by the per-audit charge. Cost is estimated at $75/audit for 120 water audits. Administrative costs of 5% of total audit costs would be added, for a total of $78.75 per water audit. Each water audit would include indoor plumbing check and landscape audits. Public perception may be better with a certified professional contractor. There would be less liability involved.

RECOMMENDATION: Contract with a professional certified water auditor for up to 470 water audits.

COST: **$14,175.00**

1.5.2. Provision of free, small-area landscape designs (example: design for an 8' shady border).

It is believed that many District homeowners may be open to changing landscaping and decreasing lawn size, but do not want to hire a landscape designer and may not want to do the entire project at once. Providing free small-area landscape designs to meet the needs of different landscape settings would give homeowners basic designs from which to work.

The District would pay a landscape designer experienced in xeriscape designs to create a series of small landscape designs for, as an example, an 8-foot walk-way border or four corners to use in decreasing a larger, rectangular lawn to a smaller, ovoid lawn.

RECOMMENDATIONS: Provision of free small-area landscape designs to District SFR customers.

COST: Budgeting is for **$1000.**

1.5.3. Provision of a list of xeriscape-knowledgeable landscapers, landscape designers, and nurseries

A common complaint from homeowners wishing to change their landscapes to a more water-efficient environment is the inability to locate knowledgeable landscape professionals and plant nurseries. By maintaining lists of landscape maintenance specialists, landscape designers and nurseries which have experience in supporting a water-efficient landscape, the District's customers will have additional tools by which they can succeed in conserving water.

RECOMMENDATIONS: Maintenance and provision of lists of landscape professionals knowledgeable in water-efficient/xeriscape landscapes.

COST: **Negligible**; staff will be compiling these lists anyway.

1.5.4. High-use letters offering assistance (water audit, information) and explaining rate schedule

1.5.5. Low-use letters congratulating water efficiency

Many sources speak highly of the impact of personal contact with customers in effecting water conservation goals.

According to Ron Munds (City of San Luis Obispo), measures which provide one-to-one contact with customers are very effective in promoting water conservation and reducing water usage. In his experience, high-use letters to customers produce over time a decrease in water consumption of those contacted, even if the customers don't take advantage of any of the offers for information or services that accompany the letters.

It is believed that the District would benefit from this measure, which would be easy to accomplish and take minimal staff time.

RECOMMENDATION: Monthly provision of letters to high-use customers, offering services (water audits, leak detection) and providing information for decreasing water use. In addition, monthly letters to the low-use customers, congratulating them for their wise use of the District's water resources, will serve as a reinforcement for desirable behavior.

COST: **Variable but minimal**, related to preparing addresses for merging with a form letter and charges for postage.

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2. "UNACCOUNTED FOR LOSSES," NON-REVENUE WATER.

2.1. Supply-side (District) monitoring for increase in District's unaccounted-for losses; if the amount rises to 10%, consider formal system-wide audit for leaks and other problems.

2,2, Demand-side (customer) leaks, non-point-of-use losses.

2.2.1. "Oops" door-hangers.

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2. "UNACCOUNTED FOR LOSSES," NON-REVENUE WATER.

The American Water Works Association recommends the term "non-revenue water" to replace the previous, inaccurate term, "unaccounted-for losses."

Refer to Table 1 on page 17.

Water system uses of water are divided into two categories:

1. Revenue water consumed has two categories:
   a. Billed metered consumption (SFR, MFR, CI, Landscape, Agriculture customers).
   b. Billed unmetered consumption. None.

2. Non-revenue water is the difference between the amount produced by the system and the billed authorized consumption, and includes three categories:
   a.. Authorized but unbilled consumption: Unbilled metered consumption (water used at NCSD office facilities), unbilled unmetered consumption (hydrant water used for fighting fires, water used for flushing lines).
   b. Apparent Losses: Unauthorized consumption, theft, customer metering inaccuracies, data handling errors.
   c. Real Losses: Leaks in transmission and distribution mains, leaks and overflows at utility tanks, leaks at service connections up to the point of customer metering.[74]

The amount of water used for fire-fighting and flushing lines and fighting fires is usually considered relatively small.[75]

Water not accounted for by metered consumption can be, but may not be, attributable to leaks in the water system. Theft and other unauthorized consumption, for instance, also contribute to the amount of water that cannot be accounted for by metered consumption.

For the years 2001-2006, the District produced a total of 16,197.78 acre-feet of water (average of 2699.63 acre-feet/year), delivered a total of 15,202.42 AF (average of 2533.74 AF/Y), and percentage of loss was a total of 995.36 AF (average of 165.89 AF/Y). The percent losses averaged 6.21% per year (Table 1).

Using the $2000/AF estimated next-increment cost of water, the yearly average monetary loss from unaccounted losses in the distribution system is $331,780.00.

The total percentage increase in production from 2001 to 2006 was 13.85% (average production increase each year was 2.31%).

[74] *Water Audit Methodology*. America Water Works Association, 2007.
[75] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: WaterPlow Press, 2001.

2.1 Supply-side (District) monitoring for increase in District's unaccounted-for losses; if the amount rises to 10%, consider formal system-wide audit for leaks and other problems.

The percent loss is compared to the cost-effectiveness standard set by the American Water Works Association (AWWA).[76] The current standard suggests that if a system's percent unaccounted-for-losses exceeds 9%, a distribution system audit could be cost effective. Based on the District's production information, the average yearly system loss was 6.21%, which is within the current AWWA standard; therefore, a distribution system audit would not be expected to be cost effective. In addition, the 6.21% average loss is below the 10% threshold in the California Urban Water Conservation Council (CUWCC) Best Management Practice 3 for unaccounted losses.[77]

2.2. Demand-side (customer) leaks, non-point-of-use losses.

A faucet leak of one drop per second results in a loss of 2400 gallons per year; based on the number of SFR District meters in 2006, that would equal 25.211 AF/Y. Leaks in the home and residential landscape can result in losses of, on average, 14% (9.5 G/C/D) of the home water use.[78] For each 5% (182 homes projected in 2008) of the District's SFR customers' water leaks which are located and corrected, projected over 5 years, it would translate into a total savings of 89.47 AF, and $175,913.12 in water costs. Average annual savings over 5 years would be 17.89 AF, $35,182.62 in water costs. Included in the estimation is $100 for each residence in estimated water audit costs, and $1,820 in initial office administrative costs. Note that the projections were only made for 5 years because savings have been shown to decrease with time until a new audit and leak correction is performed. Note also that this is only for one 5% SFR account increment that underwent water audit with subsequent corrections. Each year that this increment was performed would provide a new batch of savings (and costs).

Residential leaks can be located by the customer or by the District. It is anticipated that, given the correct instructions and tools (dye tabs for toilet leaks, etc.), that some customers would be willing and able to find and fix their own leaks, but some customers would not.

Leaks, once located, can be corrected by the customer or the District. Some water suppliers make this the responsibility of the customer. Other water suppliers believe that the increase in compliance and resulting water-loss savings justifies having the water supplier pay.

Residential water audits (indoor and outdoor) would identify leaks, as well as educate the customer and provide water-saving measures/fixtures to further decrease water usage in the homes. Water audits would also benefit other non-core program measures ("smart" controller, turf-replacement), and would benefit all measures by educating and establishing contact with customers on water conservation.

Water audits of commercial, large landscape, and agriculture accounts may result in water savings, as well. The state-funded Cachuma Resource Conservation District (USDA Service Center, Santa Maria) will provide, free of charge, water audits for large landscape and agriculture accounts. A water audit of Nipomo Park has already been performed, and demonstrated that, just by bringing the irrigation system up to 70% or greater uniformity would save them over $24,000/year in water costs. Contacting customers in these two categories with the offer of a free water audit may benefit both the District and the customer in saving water and money spent on irrigation, especially if pocketbook-

[76] *Water Conservation Programs—A Planning Manua, M52I*. American Water Works Association, 2006.
[77] *Memo of Understanding, BMP-3*. California Urban Water Conservation Council, 2007.
[78] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: WaterPlow Press, 2001.

incentive (conservation-based rate structure) and staff follow-up is provided as incentive to get the recommendation changes made.

Of special interest is the fact that the Cachuma Resource District now has access, once the water audit has been performed by the CRD, to funding for bringing large irrigation accounts up to irrigation efficiency

2.2.1. "Oops" door-hangers.

In an effort to assist SFR customers to use water efficiently, the District has instituted an "Oops!" doorhanger program by which SFRs with obvious water use problems (broken/geysering sprinkler, irrigation water flowing into the street, etc.) receive a friendly notification. Currently the utility crew places these hangers as they encounter problems during the course of their regular duties.

Expansion of the program by devoting staff time to the effort, as part of the public outreach program, would be expected to increase the efficacy of the program.

To date there have been no complaints about the doorhangers, which were designed to be friendly and helpful. One residence where a doorhanger was placed the next reading had an $800 water bill. When the customer called about the amount of the bill, she said she had received the doorhanger, but had not done anything about it. In this case, notification was accomplished but customer action was not. Therefore, an expansion of the program to include recording addresses and dates the doorhangers were left would allow for appropriate follow-up to offer information or help where appropriate.

RECOMMENDATIONS:

1. Because the District's percent loss is 6.21%, at this time a formal distribution system water audit may not be cost effective. However, the level of losses should continue to be regularly monitored. If water losses were to increase to 10%, a full-scale system audit may be warranted.
2. SFR leaks, if located and corrected, could produce substantial water savings. When combined with other water-conservation program measures, such as using the opportunity to provide low-flow showerheads and other plumbing retrofits, even more water savings can be accomplished. It is recommended that a goal be set to provide water audits to 5% of SFR customers. The District can consider making simple repairs, such as replacing a toilet flapper-valve.
3. There is potential for water and money savings in the large landscape and agriculture accounts which are not now irrigating at maximum efficiency. Recommendation is made for contacting these accounts with the offer of the free water auditing services provided by the State of California. Simple, non-intrusive follow-up, offering information and assistance, opening a line of communication with these accounts, would be beneficial to the District, and is recommended.
4. It is believed that expansion of the "Oops!" doorhanger program would increase both the impact of the program and the compliance with fixing the problem. If staff is brought on for another reason (assisting in water audits, for example), the "Oops!" doorhanger program could become part of the staff's responsibilities.

COMPARISON AND DISCUSSION OF CORE WATER CONSERVATION PROGRAM MEASURES

The core water conservation program measures work together to form a supportive matrix by which each core measure is supported by, and supports, the other core measures. The core program measures also form the bedrock upon which other, non-core measures rely.

The majority of the core measures are considered vital, yet not-quantifiable-in-savings, parts of the entire water conservation program. These are:

- Public outreach materials and efforts.
- Public outreach events.
- NCSD landscape/demonstration garden.
- Technical assistance (including "Oops!" doorhangers).

The multi-tiered conservation-based rate structure's efficacy in decreasing water use will depend on the strength of the rate structure chosen by the Board of Directors.

One of the core measures, leak detection and correction, has demonstrable savings.

Table 15: SAVINGS FROM LEAK DETECTION AND FIXING

Measure	Target Category	Total Savings Avg. AFY	Avg. AFY Consum. For All Categ,s	% AF Savngs for All District Categ's	Total $ (not NET) Savings	Total$ Costs	Savings: Costs Ratio	Years to pay off Initial Invest.
Leak detection, fixes	SFR (10%)	17.89	3698.743	0.48%	$196,351.48	$20,438.36	9.6:1	<1.0

Multi-tiered, conservation-based rate structure. This measure can be, by far, the most cost-effective of all of the measures offered. Other districts with strong conservation-based rate structures (usually three- or four-tiered) have shown significant savings. The District's customers (all categories) would be anticipated to save over 10% of their water use by a strong rate structure. The savings on the District's rate structure will depend on the structure chosen.

Since the costs implementing a conservation-based rate structure are very low, the savings:cost ratio is usually high. The strength of the ratio would depend on the strength of the conservation-based rate structure.

The goal of conservation-based rate structure is to place "pocketbook incentive" on the customers who are at the high end of amount of water use. It is this latter category of customers which are the greatest burden, per customer, on the system, and which force expansion of facilities sooner than other users.

Conservation-based rate structure for the residential categories is the top priority, although equity of responsibility for conserving water in the District, across all categories of consumers, is important. The SFR category uses, as a category, the highest percentage of water and, it is estimated, have the greatest potential to save an impressive amount of water. It is estimated that the majority of the customers in the other categories can also conserve water, but it is not as easy to predict how much can be saved by the non-residential categories. Studies have shown that the majority of water customers, in all categories, respond to a strongly tiered conservation-based rate structure by using less water. Even if the rate structure simply triggers the customer to undergo a water audit and make the changes necessary to optimize water use efficiency, it is the pocketbook-based incentive that triggers the greatest and most predictable change.

An inclining-block, multi-tiered conservation-based rate structure is recommended for SFR, MFR, landscape and commercial categories.

Leak detection, fixes. This measure also has specific findings for water savings. However, as is the case with all measures, these savings are dependent on appropriate public education and other supportive measures. If 5% of the SFR category underwent water audit each year, the savings would be almost 0.5% of the annual use of all categories combined, with a 9.6:1 savings:cost ratio, and the initial investment would be paid back in less than one year. This measure's savings decreases with time, as new leaks or irrigation distribution uniformity problems arise; therefore, the projected total savings is limited to five years.

3.1 CORE PROGRAM DISCUSSION AND RECOMMENDATIONS.

1. **Multi-tiered, conservation-based rate structure for SFR, MFR, landscape and commercial categories is recommended.** The savings in water and expenditure for supplemental water will depend on the strength of the conservation-based rate structure chosen by the Board.
2. **Full-system, formal water audit of the District's production and delivery system is not recommended at this time.** Because the District's percent loss is 6.21%, at this time formal distribution system water audits may not be cost effective. However, the level of losses should continue to be regularly monitored. If water losses were to increase to 10%, a full-scale system audit may be warranted.
3. **SFR water audits and assistance, where possible, with leak fixes, is recommended, with a goal of water audits in 5%-of-SFR household increments.** SFR leaks, if located and corrected, could produce substantial water savings. When combined with other water-conservation program measures, such as using the opportunity to provide low-flow showerheads and other plumbing retrofits, even more water savings can be accomplished. The District can consider making simple repairs, such as replacing a toilet flapper-valve.
4. **An outreach program to non-residential customer accounts, with the offer of free water audits, and then non-intrusive follow-up, is recommended.** There is potential for water and money savings in the large landscape and agriculture accounts which are not now irrigating at maximum efficiency. Simple, non-intrusive follow-up, offering information and assistance, opening a line of communication with these accounts, would be beneficial to the District, and is recommended.
5. **The "Oops!" doorhanger program should be expanded.** It is believed that expansion of the "Oops!" doorhanger program would increase both the impact of the program and the compliance with fixing the problem. If staff is brought on for another reason (assisting in water audits, for example), the "Oops!" doorhanger program could become part of the staff's responsibilities.

IX. Water Conservation Program: *Non-Core Program Measures*

1. *HARDWARE RETROFITS AND REBATES FOR RESIDENCE*

- **1.1. Toilet replacement rebates/mitigation**
- **2.2. High-efficiency washing machine rebates**
- **2.3. Provision of plumbing retrofit kits**

2. HARDWARE RETROFITS AND REBATES FOR LANDSCAPE

- **2.1. Smart irrigation controller provision or rebate**
- **2.2. Rebates for conversion from turf to drought-tolerant plantings**
- **2.3. Provision of landscape irrigation efficiency items**

BENEFITS AND COSTS OF RESIDENTIAL WATER CONSERVATION

A number of benefits occur for utilities, residential customers, and nonresidential property-owners who conserve water.

BENEFITS:

- Water savings.
- Reduced wastewater flows.
- Reduced costs for water, sewer, and associated electric and gas utility services.
- Reduced costs for clothes-washing and dishwashing detergents.
- Reduced size and extended septic system life.
- Improved safe yield and pumping reliability in wells.
- Improved local environment (instream flows, wetlands protection, topsoil preservation).
- Pollution prevention (reduced energy combustion by-products and chemical use).

COSTS:

- Price of conservation device (hardware).
- Cost to install device.
- Cost of any necessary renovation of existing plumbing, appliances, or related connections.
- Changes in water-use habits.[79]

1. HARDWARE RETROFITS AND REBATES FOR RESIDENCES (BMP 1, 2)

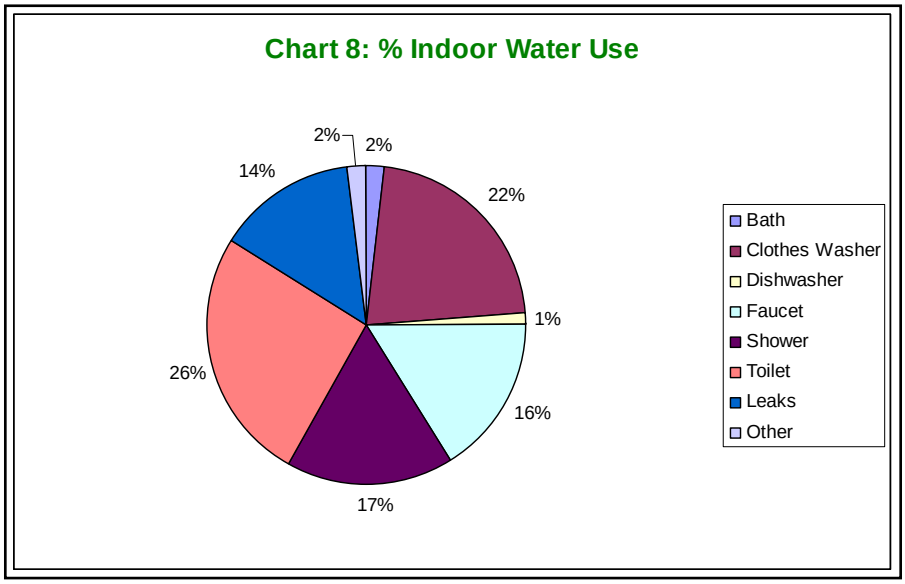
Hardware retrofits and rebates, in general, produce immediate results that persist over the life of the hardware. Unlike behavioral modification approaches (taking shorter showers, turning off water while brushing teeth, etc.) re-education and reinforcement are not necessary to continue the benefit.[80,81]

[79] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.
[80] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press, 2001.

The County of San Luis Obispo has certified a Level of Severity III (the highest level) for the water supply water for the Nipomo Mesa. The County has passed two ordinances which require plumbing retrofitting to mitigate the water use from new development. This program will be designed and administered by the County. There are no anticipated costs to the District.

1.1. Toilet rebates/replacements residential:

Studies done have repeatedly demonstrated dependable savings from replacement of high-flow toilets with low-flow toilets. Indeed, when the City of San Luis Obispo instituted a water conservation program, they found that toilet replacement was a cornerstone of their program, and has produced since its initiation in 1994 an annual water savings of 1,400 acre-feet.[82]



Toilet replacement measures are the most rewarding in water savings when the measure is first implemented in the city or district. As more toilets are replaced by the program, and as time passes and toilets are replaced by homeowners and businesses because of failure or owner decision, the market becomes "saturated" and there is less opportunity for the replacement program to be used. However, the savings from toilet conversion to low-flow devices are remarkable, and worth having in the program.[83]

Savings are estimated for targeted households at 32.2 gpd, and untargeted households 21 gpd. Costs and savings depend on the scale of the program (rebate, distribution, or direct installation).[84]

The Metropolitan Water District of Southern California's low-volume toilet program showed an average net savings per single-family residence (SFR) of 41.2 gallons/household/day (G/H/D). Mean savings were 29.9 G/H/D with one 1.6 gallons/flush (G/F) toilet, 20.6 G/H/D with two 1.6 G/F toilets, and 19.1 G/H/D with three 1.6 G/F toilets. Estimated net savings per 1.6 G/F toilet installed was 21.6 gallons/day (G/D). Multi-family residences (MFR) demonstrated an average net savings of 44.0 G/H/D. Mean savings were 44 G/H/D with one 1.6 G/F toilet and 34 G/H/D with two 1.6 G/F toilets (toilets installed in a household after the first one usually show less savings because usually the most heavily used toilet is replaced first). Estimated net savings per 1.6 G/F toilet installed was 40.3 G/D. A toilet-replacement program by the Tampa Water Department demonstrated an average savings per SFR of 38 G/H/D. In New York City, New York, average water savings of 9.3 gallons/capita/day

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[81] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* The California Urban Water Conservation Council**,** March 2005.
[82] Henderson, Gary, Munds, R. *City of San Luis Obispo 2006 Water Resources Status Report, June 2006*.
[83] Vickers, Amy. *Handbook of Water Use and Conservation.*
[84] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* The California Urban Water Conservation Council**,** March 2005.

(G/C/D) in households with 1.6 G/F toilets were demonstrated. In El Paso, Texas, their household savings from low-volume toilets was 8% reduction in monthly residential water consumption. In the City of Barrie, Ontario, Canada, the mean savings from low-volume toilets in a SFR was 16.38 G/C/D.[85]

COST-BENEFIT ANALYSIS: Refer to Table 16 for detailed accounting.

Since this is not a habit-modification measure, continual follow-up is not required, the costs of the program (rebate, shared program costs, office administration costs) are a one-time expenditure, at the beginning of the program, and the benefits continue to accrue over years.

Since the County will be administering this program, there will be no costs to the District. Should the County's program retrofit 365 toilets a year (the equivalent of one toilet in 10% of District's SFR homes), for ten years, the following could be expected:

Savings in AF over 10 years:	$88.31
Average AF/Y savings:	8.83
Total net savings in $$$ over 10 years:	$208,554.35
Average net $$$/year savings:	$ 21,765.05
Years until costs are paid off:	0
% Water savings (AF/Y)	0.24%
Savings:Cost ratio	100%

This measure could also be expanded by including the poor-performing, previously-placed ULFTs in the rebate program.

[85] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.

Table 16: PROJECTED COSTS AND SAVINGS OF LOW-VOLUME-FLOW TOILET REFIT PROGRAM WITH A 10% MARKET PENETRATION, OVER 10 YEARS (SINGLE-FAMILY RESIDENCE, 21.6 GPHD SAVINGS)

Year	SFR #Meters	(SFR) #Meters w/10% MP	Estimd. Popul. w/10% MP	SFR AFY Required w/o Measure	Saved:SFR AFY/All Customers (21.6 gphd avg)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Costs to District	Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)
2008	3647	365	1,256	214.255	8.83	$2,060.00	$18,192.30	$0.00	$0.00	$0.00	$0.00	**$18,192.30**
2009				214.255	8.83	$2,121.80	$18,738.07	$0.00	$0.00	$0.00	$0.00	**$18,738.07**
2010				214.255	8.83	$2,185.45	$19,300.21	$0.00	$0.00	$0.00	$0.00	**$19,300.21**
2011				214.255	8.83	$2,251.02	$19,879.22	$0.00	$0.00	$0.00	$0.00	**$19,879.22**
2012				214.255	8.83	$2,318.55	$20,475.60	$0.00	$0.00	$0.00	$0.00	**$20,475.60**
2013				214.255	8.83	$2,388.10	$21,089.86	$0.00	$0.00	$0.00	$0.00	**$21,089.86**
2014				214.255	8.83	$2,459.75	$21,722.56	$0.00	$0.00	$0.00	$0.00	**$21,722.56**
2015				214.255	8.83	$2,533.54	$22,374.24	$0.00	$0.00	$0.00	$0.00	**$22,374.24**
2016				214.255	8.83	$2,609.55	$23,045.46	$0.00	$0.00	$0.00	$0.00	**$23,045.46**
2017				214.255	8.83	$2,687.83	$23,736.83	$0.00	$0.00	$0.00	$0.00	**$23,736.83**
			TOTAL:	**2,142.550**	**88.31**	**$23,615.59**	**$208,554.35**	$0.00	$0.00	$0.00	$0.00	**$208,554.35**
			AVERAGE:	**214.255**	**8.83**	**$2,361.56**	**$20,855.43**					**$21,765.05**

RECOMMENDATIONS: Administration and monitoring by the County.

1.2. Provision of plumbing (non-toilet) retrofit kits.

This usually involves replacement of showerheads, installation of faucet aerators, provision of leak-detection tablets, and other water-conservation support items. In the past, when SLO City's water conservation program was initiated, showerheads were considered a "cornerstone" of the program.[86]

The results of showerhead replacement vary depending on saturation (the number of devices already in place) and retention of the showerhead. Showerhead replacement works best when the new showerhead is of good quality, when the old showerhead is removed from the premises (i.e., replacement or rebate to homeowner after installation, in exchange for the old showerhead) and when the new showerhead is actually installed[87].

Expected water savings for showerheads are from 5.2 to 5.8 G/D, for toilet dams (to decrease the amount of water in the toilet tank) 4.2 G/D, for aerators 1.5 G/D, and for leak tablets 8 G/D with a leak, 0.64 G/D overall.

Expected energy savings depend on whether the household refitted has an electric or gas water heater. In homes with an electric water heater, when a high-flow showerhead is replaced with a low-flow unit, and when a low-flow aerator is placed on a high-flow kitchen faucet, 1,568 kWh in annual savings can be expected. In homes with gas water heaters, 86 therms in savings can be expected.

Cost of retrofit kits vary, depending on quality and quantity ordered, as well as the number of items in each kit, starting as low as $2.00.[88]

RECOMMENDATIONS: Provide interested customers with an indoor-plumbing refit kit consisting of a showerhead, Teflon tape, toilet leak detector, faucet aerator, and shower timer. The price for each set would be $24.84 each (plus delivery), with an initial order of 250 sets. The total for these kits would be $6210.00.

The savings for the showerheads would be estimated at 5.8 G/D each and for the leak detection 0.65 G/D each overall (taking into account those that identified a leak and those that didn't). The savings from the Teflon tape and shower timer would be in support of the shower-savings program. The kitchen faucet aerator would be estimated to provide 1.5 G/D water savings. A total of 7.3 G/D for each kit would be estimated.

COST-BENEFIT ANALYSIS:	Refer to Table 17.
Savings in AF over 10 years:	20.443
Average AF/Y savings:	2.044
Total net savings in $$$ over 10 years:	$33,822.47
Average net $$$/year savings:	$ 2,357.97
Years until costs are paid off:	Less than 3 years.
% Water savings AF/Y:	0.06%
Savings:Cost ratio	3.3:1

[86] Henderson, Gary, Munds, R. *City of San Luis Obispo 2006 Water Resources Status Report, June 2006*.
[87] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.
[88] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* March 2005. The California Urban Water Conservation Council.

Table 17 : *PROJECTED COSTS AND SAVINGS* OF INDOOR SMALL-ITEM PLUMBING RETROFIT (EXCLUDING TOILET); 6.15% MARKET PENETRATION, OVER 10 YEARS (SINGLE-FAMILY AND MULTI-FAMILY RESIDENCE CATEGORIES) (7.3 gallons/meter/day Estimated Savings)												
Year	(SFR & MFR) #Meters	Estimd Popul. w/6.15 % MP	SFR AFY Required w/o Measure	Saved: SFR AFY	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Cost of Equip.	10% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Initial Invest.
2008	250	860	137.810	2.044	$2,060.00	$4,211.18	$6,250.00	$6,890.00	$1,314.00	$14,454.00	-$10,242.82	<3
2009	**One-time investment, with benefits reaped over years.**		137.810	2.044	$2,121.80	$4,337.52	$0.00	$0.00	$0.00	$0.00	$4,337.52	
2010			137.810	2.044	$2,185.45	$4,467.64	$0.00	$0.00	$0.00	$0.00	$4,467.64	
2011			137.810	2.044	$2,251.02	$4,601.67	$0.00	$0.00	$0.00	$0.00	$4,601.67	
2012			137.810	2.044	$2,318.55	$4,739.72	$0.00	$0.00	$0.00	$0.00	$4,739.72	
2013			137.810	2.044	$2,388.10	$4,881.91	$0.00	$0.00	$0.00	$0.00	$4,881.91	
2014			137.810	2.044	$2,459.75	$5,028.37	$0.00	$0.00	$0.00	$0.00	$5,028.37	
2015			137.810	2.044	$2,533.54	$5,179.22	$0.00	$0.00	$0.00	$0.00	$5,179.22	
2016			137.810	2.044	$2,609.55	$5,334.60	$0.00	$0.00	$0.00	$0.00	$5,334.60	
2017			137.810	2.044	$2,687.83	$5,494.64	$0.00	$0.00	$0.00	$0.00	$5,494.64	
TOTAL:			**1378.100**	**20.443**	**$23,615.59**	**$48,276.47**	**$6,250.00**	**$6,890.00**	**$1,314.00**	**$14,454.00**	**$33,822.47**	
AVERAGE:			**137.810**	**2.044**	**$2,361.56**	**$4,827.65**	**$625.00**	**$689.00**	**$131.40**	**$1,445.40**	**$2,357.97**	

The highest estimations of savings for this measure is when they are provided as part of a water audit and installed for the homeowner. Neither one of these measures is recommended as a condition of receiving the kit. However, when a water audit is performed it would certainly be efficient to offer the kit at the same time to reinforce the benefit of the water audit, and when a kit is offered it would be efficient to ask if they would like to have a water audit performed.

1.4. High-Efficiency Clothes Washer (HEW). (BMP 6)

High-efficiency washing machines are designed to save both energy and water. The San Diego County Water Authority reports that these machines 65% less water and 55% less energy per load than standard machines. The SDCWA offers $175 rebates.[89] They may or may not be front-loading. The difference in cost between low- and high-efficiency washing machines is estimated to be between $400 and $1,000. Savings are estimated at 85-109 gallons per week per machine, 14.4 to 28.7 gpd/machine SFR and 53.8 to 107.7 gpd/machine MFR.[90]

The Oak Ridge National Laboratory did a field study of high-efficiency washers for the U.S. Department of Energy, and found there was a 37.8% combined savings of water and energy use and impact on wastewater system. Rebates from the agencies involved in the study ran between $25 and $150, although it is noted that the agency offering the $25 rebate had requested more funding to raise the amount of the rebate, to make it more attractive to customers. The Consortium for Energy Efficiency (CEE) started a high-efficiency washing machine rebate program. The CCE reported an average savings of 13 gallons per load. The CEE estimated the savings potential from high-efficiency washers to be up to 59%, or about 9,000 gallons annually. A Tampa Water Department study found a 46.8% decrease in water use in washing machines. The Seattle Home Water Conservation Study found 37.7% water savings for high-efficiency washers.[91]

The Santa Cruz Water Conservation Office reports that newer front-loading machines use 20 to 25 gallons per load (a savings of at least 15 gallons per load). A typical family of four does 400 loads of wash each year. A household of four, doing seven loads of laundry a week, can save 5000 gallons or more each year. Santa Cruz offer $100 rebates.[92]

The California Urban Water Council reports that, for both residential and commercial machines, resource-efficient clothes washers use 35%-50% less water and approximately 50% less energy. They offer a $150 rebate for residential washers, and $400 for commercial washers.[93]

The Los Angeles Metropolitan Water District is offering up to $340 per high-efficiency commercial machine purchased.[94] Puget Sound Energy offers $200 for commercial HEWs.[95] The Contra Costa Water District offers up to $200 per commercial HEW to commercial customers.[96]

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[89] *High-Efficiency Clothes Washer Voucher Incentive Program*. San Diego County Water Authority. http://www.sdcwa.org/manage/conservation-hew.phtml.

[90] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* March 2005. The California Urban Water Conservation Council**.**

[91] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* March 2005. The California Urban Water Conservation Council**.**.

[92] *High-Efficiency Clothes Washer Rebate Program.* Santa Cruz City Water Conservation Office. http://www.ci.santa-cruz.ca.us/wt/wtcon/clotheswasher.html

[93] *Product News: Welcome to the Smart Rebates Program!* Council on Urban Water Council. http://www.cuwcc.org/smartrebates/smartrebates_fixtures.lasso#Residential.

[94] *Save Water, Save a Buck: High-Efficiency Clothes Washers*. L.A. Metropolitan Water District. http://www.mwdsaveabuck.com/laundry.htm

[95] *Energy Efficiency Rebate Programs*. Puget Sound Energy. http://www.pse.com/solutions/rebateComWasher.aspx.

[96] *Water Conservation: Rebates*. Contra Costa Water District. http://www.ccwater.com/conserve/rebates.asp

COST-BENEFIT ANALYSIS, RESIDENTIAL: (Table 19)

Savings in AF over 20 years:	127.70
Average AF/Y savings:	6.721
Total net savings in $$$ over 20 years:	$331,730.25
Average net $$$/year savings:	$ 16,586.51
Years until costs are paid off:	Approx.2.5
% Water savings, all meters:	3.45%
Savings:Cost ratio:	9.2:1

RECOMMENDATIONS: It is recommended that the District undertake this measure for the SFR category, with a 10% MP of the SFR of customers. The rewards per investment are encouraging and, if follow-up analysis of the program warrants it, it would be recommended that the program be expanded in future years until saturation becomes evident.

The commercial laundromat in town has recently upgraded its washers to HEW models. Therefore, no incentive program for the commercial sector is needed at this time.

COSTS: $36,500.

Table 19: *PROJECTED COSTS* AND SAVINGS OF HIGH-EFFIENCY CLOTHES WASHER PROGRAM WITH A 10% MARKET PENETRATION, SINGLE-FAMILY RESIDENCE CATEGORY, OVER 20 YEARS (SAVINGS: 6000 GALLONS/HOUSEHOLD/YEAR)

Year	#SFR Meter	(SFR) Meters w/ 10% MP	Estimd. Popul. w/10% MP	SFR AFY Required w/o Measure	Saved: SFR AFY/All Meters (6000 Gal/ Meter/Yr)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Rebate ($100 ea)	5% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008	3647	365	1,256	214.255	6.72	$2,060.00	$13,844.98	$36,500.00	$3,445	$344.50	$40,289.50	**-$26,444.52**	**~2.5**
2009				221.154	6.72	$2,121.80	$14,260.33	$0.00	$0.00	$0.00	$0.00	**$14,260.33**	
2010				228.275	6.72	$2,185.45	$14,688.14	$0.00	$0.00	$0.00	$0.00	**$14,688.14**	
2011				235.626	6.72	$2,251.02	$15,128.78	$0.00	$0.00	$0.00	$0.00	**$15,128.78**	
2012				243.213	6.72	$2,318.55	$15,582.64	$0.00	$0.00	$0.00	$0.00	**$15,582.64**	
2013				251.044	6.72	$2,388.10	$16,050.12	$0.00	$0.00	$0.00	$0.00	**$16,050.12**	
2014				259.128	6.72	$2,459.75	$16,531.63	$0.00	$0.00	$0.00	$0.00	**$16,531.63**	
2015				267.472	6.72	$2,533.54	$17,027.58	$0.00	$0.00	$0.00	$0.00	**$17,027.58**	
2016				276.084	6.72	$2,609.55	$17,538.40	$0.00	$0.00	$0.00	$0.00	**$17,538.40**	
2017				284.974	6.72	$2,687.83	$18,064.56	$0.00	$0.00	$0.00	$0.00	**$18,064.56**	
2018				294.150	6.72	$2,768.47	$18,606.49	$0.00	$0.00	$0.00	$0.00	**$18,606.49**	
2019				303.622	6.72	$2,851.52	$19,164.69	$0.00	$0.00	$0.00	$0.00	**$19,164.69**	
2020				313.399	6.72	$2,937.07	$19,739.63	$0.00	$0.00	$0.00	$0.00	**$19,739.63**	
2021				323.490	6.72	$3,025.18	$20,331.82	$0.00	$0.00	$0.00	$0.00	**$20,331.82**	
2022				333.907	6.72	$3,115.93	$20,941.77	$0.00	$0.00	$0.00	$0.00	**$20,941.77**	
2023				344.658	6.72	$3,209.41	$21,570.02	$0.00	$0.00	$0.00	$0.00	**$21,570.02**	
2024				355.756	6.72	$3,305.70	$22,217.13	$0.00	$0.00	$0.00	$0.00	**$22,217.13**	
2025				367.212	6.72	$3,404.87	$22,883.64	$0.00	$0.00	$0.00	$0.00	**$22,883.64**	
2026				379.036	6.72	$3,507.01	$23,570.15	$0.00	$0.00	$0.00	$0.00	**$23,570.15**	
2027				391.241	6.72	$3,612.22	$24,277.25	$0.00	$0.00	$0.00	$0.00	**$24,277.25**	
			TOTAL:	**5,887.696**	**127.70**	**n/a**	**$372,019.75**	**$36,500.00**	**$3,445.00**	**$344.50**	**$40,289.50**	**$331,730.25**	
			AVERAGE:	**294.385**	**6.721**	**n/a**	**$18,600.99**	**$1,825.00**	**$172.25**	**$17.23**	**$2,014.48**	**$16,586.51**	

RECOMMENDATIONS: Initiation of the high-efficiency clothes washer rebate program.

GENERAL BENEFITS AND COSTS OF LANDSCAPE WATER CONSERVATION

BENEFITS:

- Reduced peak water demand.
- Reduced groundwater consumption-greater-than-discharge and contamination.
- Reduced water costs.
- Improved long-term water utility revenue stability and less frequent rate adjustments.
- Smaller water-supply and wastewater facilities.
- Reduced runoff, soil erosion, and costs for stormwater management.
- Creation of distinctive, attractive properties.
- Reduced use of chemicals (fertilizers, pesticides, and herbicides).
- Reduced energy costs for landscape maintenance (electric and gasoline mowers, blowers and edgers).
- Reduced air pollution and noise from gasoline-powered mowers and landscape equipment.
- Extended life for lawn-mowing equipment and irrigation systems.
- Reduced labor costs for mowing and landscape maintenance.
- Increased native plant diversity.
- Preservation of wildlife habitat and instream flows.
- Reduced plant disease, rot, and mortality caused by overwatering.
- Reduced need for construction and operation of alternative supply systems.

COSTS:

- Resistance to changing outdoor water-use habits, despite long-term benefits.
- Increased time and care for maintenance during the transition from a conventional to a water-efficient landscape.
- Difficulty in accepting the look of low-water-use and native plants compared with water-intensive turf and exotic imported plants.
- Potential reductions in business among conventional green industry product and service providers who do not offer water-wise and natural landscaping services.
- Potential short-term water utility revenue instability and more frequent rate adjustments during the years when outdoor demand drops as a result of conservation.[97]

2. HARDWARE RETROFITS AND REBATES FOR LANDSCAPE

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2. HARDWARE RETROFITS AND REBATES FOR THE LANDSCAPE. (Possibly BMP 5) The difference between the amount of water used in the peak (summer) and trough (winter) billing periods is considered "seasonal water use." This is also typically considered to be the amount of water used on the customer's landscape. The water used in the winter/trough months is considered to be indoor water use (irrigation usually does not take place, or is greatly

[97] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.

decreased, during cold, rainy months). The water used during the peak (warmer summer) months is considered to have a portion attributable to landscape irrigation. There is more potential for water savings in the outdoor/landscape portion of a customer's water use than there is in the indoor portion of their use. [98]

There is an increase in summer water use for all District customer categories. The average District customer's seasonal water use is 69.15% of their entire annual water use. The two categories that are candidates for water conservation in the landscape are the SFR and Landscape categories. The SFR category has an average of 62.18% seasonal water use, and the Landscape category has an average of 48.26% seasonal water use. (Table 5).

If the District's customers were able to save 15% of their seasonal water use alone the savings would be significant (Tables 8, 9). Based on the year 2006, one year's savings for SFR would be 187.508 AF ($375,06.84), Landscape 21.599 AF ($24,326.49), and for all categories 245,427 AF ($490,853.25) (Table 8,9).

Projected out 20 years, with the year 2006 as the baseline, 3.22% annual growth in number of meters (average for the years 2001-2006), and 3% increase in water price (with the marginal water price baseline of $2000), the total savings would be 7176.141 AF ($83,885,673.82).

2.1. Irrigation "Smart" Irrigation Controller Provision or Rebate.

(Related to BMP 1, 2)

Poor irrigation scheduling (watering too often and for too long) is the primary source of water waste associated with landscape irrigation[99].

According to the California Department of Water Resources, most water audits of residential landscapes find a distribution uniformity of 50% or less (recommended uniformity is >70%).[100]

"Smart" Irrigation Controllers are designed to make adjustments to the system programming to match the demands of the climate. After the initial setup and programming, the controllers get their programming-adjustment cues from a variety of sources: CIMIS weather stations, satellites, or other data-broadcasting systems. The better ones are quite sophisticated in variations of the programming. The majority of the programming is set up upon installation (or changed during the recommended maintenance checks), and the broadcast climate information adjusts the frequency and amount of water applied.

There are large water savings that can be achieved by the proper installation and programming of a "smart" controller, either as an initial irrigation controller installation or a replacement of an existing "non-smart" controller. All irrigation systems will fail to produce maximum savings if the "set it and forget it" approach is taken. To be dependably efficient in using water, irrigation systems must be regularly checked (at least once a year) for distribution uniformity, and must receive programming changes to meet the landscape's needs as climatary changes occur and as the needs of the plants change. For old-style, non-satellite-programmed systems, it is up to the homeowner or landscaper to make these frequent changes. For "Smart" controllers, the programming changes are delivered automatically by satellite or other data feed.

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[98] A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices*, March 2005. The California Urban Water Conservation Council.

[99] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.

[100] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.

The vast majority of lawns are overwatered. Overwatering can cause an increase in disease and pests, and damp blades of grass can provide a habitat for mosquito larvae. Overwatering can also result in increased water bills, degradation of asphalt in streets and parking lots, and damage to fences and other hardscapes.

The increase in the presence of diseases and pests can lead to applications of pesticides and herbicides, and any portion of landscape irrigation that flows down the sidewalk, into the gutters, and into storm drains will carry the chemicals applied to the landscape.

The amount of lawn chemicals applied to residential properties is significant: homeowners apply nearly 10 times more pesticide per acre of turf than farmers use on crops.[101] Turf grass planted on residential, commercial and government properties covers an estimated 30 million to 50 million acres in the United States, an area larger than Pennsylvania and greater than the acreage used to grow any single U.S. agricultural crop. An estimated 600 million gallons of gasoline are used annually for lawn mowing equipment in the U.S.[102]

The issue of overwatering is not just pertinent to excessive water use and higher costs to both the water supplier and the customer, but is an important factor in stormwater management. The County of San Luis Obispo is about to adopt a new ordinance by which it will be illegal to cause anything but clean rainwater to enter a storm drain. An overwatered lawn and landscape has a higher potential of causing water to leave the intended landscape and flow down the gutter to the nearest storm drain. With this landscape water is carried the residuals of fertilizers, pesticides, herbicides and other chemicals applied to the lawn and landscape.[103]

Contrary to what many homeowners believe, watering a lawn “deeply” does nothing for the lawn. Most turf grasses have fibrous roots about 4” in depth, so any irrigation beyond a 4” depth does nothing for the lawn. It increases the water bill, however. For lawns that are watered by hose and sprinkler, to optimally water a lawn the irrigator would have to water the lawn two or three times a week, moving the sprinkler every 5 to 15 minutes, to achieve very basic uniformity and saturation. Optimal, efficient irrigation of lawn needs to be done far more frequently and in lower volumes than is required by trees, shrubs, and drought-tolerant plant material.

To reach the level of accuracy of a “smart” controller, the irrigator would have to first, before each irrigation, access CIMIS or other climate-data resource, download the latest data, and then do calculations to determine how much water the turf (or other plant material) had lost since the last irrigation, then, using the rate of water application from the garden hose and sprinkler and the crop coefficient for each type of plants to be watered, ascertain how long the sprinkler had to run on each section before moving it.

If the lawn or other plant material is growing in soil with a high amount of clay (especially if any landscape slope is involved), for optimum, efficient irrigation, each application should be split into smaller increments to allow adequate time for the water applied to soak into the soil.

For the older-model automatic irrigation systems, where seasonal changes in irrigation timing and frequency must be set by hand, and where the “set it and forget it” approach is often used,

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[101] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press, 2001.
[102] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press, 2001.
[103] *An Ordinance Amending Title 8 of the San Luis Obispo County Code to add Chapter 8.68 regarding Stormwater Pollution Prevention and Discharge Control.* IDDE Ordinance Public Hearing Draft, 08/21/2007.

turf is often overwatered. Few homeowners or landscapers perform periodic water audits for uniformity of the coverage of the irrigation system, nor do they, as recommended, check and change programming, if warranted, on a monthly basis. They discover there is a problem with uniformity usually when an area of the turf turns brown. Many homeowners or landscapers would not, at this point, do a water audit to assess for uniformity and amount being delivered to the turf. Instead, they would turn up the irrigation system amount for that station (or, worse yet, for ALL stations). If the brown spot in the turf didn't turn green, they might even try turning up the system some more. If the brown spot was due to insufficient irrigation, eventually the system would be turned up for all sprinklers in that station enough that the station with the brown spot would turn green. Once again, the entire lawn would be green, but all of the turf except for the previous brown spot would be overwatered.

The economic and environmental costs associated with a heavily irrigated, manicured green lawn are especially high. The U.S. Environmental Protection Agency has estimated that about 70 million pounds of lawn chemicals are applied in the U.S. annually, and this amount increases by 5% to 8% every year.[104]

There have been many studies of water savings with "smart" controllers. The savings can be very high, and this incentive stimulates cities, universities, government agencies, and "smart" irrigator companies to do lots of studies.

Over the years, these studies have demonstrated that, while there are very gratifying savings to be obtained from Smart irrigation systems, a program which is not well constructed—even if the controllers are handed out for free—will not get very impressive results.

The City of SLO believes that advancements in irrigation technology appear to a major source of water savings.[105]

Simple measures such as installing a rain sensor, which shuts off the irrigation system when it rains, can, for irrigation systems that continue to irrigate even when it is raining, save 16% of water used for landscape irrigation, and cost around $25.[106] More sophisticated weather-sensing systems save considerably more, have more potential to save water, but also require maintenance to obtain and retain savings[107,108,109]

Smart controllers, or ET (evapotranspiration) controllers, adjust irrigation systems' scheduling and run times by real-time measures of evapotranspiration and/or temperature, rainfall, soil

[104] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press. 2001.
[105] Henderson, Gary, Munds, R. *City of San Luis Obispo 2006 Water Resources Status Report, June 2006*.
[106] *Rain Sensor Devices.* WAV, Providing and Preserving Water. (www.wavh20.com)
[107] Irrigation controllers: timers for the homeowner. July 2003. US Environmental Protection Agency et al. http://www.epa.gov/owm/water-efficiency/index.htm.
[108] Hunt, T.; Lessick, D. et al. *Residential weather-based irrigation scheduling evidence from the Irvine "ET Controller" study. Irvine Ranch Water District*. June 2001. (http://www.irwd.com/welcome/FinalETRpt.pdf)
[109] Bamezai*. A. Los Angeles Dept. of Water and Power weather-based irrigation controller pilot study.* August 2004. LADWP. (http://www.cuwcc.org/uploads/product/LADWP-IrrigationController-Pilot-Study.pdf).

moisture, and sunlight intensity. These systems access information by a satellite pager and/or telephone lines.[110]

According to the Municipal Water District of Orange County, switching to a "smart" irrigation controller can save 20% to 25% of water use and customer water bills, and reduces urban runoff of up to 50%. The Metropolitan Water District of Orange County offers rebates of $60 per active valve (maximum rebate of $540), not to exceed the cost of the "smart" controller.[111]

The City of Newport Beach, to address both water conservation and storm runoff problems, has initiated a program in which free water audits and installation of WeatherTrak Smart controllers, as well as the monthly $4 data-broadcast charge, are provided to residents primarily in the south-coast area of the city. The installation and water audits are funded by the City and performed by a trained landscaper.[112] The homeowner is responsible for correcting any problems identified in the water audit before the WeatherTrak is installed.

The Irvine Ranch Water District and the Metropolitan Water District of Orange County did a seven-year study of "smart" (ET) controllers and the impact on the change in metered water consumption and reduction in measured urban runoff. The four foci of the study were to investigate ET controllers used both in residential landscapes and large landscape areas; to evaluate the effectiveness of an educational program targeting residential homeowners; to study the relationship between proper irrigation of landscapes and dry-season runoff; and to assess the acceptance level of controller-technology-based water management. They found that for accounts using ET controllers water use was decreased an average of 41 gallons per day per SFR (approximately 10% of total household water use). The majority of the savings were found in the summer and fall periods. Fifteen large landscape sites with dedicated irrigation meters (0.14 to 1.92 acres) showed an average water reduction of 545 G/D. Regarding runoff, comparing the control group to the group having undergone controller retrofit, there was a 71% reduction in dry-season runoff. Regarding acceptance of the ET controllers, 72% of the participants reported they liked the controllers, and 70% ranked their landscape as looking good to excellent.[113]

The IRWD conducted the "ET Controller Study" which tested a controller system that automatically adjusted according to the weather, using a broadcast signal. In addition to the group that received the ET controllers, there was a control group and a group that received postcards with ET information but no automatic controller adjustments. The group with the automated ET controllers saved an average of 37 gallons per household per day.[114]

Aqua Conserve in a study published in 2002 reported that ET controllers adjusted with historical data and temperature sensors conserved water for high-volume residential customers in California and Colorado. The study was based on post-intervention consumption related to five years' historical consumption, and the study included a control group. In Denver, total outdoor

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110 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. March 2005. The California Urban Water Conservation Council.
111 Municipal Water District of Orange County, *Smart Timer Rebate Program*. www.mwdoc.com.
112 Brennan, Pat. *Newport Rolls out Robot Sprinklers*. The Orange County Register, 12/05/2006.
113 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, March 2005. The California Urban Water Conservation Council.
114 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, March 2005. The California Urban Water Conservation Council.

water saved was 21%, with an average savings per participant of 21.47%. In Sonoma, California the total savings were 23%, and an average savings per participant of 7.37 %. Valley of the Moon Water District showed a total savings of 28% and an average savings per participant of 25.1%.[115]

A study in 2003 by Aquacraft of WeatherTRAK controller installations in Colorado indicated that the 10 sites in their study (combination of volunteer and high-volume sites, all residential except for one commercial) averaged savings of 26,000 gallons per year per site. The five largest-saving sites' savings were 68,000 gallons per site. For the group, the controller water-application was 94% of ETo (28 inches of water).[116]

Bamezai in 1996 reported in a study for the Los Angeles Department of Water and Power an average savings of 34% (with controls for climate and landscape size) for multiple sites connected to a central ET controller that controlled irrigation based on ET for each meter. Interestingly, most of the savings were achieved for diverse plant materials on sloped landscape areas.

Limitations include proper maintenance and operation which is necessary to receive the full benefits from ET controllers. In some cases outdoor water consumption was estimated because the sites did not have separate landscape meters. High-use customers and volunteers were more frequently targeted. This group tended to achieve large absolute savings figures (but not necessarily larger percentage of savings), and they tend to be more receptive to conservation than the average customer. The cost of equipment may be related to the number of purchases and installations. The extent of the tailoring of the program design for each site is important, as are the different levels of outreach and support over time. Another factor is the accuracy of the local CIMIS station in reflecting the microclimate of the irrigation site. The Nipomo Mesa has a CIMIS station located in the Woodlands.

Program costs can (if purveyor shares the costs) include for the purchase, installation, operation and maintenance. In addition, costs can include administration, contractors and marketing costs.

According to the IRWD study of 2001, ET controllers cost approximately $100 per unit to buy, and $75 to install. There is a monthly signal fee of $5. The expected life is 10 to 15 years.

The 2003 Aquacraft study of WeatherTRAK Smart controller installations indicated that it took between 2.25 and 4 hours per site to install the ET controllers, and some sites included moisture sensors.

Another study reported regarding controllers with soil moisture sensors total costs "for repairs and replacements" were $270. Average annual repairs and replacement was approximately $12 per controller.[117]

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115 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. March 2005. The California Urban Water Conservation Council.

116 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. March 2005. The California Urban Water Conservation Council.

117 A&N Technical Services, Inc. BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. March 2005. The California Urban Water Conservation Council.

Table 20: ANALYSIS OF SMART CONTROLLERS FOR IRRIGATION ADEQUACY AND EXCESS (Center for Irrigation Technology)[118]						
	Irrigation Adequacy			Irrigation Excess		
Controller	**Min. of 6 Test Zones**	**Max. of 6 Test Zones**	**Mean/Average Of 6 Test Zones**	**Min. of 6 Test Zones**	**Max. of 6 Test Zones**	**Mean/Average of 6 Test Zones**
AlexTronic Enercon Plus	100%	100%	100%	0%	3.6%	1%
Alex-Tronix Smart Clock	100%	100%	100%	0%	1.1%	0.2%
Calsense ET2000e-24-GR-RB with RB-1 Tipping Rain Bucket	100%	100%	100%	0%	0%	0%
ETwater Smart Controller	100%	100%	100%	0%	6.3%	1.5%
Hunter ET System with Pro-C 300 Controller	100%	100%	100%	0%	2.3%	0.5%
Irritol Smart Dial*	100%	100%	100%	0%	0%	0%
Rain Bird ET Manager with ESP-TM Controller	100%	100%	100%	0%	0%	0%
Toro IntelliSense*	100%	100%	100%	0%	0%	0%
Weathermatic SL1600	100%	100%	100%	0%	2.3%	0.4%
WeatherTrak	100%	100%	100%	0%	0%	0%

*Uses WeatherTrak ET Everywhere ET/rainfall data and WeatherTrak Scheduling Engine to provide custome schedule.
WeatherTRAK ET Everywhere delivers daily ET updates via a wireless network for self-adjusting irrigation scheduling based on changing weather; collects data from more than 14,000 weather stations across the U.S. including the NOAA network, state and local networks, and private weather stations.
Applies scientific modeling techniques to validate local weather to 1 km^2.
WeatherTRAK Scheduling Engine calculates irrigation schedules based on zone-specific, Irrigation Association recommended parameters including plant, soil, slope and sprinkler type; supports user-defined water windows, water days, and manual watering; built-in and customizable plant settings; automated cycle and soak times according to soil and slope settings.

[118] *Smart Controller Efficiency Testing.* Irrigation Assocation. http://www.irrigation.org/SWAT/Industry/ia-tested.asp.

Table 21: ANALYSIS OF SMART CONTROLLERS FOR STANDARD FEATURES (Center for Irrigation Technology)						
Controller	**Installation**	**Data Source**	**Data Link**	**Initial Purchase**	**Add'l Hardware**	**Additional Fees**
Alex-Tronix Enercon Plus	Replaces existing controller or is installed on a new system.	Tested with on-site temp. sensor w/optional rain sensor.	Hardwired	Purchase price includes temp. sensor mounted within pedestal.	*Rain mount. *Rain and temp sensors pole-mount. *Latching solenoid. *Lightning protection.	None.
Alex-Tronix Smart Clock	Replaces existing controller or is installed on a new system.	Tested with on-site temp. sensor w/optional rain sensor.	Hardwired	Purchase price includes temp. sensor.	*Rain switch pole mount. *Rain and temp. sensors pole mount. *Latching solenoid. *Stainless stell pedestal mount.	None.
Calsense ET2000e-24-GR-RB with RB-1 Tipping Rain Bucket	Replaces existing controller or is installed on a new system.	SWAT tested w/wireless internet link to CIMIS weather station #80.	Wireless network (optional hardwire, phone, radio, Ethernet, WiFi)	Purchase price based on # of zones and other options.	*Optional RB-1 tipping rain bucket. *Optional on-site ET gauge. *Optional wind gauge.	Additional charges dependent upon selected communication option.
ETwater Smart Controller	Replaces existing controller or is installed on a new system.	Local weather station through ETwater server.	*Model 100: Residential-Internet via landline phone (add'l charge for wireless cell phone option) *Model 200: Commercial-Interent via landline or wireless cell phone	*Purchase price is based on # zones initially activated. *Additional zones may be activated at a later time at an additional cost.	Residential: One-time optional hardwere purchase allows phone connection through household electrical wiring rather than direct-wired phone.	*First year of internet-based scheduling is free. *3-year subscription or discounted lifetime service purchase options are available thereafter.

Hunter ET System with Pro-C 300 Controller	Retrofit to Hunter SmartPort enabled controllers.	ET system onsiet sensor suite.	Direct low-voltage wiring into Hunter SmartPort	ET System must be purchased separately from compatible Hunter controller model: SRC, Pro-C, ICC.	ET WIND is an optional anemometer for measuring wind speed.	None.
Irritol Smart Dial*	May replace existing controller or be installed on a new system.	Contractor or end-suer calls to activate WeatherTRAK ET Everywhere.	Wireless network	Purchase price is based on #of zones. Wireless receiver is integral.	Optional wired or wireless rain sensor and wireless rain/freeze sensor.	Annual subscription signal fee. Multi-year package prices available.
Rain Bird ET Manager with ESP-TM Controller	Retrofits with an existing controller or installs on a new system.	Weather Reach Signal Provider accesses a weather station and sends local weather information hourly to the ET Manager.	Wireless paging.	ET Manager wireless receiver is integral.	*Optional tipping bucket rain guage. *Optional external antenna. *Outdoor enclosures.	Varies depending on Weatehr Reach Signal Provider.
Toro IntelliSense*	May replace existing controller or be installed on a new system.	Contractor or end-user calls to activate WeatherTRAK ET Everywhere	Wireless network	Purchase price is based on # of zones. Wireles receiver is integral.	Optional wired or wireless rain sensor and wireless rain/freeze sensor.	Annual subscription signal fee; multi-year package prices available.
Weathermatic SL1600	Replaces existing controller or is installed on a new system	Weathermatic on-site weather monitor.	Direct low-voltage wire or wireless.	Purchase price is based on #of zones. Weather monitor is an add'l cost.	None required	None.
WeatherTrak	May replace existing controller or be installed on a new system.	Contractor or end-user calls to activate WeatherTRAK ET Everywhere.	Wireless network	Purchase price is based on # of zones. Wierless receiver is integral.	Optional wireless rain or rain/wind/ freeze/flow sensor.	Annual subscription signal fee. Multi-year package prices available.

Table 22: ANALYSIS OF SMART CONTROLLERS FOR ADDITIONAL FEATURES (Center for Irrigation Technology)					
Controller	**Zones**	**Time of Day**	**Day of Week**	**Other**	**If Data Link is Discontinued**
AlexTronic Enercon Plus	Available in a base model of 4 zones; can control up to 24 by installing add'l station modules in groups of 4.	Capable of restricting the time of day for watering.	Capable of restricting watering days by selection or interval.	*Multiple start times. *Programmable rain delay. *5-yr battery life with low battery indication.	May be used as a standard irrigation controller including %adjust and 4 independent programs w/multiple start times.
Alex-Tronix Smart Clock	Available with 6 zones.	Capable of restricting the time of day for watering.	Capable of restricting watering days by selection or interval.	*Multiple start times. *Programmable rain delay. *5-yr battery life with low battery indication.	Smart Clock may be used as a standard irrigation controller including %adjust and 4 independent programs w/multiple start times.
Calsense ET2000e-24-GR-RB with RB-1 Tipping Rain Bucket	Available in 6, 8, 12, 16, 24, 32, 40, 48 zone models	Capable of restricting the time of day for watering.	Capable of restricting watering days by selection or interval.	*Flow monitoring and mngmt. *Optional integrated radio remote. *Cycle and soak. *Shared weather data using personal computer and *Command CENTER software.	Calsense controllers feature a historical ET database that is used in the event communication is interrupted. It may also be used as a standard irrigation controller, including cycle and soak features.
ETwater Smart Controller	Model 100: Residential, 3-12 zones. Model 200: Commercial, 12-48 zones. Both models are activated via the internet.	Capable of restricting the time of day for watering.	Capable of restricting watering days by selection or interval.	*Sets initial watering schedule based on user's landscape profile. *Remote monitoring and mngmt. Via 2-way internet interface. *Unlimited number of programs. *Unlimited cycle and soak start times. *Water budget only when connected to internet-based scheduling. *Max. water time unlimited. *Rain sensor capable.	If the ETwater Smart Controller Internet-based scheduling is discontinued it may be used as a standard irrigation controller with cycle and soak capability.

Hunter ET System with Pro-C 300 Controller	Original Hunter controller may have up to 48 zones, depending on the model.	Separately programmale start times for ET controlled zones. Note: ET System WiltGard will override time of day restrictions.	ET System has day of week, even/odd date, and interval day scheduling (up to 31 days). Note: ET System WiltGard will override day of week restriction.	*WiltGard technology enables it to trigger protective watering when extreme conditions threaten plants. *ET information combines w/each zone's particular plant, soil, sun and sprinkler data. *Easiy upgrades most Hunter controllers to weather-based control with no high-voltage AC wiring required. *Non-volatile memory.	If wiring to on-site ET system sensor is removed, system displays fault message and operates on lawst full 24-hr ET average. Traditional controller schedules may be selected manually if sensor service is required.
Irritol Smart Dial*	SmartDial: 6,9,12 stations. Indoor and Outdoor Mount options.	Capable of restricing the time of day for watering.	Capable of restricting watering days by selection or interval.	*Includes copy button to simplify programming. *Remote internet-based irrigation mngmt. Via 2-way wireless. *Standard program mode for plant establishment. *Alert functionality. *Unlimited cycle and soak, and # of programs.	If the ET Everythwere scheduling is discontinued it may be used as a standard irrigation controller w/water budget and cycle and soak capability.
Rain Bird ET Manager with ESP-TM Controller	Available # of zones contingent upon type of interconnected controller.	Capable of restricting watering time to a user-defined water window, independent of connected controller.	Capable of restricting watering days by odd, even or custom, independent of connected controller.	*ET Manager Scheduler software included. *ET Manager resource CD included. *Compatible w/virtually any standard sprinkler controller. *Built-in historical weather database. *Programmable delay for excessive weather conditions (wind, rain, freezing). *Based on IA recommended ASCE formula for determining ET using all required weather parameters.	The ET Manager features an historical weather database that is used in the event the Weather Reach Signal is interrupted.
Toro IntelliSense*	TIS-612: 6,9,12 stations; inddor and outdoor mount options. TIS-24: 24 stations.	Capable of restricing the time of day for watering.	Capable of restricting watering days by selection or interval.	***I**ncludes copy button to simplify programming. *****Remote internet-based irrigation mngmt. Via 2-way wireless. *Standard program mode for plant establishment. *Alert functionality. *Unlimited cycle and soak, and # of programs.	If the ET Everywhere scheduling is discontinued it may be used as a standard irrigation controller w/water budget and cycle and soak capability.

Weathermatic SL1600	Available in 4-8, 4-24, 12-48 zone models.	Capable of restricing the time of day for watering.	Capable of restricting watering days by selection or interval.	*Built-in valve locator feature. *calculates irrigation schedules based on zone-specific, Irrigation Assoc. recommended parameters including plant, soil, slope and sprinkler types. *On-board multi-meter.	If weather monitor is discontinued it may be used as a standard irrigation controller with water budget and cycle and soak capability.
WeatherTrak	WeatherTrak: 9-48 stations; indoor and outdoor mont options.	Capable of restricing the time of day for watering.	Capable of restricting watering days by selection or interval.	***I**ncludes copy button to simplify programming. ***R**emote internet-based irrigation mngmt. Via 2-way wireless. *Standard program mode for plant establishment. *Alert functionality. *Unlimited cycle and soak, and # of programs.	If the ET Everywhere scheduling is discontinued, it may be used as a standard irrigation controller w/cycle and soak capability.

RECOMMENDATION: Recommendation is not made for a "RainClick" or other rain-sensing add-on attachment to existing irrigation systems. In California, the majority of our rainfall is during just a few months, during the cooler months of the year. It is easy for homeowners or landscapers to simply turn off the irrigation system during those months. The savings, therefore, would be only those homeowners/landscapers who did not turn off their systems during the rainy, cooler months of the year. In addition, a "RainClick" addition to a system, without first conducting a water audit to assess for distribution uniformity, would be much less likely to return the anticipated savings.

If this measure is selected for inclusion in the program, far greater savings are capable with the installation of a Smart controller. While all of the ones evaluated have potential for savings, it is believed that the WeatherTRAK would be the best choice for the District. It is easy to program, has advanced features such as "cycle and soak" (splitting the irrigation duration into increments, with off periods in between, to allow for clay soils to absorb the water), ensuring efficient irrigation and no run-off, and "slope" which allows programming for degree of slope and location of valve on the slope.

Another advantage to the WeatherTRAK system is the fact that locally the Shea Trilogy homes have these systems in place, and have already had informational presentations regarding the "smart" controllers. It would be anticipated that with a greater local presence there would be more trained landscapers and more company support available.

The WeatherTRAK systems have three components: a network of weather stations that can be downloaded remotely, a central data processing and communications hub, and the WeatherTRAK ET controllers at each landscape site. Information sent to the controller is via a pager-like technology. Information can be sent as one message to a group of landscape sites (i.e., for a group of sites all sharing the same ET information), and to individual sites (by serial numbers). The WeatherTRAK controllers have crop coefficients built in which modifies the climate data sent from the communications center.

The WeatherTRAK helpline has information available in both English and Spanish, and some adjustments can be made remotely.

In a study done in Colorado, the typical time to install the WeatherTRAK controller on site was 1.25 hours, and an hour to analyze the site for square footage and plant type. A water audit would typically take another 1.25 hours. In total, it would typically take 3.5 hours to perform the water audit, analyze the square footage and plant type, and install the controller. The amount of time for addressing the problems in uniformity and leakage identified on water audit would vary depending on the number and extent of the problems.

The City of Newport Beach, in their WeatherTRAK program, is paying for the WeatherTRAK controller, the water audit and the installation, as well as a portion of the monthly signal-broadcast charge.

For a "smart" controller to be maximally efficient, the water audit and installation/initial programming must be correctly performed, and the landscape brought up to uniformity efficiency before the controller is installed. Typically, programs that simply offer a rebate or even give away the controllers do not have a high rate of return in water savings. The best results appear to be obtained when water audit, installation and initial programming is done by a trained professional.

The following "smart" controller program is recommended:

1. A small, initial pilot program of only 10 single-family residences selected to fine-tune the program and assess for efficacy of the program.

2. Purchase of WeatherTRAK controllers for the 10 pilot sites: approximately $400 each (for <100 purchased at a time).
3. Pay for a trained landscaper to perform a water audit, identify irrigation problems in the current system, to certify (once homeowner, at homeowner's cost, has corrected problems identified in the water audit) that problems have been corrected, and pay for installation of the WeatherTRAK controller and initial site programming: approximately $275, based on Newport Beach's experience.
4. Pay for first year of ET broadcast subscription: approximately $48 to $60.

Depending on the savings demonstrated, the District could elect, year to year, to continue paying the nominal ET broadcast subscription fee. Since subscription to the programming broadcast system is integral to receiving maximum benefits from the program, the District could view paying the subscription fee as an investment in getting the best return for the program's initial investment.

To qualify for the WeatherTRAK controller program, recipients would be required to:
1. Be a District SFR customer (one rebate-program participant per customer).
2. Have 1000 ft^2 or greater of turf.
3. Have a below-ground, automatic irrigation system currently in place.
4. Undergo a water audit, correct all identified problems, and bring existing system up to 70% or greater distribution uniformity.
5. Attend all four District landscape workshops.
6. Commit to subscription to ET information broadcast service by which the controller is adjusted for climatary changes.
7. Sign appropriate agreement outlining expectations and benefits of program.

It is believed that the District's payment for the water audit, installation, and monthly charge for ET broadcast subscription will accomplish the following:
- Communicate to the customer program recipients, and non-recipients, the worth and desirability of using the latest technology to save water in landscape irrigation.
- Ensure more participants in the program. Recipients would have to make a significant commitment and investment to qualify for the program, and to bring their current irrigation system up to par (uniformity and absence of leaks). Having part of the costs underwritten by the District would provide the financial incentive to encourage customers to make this commitment and expenditure.
- Accomplish water audits and correction of problems in residential landscapes which may not have otherwise been accomplished.
- Communicate to customers the District's on-going commitment to both water conservation and making the conservation easier to accomplish by customers.
- Serve as a positive public-relations outreach opportunities.

Table 23: *PROJECTED COSTS AND SAVINGS* IN SEASONAL WATER USE OF ET-CONTROLLER PILOT PROGRAM, .27% MARKET PENETRATION, SINGLE-FAMILY RESIDENCES , OVER 15 YEARS

Year	SFR #Meters	(SFR) #Meters in Pilot Study (.27%)	Estimd. Popul.	SFR AFY (Seasonal) Required w/o Measure	Saved: AFY w/ measure (25%)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Cost of Equip, Install, Audit ($735 ea)	20% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008	3647	10	34	3.650	0.912	$2,060.00	$1,879.73	$7,350.00	$13,780.00	$1,378.00	$22,508.00	**-$20,628.27**	**<11**
2009	**Initial investment in equipment with benefits reaped over years.**			3.650	0.912	$2,121.80	$1,936.12	$0.00	$1,378.00	$137.80	$1,515.80	**$420.32**	
2010				3.650	0.912	$2,185.45	$1,994.21	$0.00	$1,419.34	$141.93	$1,561.27	**$432.93**	
2011				3.650	0.912	$2,251.02	$2,054.03	$0.00	$1,461.92	$146.19	$1,608.11	**$445.92**	
2012				3.650	0.912	$2,318.55	$2,115.66	$0.00	$1,505.78	$150.58	$1,656.36	**$459.30**	
2013				3.650	0.912	$2,388.10	$2,179.13	$0.00	$1,550.95	$155.10	$1,706.05	**$473.08**	
2014				3.650	0.912	$2,459.75	$2,244.50	$0.00	$1,597.48	$159.75	$1,757.23	**$487.27**	
2015				3.650	0.912	$2,533.54	$2,311.83	$0.00	$1,645.40	$164.54	$1,809.94	**$501.89**	
2016				3.650	0.912	$2,609.55	$2,381.19	$0.00	$1,694.77	$169.48	$1,864.24	**$516.95**	
2017				3.650	0.912	$2,687.83	$2,452.62	$0.00	$1,745.61	$174.56	$1,920.17	**$532.45**	
2018				3.650	0.912	$2,768.47	$2,526.20	$0.00	$1,797.98	$179.80	$1,977.78	**$548.43**	
2019				3.650	0.912	$2,851.52	$2,601.99	$0.00	$1,851.92	$185.19	$2,037.11	**$564.88**	
2020				3.650	0.912	$2,937.07	$2,680.05	$0.00	$1,907.47	$190.75	$2,098.22	**$581.83**	
2021				3.650	0.912	$3,025.18	$2,760.45	$0.00	$1,964.70	$196.47	$2,161.17	**$599.28**	
2022				3.650	0.912	$3,115.93	$2,843.26	$0.00	$2,023.64	$202.36	$2,226.00	**$617.26**	
			TOTAL:	**54.749**	**13.69**	**n/a**	**$34,960.98**	**$7,350.00**	**$37,324.95**	**$3,732.50**	**$48,407.45**	**-$13,446.47**	
			AVERAGE:	**3.650**	**0.91**	**n/a**	**$2,330.73**	**$918.75**	**$2,488.33**	**$248.83**	**$3,227.16**	**-$896.43**	

COST-BENEFIT ANALYSIS, PILOT PROGRAM: (Table 23)
If this water-conservation measure is selected, it is recommended that an initial pilot (10 residences) project be performed before expanding the program to greater numbers of residences. It is projected that the following savings would be achieved from the pilot program (Table xxx).

Note that costs for the pilot program are more per participating account, and the costs take longer to pay back, because the shared program and administrative costs are distributed across only 10 accounts.

Savings in AF over 15 years:	13.69
Average AF/Y savings:	.91
Total net savings in $$$ over 15 years:	$-13,446.47
Average net $$$/year savings:	$ -896.53
Years until costs are paid off:	<11
% Water savings, all meters:	.0246%
Savings:Cost ratio:	0.7:1

Table 24: *PROJECTED COSTS AND SAVINGS* IN SEASONAL WATER USE OF ET-CONTROLLER PROGRAM, 5% MARKET PENETRATION, SINGLE-FAMILY RESIDENCES , OVER 15 YEARS

Year	SFR #Meters	(SFR) #Meters (5% MP)	Estimd. Popul.	SFR AFY (Seasonal) Required w/o Measure	Saved: AFY w/ measure (25%)	Cost of Water/AF w/3% inflat.	$$Savings/ Year (w/ 3% infl/yr)	Cost of Equip, Install, Audit ($735 ea)	20% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008	3647	182	627	66.557	16.639	$2,060.00	$34,276.92	$134,027.25	$13,780.00	$1,378.00	$149,185.25	**$114,908.33** -	**<5**
2009				66.557	16.639	$2,121.80	$35,305.23	$0.00	$1,378.00	$137.80	$1,515.80	**$33,789.43**	
2010				66.557	16.639	$2,185.45	$36,364.39	$0.00	$1,419.34	$141.93	$1,561.27	**$34,803.11**	
2011				66.557	16.639	$2,251.02	$37,455.32	$0.00	$1,461.92	$146.19	$1,608.11	**$35,847.21**	
2012				66.557	16.639	$2,318.55	$38,578.98	$0.00	$1,505.78	$150.58	$1,656.36	**$36,922.62**	
2013				66.557	16.639	$2,388.10	$39,736.35	$0.00	$1,550.95	$155.10	$1,706.05	**$38,030.30**	
2014				66.557	16.639	$2,459.75	$40,928.44	$0.00	$1,597.48	$159.75	$1,757.23	**$39,171.21**	
2015	**Initial investment with benefits reaped over years.**			66.557	16.639	$2,533.54	$42,156.29	$0.00	$1,645.40	$164.54	$1,809.94	**$40,346.35**	
2016				66.557	16.639	$2,609.55	$43,420.98	$0.00	$1,694.77	$169.48	$1,864.24	**$41,556.74**	
2017				66.557	16.639	$2,687.83	$44,723.61	$0.00	$1,745.61	$174.56	$1,920.17	**$42,803.44**	
2018				66.557	16.639	$2,768.47	$46,065.32	$0.00	$1,797.98	$179.80	$1,977.78	**$44,087.54**	
2019				66.557	16.639	$2,851.52	$47,447.28	$0.00	$1,851.92	$185.19	$2,037.11	**$45,410.17**	
2020				66.557	16.639	$2,937.07	$48,870.69	$0.00	$1,907.47	$190.75	$2,098.22	**$46,772.47**	
2021				66.557	16.639	$3,025.18	$50,336.82	$0.00	$1,964.70	$196.47	$2,161.17	**$48,175.65**	
2022				66.557	16.639	$3,115.93	$51,846.92	$0.00	$2,023.64	$202.36	$2,226.00	**$49,620.92**	
			TOTAL:	**998.357**	**249.59**	**n/a**	**$637,513.52**	**$134,027.25**	**$37,324.95**	**$3,732.50**	**$175,084.70**	**$462,428.82**	
			AVERAGE:	**66.557**	**16.64**	**n/a**	**$42,500.90**	**$16,753.41**	**$2,488.33**	**$248.83**	**$11,672.31**	**$30,828.59**	

COST-BENEFIT ANALYSIS, <u>EXPANDED</u> PROGRAM: (Table 24)
If the pilot program proves successful, and the demonstrated savings warrant the District's resource expenditure, it is recommended that an expanded program of 5% of SFRs (182 homes) be initiated, expanding the program to greater numbers of residences. It is projected that the following savings would be achieved from the expanded program (Table xxx).

Savings in AF over 15 years:	249.59
Average AF/Y savings:	16.64
Total net savings in $$$ over 20 years:	$462,428.82
Average net $$$/year savings:	$ 30,828.59
Years until costs are paid off:	<5
% Water savings, all meters:	.45%
Savings:Cost ratio:	3.6:1

2.2. Rebates for conversion from traditional landscape plantings to drought-tolerant.

> *"The landscape of the United States will shift drastically in the next few decades. Western states are running out of water. Baby boomers everywhere are worked up about chemicals on the lawns where their kids play. And a traditional lawn sometimes just takes too much time to care for."*
>
> --Margaret Roach, garden editor of *Martha Stewart Living.*

Replacement with artificial turf. A recommendation for replacing turf with artificial turf will not be made at this time because of concerns of contamination of stormwater and groundwater by heavy metals (zinc, copper, barium and chromium).[119,120] In addition, there are concerns about increased occurrence of multi-drug-resistant bacterial abscesses and infections in players who play sports on artificial turf,[121] and these methicillin-resistant infections may be spread to others both from the contaminated turf itself as well as in a locker-room setting.[122]

Replacement with drought-tolerant plant material. A reduction of 25% to 40% of water used for landscape irrigation could be realized by landscape management, landscape design and hardware improvements. Improving efficiency and increasing water savings are the most economical, easiest and least destructive tools that can be used to meet California's water needs in the future.[123]

A turf-replacement rebate program produced reported savings of 398 gallons per day participant-weighted average savings of both commercial and residential accounts.[124] This translates to an average savings of 145,270 gallons per year, 194.18 units per year, and .438 acre-feet per year.

In Austin, Texas after the initiation of a turf-replacement rebate program, the average water savings per participant site was 214 gallons per day in the summer when compared to water use for the previous landscaping.[125]

A xeriscape conversion study performed for the Southern Nevada Water Authority(SNWA) found that its Smart Landscape Program yielded a 37% positive return, bringing in $1.58 for each $1.00 spent in rebates and incentives. Conversion from lawn to xeriscape produced average water savings of 33%, with the greatest savings in the summer. The average cost to convert was $1.55/square foot. The average area of turf replaced was 2160 ft^2. The average savings in maintenance was about 2.2 hours a month, both in hours and direct costs, for the whole property when xeriscape principles (See *Appendix 2*) were applied, translating to $206/year in costs (or $7.80/hour).[126]

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[119] Ashktorab, H. *Artificial turf.* February 2005. Santa Clara Valley Water District. Personal correspondence.
[120] HJK 2003. *Environmental Compatibility of Sports Surfaces.* 2003. (www.isss.de/publications/UVP/HistoryHJK.pdf)
[121] Seppa, Nathan. *There's the Rub: Football Abrasions Can Lead to Nasty Infections*. Science News Online. www.sciencenews.org. 02/05/2005.
[122] *Pro Football Players Pass Staph Infections*. WebMD. www.webmd.com. 02/02/2005.
[123] Gleick, P.H., Haasz, D. Waste not, want not. Pacific Institute. 2003 (http://www.pacinst.org/reports)
[124] Padilla, A., and D. Torres. *Water Savings from a Turf Rebate Program in the Chihuahuan Desert*. AWWA Water Resources Conference Proceedings, 2004.
[125] City of Austin, Texas. *Xeriscaping: Sowing the Seeds for Reducing Water Consumption."* Prepared for the U.S. Bureau of Reclamation, Austin, Texas. May 1999.
[126] Sovocool, Kent A. *Xeriscape conversion study final report*. Southern Nevada Water Authority, 2005.

According to the *Source Book on Natural Landscaping for Public Officials*, "The major savings of natural landscaping is the lost cost of landscape maintenance. The combined costs of installation and maintenance for a natural landscape over a ten-year period may be one-fifth of the costs for conventional landscape maintenance."[127]

Shifting to xeriscape plants in the landscape produces considerable savings. In a study of SFRs, presented at an American Water Works Association conference, xeriscape plants used 17% less water than traditional landscapes.[128]

SNWA entices its customers to conserve water in the landscape by offering them a wide range of rebates and support services, including $1/ft^2 for conversion from turf to xeriscape, rebates for clock upgrades, a list of water-smart landscapers, and a landscape awards program.[129]

Cathedral City, California offered its water users $500 to convert their lawns to xeriscape.[130]

In 2004, Clark County (Nevada) began considering a program of removal of approximately 2 million ft^2 of turf, replacing it with xeriscape landscaping, estimating that 60 million gallons of water a year could be saved.[131]

The Metropolitan Water District has devoted millions for its campaign to get consumers to switch to xeriscape plants.[132]

RECOMMENDATION:
A rebate-assisted program for replacement of turf by drought-tolerant ("xeriscape") plants is recommended, following basic principles of:

- Sound landscape planning and design.
- Limitation of turf placement to appropriate areas.
- Use of drought-tolerant plant material.

TEXT BOX 1

TURF-XERISCAPE CONVERSION PROJECTION

STUDY UPON WHICH 16% ESTIMATES ARE BASED:
Based on min. 500 ft2 turf conversion to xeriscape, or new xeriscape installation; trees to cover 50% of property with canopy when mature;non-gravel/rock; in-ground irrigation system in place; cap of 2000 ft2; rebate $.48/ft2. Produced 30% savings of total water use, with highest savings in summer. (SNWA Xeriscape study).

Average amount converted: 2160 ft^2

Average monthly savings: 30% of water bill.

Average monthly savings per ft^2 converted: .0153%

(Sovocal, Kent A. *Xeriscape Conversion Study, Final Report, 2005.* Southern Nevada Water Authority.)

Adjusting SNWA evapotranspiration rate to Nipomo's ET rate (by dimensional analysis):

SNWA ET rate = 90 in/yr
NCSD ET rate = 47.4 in/yr

90" 47.44"
___ x _____
30% **15.81%=Nipomo % estimated savings.**

Rebate cap: 1000 ft^2 ($528.00)
Rebate min: 500 ft^2 ($264.00)

[127] *A Sourcebook on Natural Landscaping for Public Officials.* U.S. Environmental Protection Agency. http://www.epa.gov/glnpo/greenacres/toolkit/index.html.
[128] Nelson, J.O.; Kruta, J.C. *Water saved by single family xeriscapes*. 1994 Annual conference proceedings; American Water Works Association, June 1994**.**
[129] Water Smart Rebates and Services. Southern Nevada Water Authority, 2003. (http://www.lvvwd.com/html/ws_rebates.html).
[130] Bowles, *J. Anti-drought push gets funds*. Riverside Press-Enterprise, October 2004.
[131] *Vegas-area schools consider removing turf to save water.* September 2004. WaterWiser, American Water Works Association from US Water News. (http://www.awwa.org/waterwiser/watch/archive.cfm).
[132] Bowles, J*. Anti-drought push gets funds.* Riverside Press-Enterprise, October 2004*.*

- Efficient irrigation.
- Soil amendments.
- Use of mulches.
- Proper landscape maintenance procedures

If this program is selected, it is recommended that a limited pilot program of 10 SFR homes be selected for the program, with subsequent expansion of the program if outcome analysis warrants it, and after the details of the program have been fine tuned.

Participant eligibility:

- Must be District SFR customer (one rebate-program participant per property or account).
- Submission by customer of drawing (with measurements) indicating dimensions of entire yard and dimensions and location of landscape area to be converted to drought-tolerant planting, including placement and basic canopy size of trees to be conserved.
- Submission of representative photographs of the areas to be converted to drought-resistant landscape.
- Completion of a series of NCSD free workshops on water conservation in the landscape, drought-resistant plants (selection and maintenance), composting and soil amendments, irrigation, and basic landscape design.
- Submission of a basic proposed turf-replacement landscaping plan, indicating plant names, numbers of plants, and location in the landscape.
- Sign a contract representing the requirements and benefits of programs.

Customer Benefits of Program:

- Assistance in obtaining a beautiful, integrated landscape.
- Assistance with part of the costs of converting turf to drought-resistant plants.
- Discount from local nurseries for plants purchased for the turf-replacement project.
- Instruction on basic principles of landscaping (soil/compost, irrigation, plant selection, landscape design).
- Follow-up with horticulturist during and after project.
- Availability of horticulturist to answer questions/assist with problem-solving.
- Free software (while available) on drought-resistant plants and landscaping.
- Pride in supporting community efforts to conserve water and protect the Nipomo Mesa aquifer.
- Eligibility for yearly Nipomo Water-Wise Landscape of the Year Contest.

Program Design: Based on the much referenced study, *Xeriscape conversion study final report*, Southern Nevada Water Authority, 2005, with adjustments of percentage savings for Southern Nevada's 90'/year evapotranspiration rate to Nipomo's 47.4" ET/year (see Text Box 1 for specifics).

- Rebate: $0.48/ft2, minimum of 500 ft2 and maximum of 1000 ft2 rebated.
- Percentage of Shared Program Costs: 10% ($5120).
- Number of enrollees: Minimum of 10, maximum of 50, per year.
- Workshops Required for Enrollees: 4.
- Contract outlining basic requirements and benefits of program.

This program will be conducted in two phases:

1. A small (10 homes) pilot program to fine-tune program design and assess for costs and savings.
2. Subsequent 5% (182 or less homes) increments, assessing for efficacy and feasibility of the program after each increment is completed.

Table 25: PROJECTED COSTS AND SEASONAL-WATER-USE-SAVINGS OF TURF REPLACEMENT WITH DROUGHT-TOLERANT PLANT MATERIAL; PILOT PROGRAM (10 HOMES, 0.27% OF ALL SFR METERS) SINGLE-FAMILY RESIDENCE CATEGORY, OVER 20 YEARS (SAVINGS: 16% OF ANNUAL WATER USE)

Year	SFR #Meters	#Meters (0.27% of SFR Meters) (10 homes)	Est'd popul'n (10 homes)	SFR AFY (Seasonal) Required w/o Measure	Saved: SFR AFY/All Meters (16%/ Meter/Yr)	Cost of Water/AF w/3% inflat.	$$Savings/ Year	Rebate (up to $500 ea)	10% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008	3647	10	34	3.650	0.58	$2,060.00	$1,203.03	$5,000.00	$6,890.00	$1,189.00	$13,079.00	**-$11,875.97**	**<10**
2009	**One-time investment yielding results over years.**				0.58	$2,121.80	$1,239.12	$0.00	$0.00	$118.90	$118.90	**$1,120.22**	
2010					0.58	$2,185.45	$1,276.29	$0.00	$0.00	$122.47	$122.47	**$1,153.83**	
2011					0.58	$2,251.02	$1,314.58	$0.00	$0.00	$126.14	$126.14	**$1,188.44**	
2012					0.58	$2,318.55	$1,354.02	$0.00	$0.00	$129.93	$129.93	**$1,224.09**	
2013					0.58	$2,388.10	$1,394.64	$0.00	$0.00	$133.82	$133.82	**$1,260.82**	
2014					0.58	$2,459.75	$1,436.48	$0.00	$0.00	$137.84	$137.84	**$1,298.64**	
2015					0.58	$2,533.54	$1,479.57	$0.00	$0.00	$141.97	$141.97	**$1,337.60**	
2016					0.58	$2,609.55	$1,523.96	$0.00	$0.00	$146.23	$146.23	**$1,377.73**	
2017					0.58	$2,687.83	$1,569.68	$0.00	$0.00	$150.62	$150.62	**$1,419.06**	
2018					0.58	$2,768.47	$1,616.77	$0.00	$0.00	$155.14	$155.14	**$1,461.63**	
2019					0.58	$2,851.52	$1,665.27	$0.00	$0.00	$159.79	$159.79	**$1,505.48**	
2020					0.58	$2,937.07	$1,715.23	$0.00	$0.00	$164.59	$164.59	**$1,550.65**	
2021					0.58	$3,025.18	$1,766.69	$0.00	$0.00	$169.52	$169.52	**$1,597.17**	
2022					0.58	$3,115.93	$1,819.69	$0.00	$0.00	$174.61	$174.61	**$1,645.08**	
2023					0.58	$3,209.41	$1,874.28	$0.00	$0.00	$179.85	$179.85	**$1,694.43**	
2024					0.58	$3,305.70	$1,930.51	$0.00	$0.00	$185.24	$185.24	**$1,745.27**	
2025					0.58	$3,404.87	$1,988.42	$0.00	$0.00	$190.80	$190.80	**$1,797.62**	
2026					0.58	$3,507.01	$2,048.08	$0.00	$0.00	$196.52	$196.52	**$1,851.55**	
2027					0.58	$3,612.22	$2,109.52	$0.00	$0.00	$202.42	$202.42	**$1,907.10**	
				TOTAL:	**11.10**	**n/a**	**$32,325.83**	**$5,000.00**	**$6,890.00**	**$3,972.98**	**$15,862.98**	**$16,260.44**	
				AVERAGE:	**0.58**	**n/a**	**$3,078.65**	**$476.19**	**$656.19**	**$388.02**	**$1,520.40**	**$1,548.61**	

COST-BENEFIT ANALYSIS: The study upon which this is based (Sovocal, Kent A. *Xeriscape Conversion Study, Final Report, 2005.* Southern Nevada Water Authority) was selected because it was the most complete and detailed study available, and the savings given were well within the savings reported by studies on other water purveyors and regions. Because of the vast differences in climate between Southern Nevada and Nipomo, the two areas' evapotranspiration rates were used to convert the savings in Southern Nevada into savings more likely to occur in Nipomo. SNWA's savings were 30% of annual water use; converting with Nipomo's ET rate, the savings for Nipomo' s residents would be 16%.

(Table 25) For the **pilot program, 10 homes only**, the costs-benefits are as follow:

Savings in AF over 20 years:	11.10
Average AF/Y savings:	.58
Total net savings in $$$ over 20 years:	$16,260.44
Average net $$$/year savings:	$ 1,548.61
Years until costs are paid off:	<10
% Water savings, all meters:	.02%
Savings:Cost ratio:	2.1:1

The costs for the pilot program are more per participating account and the costs take longer to pay back because the shared program and administrative costs are distributed across only 10 accounts.

If the pilot program proved successful and savings were believed to warrant expansion of the program, it is recommended that the program then be expanded in increments of 5% or less of the SFRs (182 homes).

(Table 26) The costs-benefits for **5% of SFR residences** are as follow:

Savings in AF over 20 years:	212.98
Average AF/Y savings:	10.65
Total net savings in $$$ over 20 years:	$283,381.45
Average net $$$/year savings:	$ 22,847.96
Years until costs are paid off:	<5
% Water savings, all meters:	0.29%
Savings:Cost ratio:	4.4:1

Table 26: *PROJECTED COSTS* AND SEASONAL-WATER-USE SAVINGS WITH XERISCAPE TURF-REPLACEMENT PROGRAM, 5% MARKET PENETRATION (182 HOMES), SINGLE-FAMILY RESIDENCES , OVER 20 YEARS

Year	#SFR Meters	#SFR Meters (5% MP)	Estimd. Popul.	SFR AFY (Seasonal) Required w/o Measure	Saved: AFY w/ measure (16%)	Cost of Water/AF w/3% inflat.	$$Savings/ Year	Cost of Rebates (Max: $500 ea)	10% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates , Costs)
2008	3647	182	627	66.557	10.649	$2,060.00	$21,937.23	$91,175.00	$6,890.00	$9,806.50	$107,871.50	**-$85,934.27**	**<5**
2009	**Initial investment with benefits reaped over years.**			66.557	10.649	$2,121.80	$22,595.35	$0.00	$0.00	$980.65	$980.65	**$21,614.70**	
2010				66.557	10.649	$2,185.45	$23,273.21	$0.00	$0.00	$1,010.07	$1,010.07	**$22,263.14**	
2011				66.557	10.649	$2,251.02	$23,971.40	$0.00	$0.00	$1,040.37	$1,040.37	**$22,931.03**	
2012				66.557	10.649	$2,318.55	$24,690.55	$0.00	$0.00	$1,071.58	$1,071.58	**$23,618.96**	
2013				66.557	10.649	$2,388.10	$25,431.26	$0.00	$0.00	$1,103.73	$1,103.73	**$24,327.53**	
2014				66.557	10.649	$2,459.75	$26,194.20	$0.00	$0.00	$1,136.84	$1,136.84	**$25,057.36**	
2015				66.557	10.649	$2,533.54	$26,980.03	$0.00	$0.00	$1,170.95	$1,170.95	**$25,809.08**	
2016				66.557	10.649	$2,609.55	$27,789.43	$0.00	$0.00	$1,206.08	$1,206.08	**$26,583.35**	
2017				66.557	10.649	$2,687.83	$28,623.11	$0.00	$0.00	$1,242.26	$1,242.26	**$27,380.85**	
2018				66.557	10.649	$2,768.47	$29,481.80	$0.00	$0.00	$1,279.53	$1,279.53	**$28,202.28**	
2019				66.557	10.649	$2,851.52	$30,366.26	$0.00	$0.00	$1,317.91	$1,317.91	**$29,048.35**	
2020				66.557	10.649	$2,937.07	$31,277.24	$0.00	$0.00	$1,357.45	$1,357.45	**$29,919.80**	
2021				66.557	10.649	$3,025.18	$32,215.56	$0.00	$0.00	$1,398.17	$1,398.17	**$30,817.39**	
2022				66.557	10.649	$3,115.93	$33,182.03	$0.00	$0.00	$1,440.12	$1,440.12	**$31,741.91**	
2023				66.557	10.649	$3,209.41	$34,177.49	$0.00	$0.00	$1,483.32	$1,483.32	**$32,694.17**	
2024				66.557	10.649	$3,305.70	$35,202.81	$0.00	$0.00	$1,527.82	$1,527.82	**$33,674.99**	
2025				66.557	10.649	$3,404.87	$36,258.90	$0.00	$0.00	$1,573.66	$1,573.66	**$34,685.24**	
2026				66.557	10.649	$3,507.01	$37,346.67	$0.00	$0.00	$1,620.87	$1,620.87	**$35,725.80**	
2027				66.557	10.649	$3,612.22	$38,467.07	$0.00	$0.00	$1,669.49	$1,669.49	**$36,797.57**	
			TOTAL:	**1,331.143**	**212.98**	**n/a**	**$589,461.59**	**$91,175.00**	**$6,890.00**	**$34,437.36**	**$132,502.36**	**$283,381.45**	
			AVERAGE:	**66.557**	**10.65**	**n/a**	**$29,473.08**	**$8,683.33**	**$344.50**	**$1,721.87**	**$6,625.12**	**$22,847.96**	

In summary, estimates indicate that a turf-replacement program would require an initial outlay, but should pay for itself in less than five years, and after that continue to produce both water and costs savings.

It is felt that, because of the initial costs over administering the program, a minimum of 10 enrollees is required each year for the program. The exception would be the first year when word may not have reached all of the District's customers, and customers may not have yet become inspired by the new water rates' impact on their water bills next summer.

It is felt that, based on the personnel hours required to administer and set up the program, 50 customers would be the maximum number accepted each year. Should more personnel be made available, the program could be expanded.

RECOMMENDATIONS: It is recommended that an initial turf-replacement pilot program be initiated, with expansion to more participants per year if analysis of the pilot program warrants. If the pilot program shows savings as expected, and the program was expanded to 5% of SFR homes (182 meters), the costs of the expanded program would be returned in less than five years, and after that (except for yearly administrative costs), there would be almost pure savings in water and costs for water, totaling $283,381 over 20 years, or $22,847.96 a year in costs.

COSTS: **$13,079 for the pilot program.**

2.3. Landscape irrigation efficiency equipment.

There are a number of low-cost equipment items that can assist in efficient irrigation of the residential landscape. Poor irrigation scheduling (watering too often and for too long) is the primary source of water waste associated with landscape irrigation. Other contributing factors are inefficient and poorly maintained irrigation systems.[133]

A garden hose can deliver up to 10 gallons per minute. Equipment such as automatic shut-off nozzles for hand-watering and timers that shut off hose-end sprinklers can help eliminate wasted irrigation water. To help eliminate overwatering, a soil moisture probe can give an objective assessment of the soil moisture content. The stick-finger-in-soil method is highly subjective and, unless the applicator is very strong, does not reach 3" to 4" to assess if there is still water available at the plant root level. Rain gauges are inexpensive and a good way to reinforce homeowner awareness of the hydrologic cycle, and give objective feedback regarding what kind of plants can reasonably be supported by the native climate and the amount of funds dedicated to pay for landscape irrigation. Finally, educational products, such as a water drop wheel, can give easily accessible information regarding amount of water used and saved by water conservation measures.

Water Wheel

RECOMMENDATIONS: It is recommended that 250 sets of outdoor irrigation efficiency equipment be provided to SFR customers. The kit would contain a soil moisture probe, lawn sprinkler timer, garden-hose nozzle, rain gauge, and water-drop education/information wheel.

[133] Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: Water Plow Press, 2001.

Studies on actual savings from these measures could not be found. The cost for each set would be $18.19 ($4,547.50 for 250 kits). The benefits would include those listed on page 65 "General Benefits and Costs of Landscape Water Conservation."

NOTE: An integral part of the landscape portion of the program would be working with local growers, nurseries and landscapers to ensure that the program design is appropriate for our area, and to facilitate revenue from changes in residential landscape design and maintenance remaining, when possible, with our local businesses.

Table 27: COMPARISON/ TALLY OF SAVINGS FOR NON-CORE PROGRAM MEASURES										
Measure	Target Category	TotalSavings Avg. AFY	Avg. AFY Consum. For All Categories	# of Meters All categories	% AF Savings for All District Categories	Total $ (not NET) Savings	Total$ Costs	Savings: Costs Ratio	Years to Pay off Initial Invest.	Ranking
Low-volume toilets	SFR	8.83	3698.743	xxx	0.24%	$208,554.35	$0.00*	100:0*	0*	1
Indoor plumbing retrofit (non-toilet	SFR, MFR	2.044	3698.743	xxx	0.06%	$48,276.47	$14,454.00	3.3:1	<3	2
High-Efficiency Clothes Washer	SFR	127.7	3698.743	xxx	3.45%	$372,019.75	$40,289.50	9.2:1	~2.5	1
WeatherTRAK PILOT program	SFR,.27% (10 homes)	0.91	3698.743	xxx	0.0246%	$34,960.98	$48,407.45	0.7:1	<11	6
WeatherTRAK 5% SFR	SFR, 5% 182 homes	16.64	3698.743	xxx	0.45%	637,513.52	175,084.70	3.6:1	<5	7
Xeriscape turf-replacement PILOT program	SFR, .27% (10 homes)	0.58	3698.743	xxx	0.02%	32,325.83	15,862.98	2.1:1	<10	4
Xeriscape turf-replacement	SFR, 5% 177 homes	10.65	3698.743	xxx	0.29%	589,461.59	132,502.36	4.4:1	<5	5
Irrigation efficiency equipment	SFR	Unknown	Unknown							3

*San Luis Obispo County will be performing a plumbing retrofit program to offset new development. The costs will be born by the County.

COMPARISON AND DISCUSION OF NON-CORE WATER CONSERVATION PROGRAM MEASURES

For evaluation purposes, comparison and ranking of the proposed non-core water conservation measures was performed using the following criteria:

- Amount of potential water savings.
- Cost to District (savings:cost ratio).
- Years to pay off initial investment in equipment or rebates.
- Ease of designing, promoting and administering the program for the measure.

High-efficiency clothes washer rebates (ranked #1). This measure would provide an anticipated 3.45% water savings of the District's annual water consumption (all categories).

As is true for all indoor hardware refit programs, the HEW rebate program would require an initial outlay for rebates, but once those have been processed, further expenditure of staff time and District funds (except for program assessments) would not be needed. These programs are easy to set up and easy to administer. For the high-efficiency clothes-washer rebate program, it is estimated that the savings:cost ratio would be greater than 9:1, and it would take less than 2.5 years to pay off the initial investment in rebates. After that, for the life of the machine, savings would continue to accrue. The District's savings are such that the expenditure on rebates is a good investment, and will stimulate more customer interest in HEWs.

It is recommended that the HEW rebate program be initiated. In addition to the District rebate, information will be provided regarding the rebate program from the So. Ca. Gas Company. The two rebates together will provide a strong stimulus for customers to invest in a more efficient clothes-washer. It is recommended that this program be started in 2008.

Indoor plumbing (non-toilet) retrofit (ranked #2) It is recommended that kits that include a high-quality, low-flow showerhead, a high-quality, low-flow faucet aerator, leak-detection dye tablets, and a shower timer be provided, free, to SFR customers. It is estimated that this kit will provide residential customers the tools they need to decrease indoor water use. Although the anticipated water savings from this measure are small (0.06%), the support of other water-saving measures would provide much more in the way of additional benefits. There is a 3.3:1 savings:cost ratio, and the initial funds would be paid back in water savings in less than three years.

It is recommended that the indoor plumbing kits be provided to SFR and MFR requesting customers (one per account, on a first-come/first-served basis), with an initial purchase of 250 kits, to be provided one to a household, first-come/first-serve basis. The kits can be either provided at the District's office facility, or provided at the time of the water audit. If the kits are provided through the office, it is recommended that the customer's old showerhead must be exchanged for the kit. This will help ensure that the showerhead (and hopefully the other items) will actually be installed. It is recommended that this program be started in 2008.

Irrigation outdoor efficiency equipment (ranked #3). This kit of several components (soil moisture probe, educational water-wheel, rain gauge, timer for hose-end sprinkler, and automatic shut-off hose nozzle) is designed to educate, increase water-use awareness, and encourage and assist with water use efficiency. Studies for water savings from the use of these items are not available. However, considering the fact that up to 10 gallons of water per minute can come out of a hose, measures that stop unneeded water from exiting the hose will decrease water waste and

conserve water. In addition, these items will serve as a support for other water conservation measures, by educating and making customers more aware of water use, especially unintended water use.

It is recommended that an initial order of 250 kits be placed, with provision of these kits to requesting SFR customers, one to a household, on a first-come/first-serve basis.

Xeriscape/turf-replacement, pilot and expanded program (ranked #5,6) There are significant savings reported when turf is replaced by xeriscape plants. Many water suppliers are funding turf-replacement by customers. Since the outlay for the rebates would be high, and because it is anticipated that the program would be more challenging to design and administer, it is strongly recommended that, if this measure is considered, that a pilot program of 10 homes first be accomplished before making the larger investment in an expanded program. If the post-pilot-study analysis warrants it, the program could then be expanded. Because of the staff resources required to initiate and administer the program, it is recommended (if the expanded program is warranted) that the program be expanded in increments, with each increment containing a minimum of 10 residences and a maximum of 30 residences.

The amount of savings, over the years, is predicted to be very large. If this measure is initiated, it is recommended that the pilot program be started in 2008.

WeatherTRAK Smart Irrigator program, pilot and expanded program (ranked #8, 9). There are significant savings that have been reported by many sources for Smart irrigation systems. Some of our customers may be reluctant to replace or reduce the amount of their property devoted to lawn. For these customers, it is estimated that the most amount of increased efficiency in water use can occur in landscape irrigation. Turf uses, by far, the largest percentage of water used for most SFR customers. Therefore, ensuring that their landscape irrigation is at maximum efficiency could bring significant savings from these customers and ensure that the water that is dedicated for irrigating their lawns and landscape is not being wasted by unintended usage. Since the outlay for the rebates would be high, and because it is anticipated that the program would be more challenging to design and administer, it is strongly recommended that, if this measure is considered, that a pilot program of 10 homes first be accomplished before making the larger investment in an expanded program. If the post-pilot-study analysis warrants it, the program could then be expanded.

Because of the staff resources required to initiate and administer the program, it is recommended (if the expanded program is warranted) that the program be expanded in increments, with each increment containing a minimum of 10 residences and a maximum of 30 residences.

If this program is selected, it is recommended that the Smart irrigator rebate program be undertaken initially as a pilot program and, if warranted, expansion to a larger program. The amount of savings, over the years, is predicted to be very large. If this measure is initiated, it is recommended that the pilot program be started in 2009 or 2010. This program, out of all those recommended, would take the most staff time for planning, promoting and administering.

X. Comparison of Measures, Discussion and Final Recommendations

A successful water conservation program contains support, incentives and assistance by many means. If the program is designed well, the individual measures of the program support each other, and the sum of the whole is greater than the sum of the individual components.

The proposed water conservation program has two main categories: **core** and **non-core** measures.

The **core** measures are designed to complement each other, and to provide a strong, multi-footed base which supports each of the individual core measures, as well as the non-core measures. The most important element of all of the measures would be a strong conservation-based, multi-tiered rate structure. Studies have repeatedly demonstrated a strong customer response to a rate structure that gives pocketbook incentive to conserve. The best designed, voluntary toilet-replacement rebate measure in the world will be largely unsuccessful if there is no pocketbook incentive for the customer to conserve water. The savings by this measure will depend on the strength of the rate structure passed by the Board of Directors.

The other core measures (public education and outreach) are vital to the success of any water conservation program, but not quantifiable individually. However, it seems obvious that a customer who does not know about the need for water conservation, or the rebate measures offered, will not be motivated to save water or take advantage of the rebate measure.

The **non-core** measures include individual measures that may or may not support each other. For instance, the landscape "irrigation efficiency equipment" measure would support the ET-controller rebate and xeriscape/turf-replacement measures, but not the high-efficiency clothes-washer measure (although the argument can be made that conservation of any kind makes the consumer more aware of water use in other situations). The non-core measures range from easy to not-so-easy to design and run, and it is recommended that the easy ones with the greatest potential savings be attempted first before escalating to the measures which require more staff time, effort, and District funding.

For xeriscape/turf-replacement and ET-controller rebate measures, because of the difficulty in designing and running the programs, and the expense involved, it is recommended that small pilot programs of 10 SFR accounts for each measure be performed before expanding to programs with more participants.

Perhaps the most important part of any water conservation program is the customers' willingness to participate. There are many District customers who simply are not willing to conserve water if it is going to be used for new housing and further growth.

Therefore, it is recommended, as a vital part of the water conservation program, that the Board consider enacting an ordinance that guarantees our customers that the water they conserve will not be used to support new housing growth in the District.

It is believe that an approach which provides the District's customers with the pocketbook incentive, education and assistance, technical help, rebates, and other supportive measures, while guaranteeing that the water they save will not be used for new growth, will be more readily accepted by the District's customers, and will meet with greater success.

FINAL RECOMMENDATIONS

CORE MEASURES PROGRAM:

1. **Multi-tiered, inclining block, conservation-based rate structure.** It is recommended that a strong conservation-based rate structure be instituted for both residential and nonresidential customers for SFR, MFR, commercial and landscape accounts.
2. **Public outreach materials and events, NCSD landscape/demonstration garden, technical assistance (water audits, etc.) and other supportive measures.** These measures will complete the core measures program foundation upon which the rest of the program is built.

NON-CORE MEASURES PROGRAM:

1. **High-efficiency clothes washer rebates in increments of 10% (~365) of SFR accounts**. Each increment is projected to produce 3.45% water savings for the entire District, all categories. This program can be easily accomplished, and has a quick, high-rate return in water savings.
2. **Low-volume-flush toilets.** This program will be administered by San Luis Obispo County. For every 365 toilets that are replaced, it will save 8.83 AF/Y (or $18,192/year), or 0.24% savings of all the water consumed by the District.
3. **Indoor plumbing (non-toilet) retrofit and leak detection aids, in increments of 250 residences (6.9% of residences in 2008).** This measure will add only 0.06% savings, if estimated on its own, but the savings will be increased when it is considered as part of the water-audit/education and leak-detection program.
4. **Irrigation efficiency equipment in increments of 250 residences (6.9% of residences in 2008).** Quantifiable savings are not available for this measure. However, especially when provided as part of a water audit/leak-detection program, this measure will serve as incentive to save water in the landscape.
5. **Turf-replacement rebate program.** Once the pilot program has been performed, monitored and analyzed, and expansion of the program warranted to increments of 5% of SFR homes (~180 homes), each 180 increment can be expected to produce 10.65 AF/Y water savings (or net savings of $22,847.96/year in supplemental water costs), 0.29% water savings for the entire District.

ORDINANCE:

To gain the most customer support possible for the water conservation program, it is recommended that the Board consider enacting an ordinance which guarantees customers that the water they conserve will not be used for new growth.

NOT RECOMMENDED BUT AVAILABLE FOR CONSIDERATION:

- **Smart ET-controller irrigation rebate.** This measure would be the most complicated and time-consuming to design, launch, administer and monitor. However, the reported returns are huge. If the recommended measures are not sufficient to meet District's water conservation goals, then this measure could be considered.

In Closing

The NCSD and its customers are facing water challenges that can only be met with proper planning and customer support. Water conservation plays a vital role in meeting these challenges. Fortunately, there is a wealth of information and statistics compiled by those who have been down this road before us, and we are now on notice regarding the anticipated impending "permanent drought" that may affect us as early as 2050, the anticipated multi-year drought in the nearer future, and the insecurity of the provision of State water. Throughout the State of California, politicians and managers of water suppliers are taking the lead in initiating plans now for the events predicted to occur in the future.

People in the future will look back on those making water policy decisions at this crucial point, and will view us as either heroes or failures. By moving forward now in a decisive manner, we stand a chance of being regarded as the former and not the latter.

CALIFORNIA URBAN WATER CONSERVATION COUNCIL
BEST MANAGEMENT PRACTICES

1. **Water survey programs for single-family residential and multi-family residential customers.** Survey, including water audit, 15% of residential customers within 10 years.
2. **Residential plumbing retrofit.** Retrofit 75% of residential housing constructed prior to 1992 with low-flow showerheads, toilet displacement devices, toilet flappers, and aerators.
3. **System water audits, leak detection and repair.** Audit the water utility distribution system regularly and repair any identified leaks.
4. **Metering with commodity rates for all new connections and retrofit of existing connections.** Install meters in 100% of existing un-metered accounts within 10 years; bill by volume of water use; assess feasibility of installing dedicated landscape meters.
5. **Large landscape conservation programs and incentives.** Prepare water budgets for 90% of commercial and industrial accounts with dedicated meters; provide irrigation surveys to 15% of mixed-metered customers.
6. **High-efficiency washing machine rebate programs.** Provide cost-effective customer incentives, such as rebates, to encourage purchase of machines that use 40% less water per load.
7. **Public information programs.** Water utilities to provide active public information programs to promote and educate customers about water conservation.
8. **School education programs.** Provide active school education programs to educate students about water conservation and efficient water uses.
9. **Conservation programs for all commercial, industrial and institutional accounts.** Provide a water survey of 10% of these customers within 10 years and identify retrofitting options; OR reduce water use by an amount equal to 10% of the baseline use within 10 years.
10. **Wholesale agency assistance program.** Provide financial incentives to water agencies and cities to encourage implementation of water conservation programs.
11. **Conservation pricing.** Eliminate non-conserving pricing policies and adopt pricing structure such as uniform rates or inclining block rates. Incentives to customers to reduce average or peak use, and surcharges to encourage conservation.
12. **Conservation coordinator.** Designate a water agency staff member to have the responsibility to manage the water conservation programs.
13. **Water waste prohibition.** Adopt water waste ordinances to prohibit gutter flooding, single-pass cooling systems in new connections, non-re-circulating systems in all new car wash and commercial laundry systems, and non-recycling decorative water fountains.
14. **Residential ultra-low flow toilet (ULFT) replacement programs.** Replace older toilets for residential customers at a rate equal to that of an ordinance requiring retrofit upon resale.

XERISCAPE: SEVEN PRINCIPLES

1. Planning and design. Assessing the landscape for exposure, topography, climate, soil, planting zones (hydrozones). A good design is the backbone of a good xeriscape.

- Start the project with a basic scaled drawing of the property, including buildings, walks, and other hardscape.
- Identify sunny and shady areas, slopes and views.
- Include in your design large shrubs and trees that you wish to remain in the landscape. Be sure to draw them to scale so you don't add new plants too close to the existing plants.
- Evaluate the needs of the people, pets and wildlife who will be using the landscape: play areas for children and/or pets, deck for entertaining, herb garden, cutting garden, vegetable garden, hummingbird/butterfly garden, etc., and incorporate these needs into the design.
- Group plants with similar water and exposure needs into zones to make watering easier and more efficient.
- If an herb, vegetable or wildlife garden is desired, place it so it is up-slope and up-wind from any turf or other areas of the landscape that may require pesticide applications. Toxin-laden wind-drift and run-off should not be allowed into areas where food items will be grown (this includes fruit trees) which, for safety's sake, should not be planted in a lawn or garden area which will be treated with chemicals.

2. Improve the soil. Test the soil for nutrient content by collecting a sample and sending it to a soil labMost soils benefit from adding 2 to 3 cubic-yards of organic matter (such as commercial compost or aged manure) for every 1000 square-feet of landscape area. Soil with adequate organic matter absorbs and retains water much better than OM-poor soil, and the reward will be healthy grass and good plant growth, which will require less water. Note that some native plants have evolved to thrive in poor soil. Check for specific plant requirements.

3. Irrigate efficiently. Review the landscape design and choose the most efficient irrigation for the landscape. The new drought-tolerant plantings will require supplemental water in the first year or two, but afterwards will need little irrigation. Select an irrigation system that can be programmed depending on the needs of the plant and climate. Choose appropriate, efficient spray heads and/or emitters. Maintain the system regularly, assessing for distribution uniformity and amount delivered. As the landscape matures, the needs of the plants will change. Once plants have reached the desired size, experiment with decreasing the amount or frequency of irrigation. Any excess growth beyond the size you want is water, money, and maintenance-energy wasted.

4. Limit traditional turf areas. Include only the amount of turf actually needed in the landscape. Replacing all or a portion of an existing lawn area with other attractive landscaping will save money in water costs, maintenance, and chemicals. Consider using a turf alternative, such as *Carex praegracilis,* which is very drought tolerant.

5. Select appropriate plants. A wide selection of plants are available for xeriscaping. Choose plants based on the role they will play in the landscape. Group plants according to water and exposure needs. Place plants grown for eating (fruit trees, herb garden, vegetable garden) up-wind and up-slope from plants, such as turf grass, that may require applications of toxic chemicals. BE SURE TO SELECT PLANTS THAT ARE NOT INVASIVE IN YOUR AREA.

6. Use mulch. Mulch moderates soil temperatures, increases the soil's moisture-holding capacity, increases the soil's fertility (cation-exchange capacity), slows erosion, and suppresses weeds that would compete with landscape plants for nutrients and water.

7. Maintain regularly. All landscapes need some maintenance, even xeriscape landscapes. Maintenance can be decreased, once plants have reached the desired size, by decreasing the amount of irrigation applied. It will save money and energy spent on irrigation and maintenance.

Nipomo Community Services District
148 S. Wilson, P.O. Box 326
Nipomo, CA 93444
Phone: (805) 929-1133

UTILITY SERVICE BILL

Service Address	Billing Date	Due Date	Total Amount Due

TO AVOID PENALTY, PAYMENT MUST BE RECEIVED ON OR BEFORE DUE DATE.

Account Number	Amount Paid

PAYABLE TO: Nipomo CSD

MAIL TO: P.O. Box 326
Nipomo, CA 93444

--Detach and return above portion with your payment. Retain lower portion for your records—

NIPOMO COMMUNITY SERVICES DISTRICT • UTILITY SERVICE BILL
148 S. Wilson, P.O. Box 326, Nipomo CA 93444 (805) 929-1133

Service Address	Account No.	From	To	Due Date

Meter Read (In Units)
1 Unit = 100 hundred cubic feet = 748 gallons

Prior Meter Read: xx Current Meter Read: xx

Usage This Period: xx Usage One Yr. Ago: xx

Tiered Rates:
Water charges are based on consumption per tier.

Tier	From, To	Charge/Unit	Charges	% of Charges
1	1-20	$x.xx – x.xx	$xxx.xx	xx%
2	20.5-30	$x.xx – x.xx	$xxx.xx	xx%
3	30.5-40	$x.xx – x.xx	$xxx.xx	xx%
4	40.1 +	$x.xx – x.xx	$xxx.xx	xx%

CHARGES

Previous Balance:

Water Service:

Water Use:

Total Current Charges

TOTAL NOW DUE:

WATER USE IT WISELY

Water Conservation Tip: xxx xxx xxx

Note from NCSD: Your water usage this period was in the top xx% of all customers billed.

WATER USAGE HISTORY

Year	January	February	March	April	May	June	July	August	September	October	November	December
2006												
2007												

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"Based on policies contained in the Water Element of the General Plan, the City has adopted a per capita planning use rate of 145 gallons per person per day (gpcd) for projecting future water supply needs and determine the availability of water for new development. The 145 figures Is not the amount that the average person uses but takes into account all water uses including residential, commercial, industrial, landscape, etc. The city wide water use is monitored to insure that actual use remains below the adopted planning figure so that the City does not exceed our available water resources." Pg. 3

"This last year's per capita water use was approximately 122 gpcd, a decrease from the last year's use of 126 gpcd." Pg. 3

"The non-residential water savings have been achieved through the replacement of pre-rinse spray valves in restaurants, hospitals and grocery stores city-wide, with water conserving hardware. Like the toilet retrofit program, this is a "hard-wired" water conservation measure that will provide reliable, ongoing water savings estimated at 20 acre feet per year." Pg. 6

"The Water Conservation Program is an integral part of the City's overall water management strategy and is now being considered as a new source of supply, contributing to our safe annual yield based on the water saved." Pg. 7

"With the adoption of the UWMP in 1994, toilet retrofitting had been identified as a significant water demand management strategy and integral part of the City's overall water management plan." They replaced "…approximately 83% of all toilets within the City of San Luis Obispo. This represents an annual estimated water savings of over 1,400 acre feet." Pg. 8

"As part of the 2001-03 Financial Plan, a High Efficiency Washing Machine Rebate Program was implemented. A $150 dollar rebate was offered for qualifying machines. The budgeted amount was for 100 machines for each fiscal year. Funding for the 2001-02 and 2002-03 fiscal years was fully utilized by January 2003….It is estimated that about 6 acre feet of water will be saved annually by these water efficient machines with considerable energy savings as a side benefit." Pg. 9

According to table entitled "Washing Machine Rebates," (Pg. 9), a total of 354 rebates have been given, with a total estimated savings of 5.97 afy.

"During 2005, 1,814 HUL were sent to single family residential customers. The program targets residential customers that use more than 50 units of water during a two month billing cycle between April and November. From the November through March, letters are sent to customers using more than 40 units during a billing period. Conservation staff developed a monitoring system in an effort to quantify the water savings resulting from this effort. Based on the data analyzed from 2003 through 2005, the HUL program is conservatively saving an average of 100 acre feet of water per year." Pg. 10

"There are about 450 irrigation only accounts in the City. Of these approximately 80 water budgets have been developed….The goal is to inform customers that they could reduce their water use and associated bills, if their irrigation systems were operated more efficiently." Pg. 11

"The commercial sector program focused on restaurant dishwashing hardware. The City, partnering with the California Urban Water Conservation Council (CUWCC) completed the installation of 100

water/energy efficient pre-rinse spray valves in restaurants, hospitals and grocery stores city-wide. Each valve will save about 50,000 gallons of water and 335 therms of natural gas per year. A majority of the program costs were funded through a California Public Utilities Commission grant which was administered by the CUWCC The City cost was $50.00 per valve. This included the valve, the canvassing and contact with the potential recipients and installation of the valve. The City's cost per acre foot of water saved, based on the life of the valve, is less than $10.00 per acre foot, with an estimated annual savings of about 20 acre feet per year." Pg. 11

"The water saved through Water Conservation Program, historically, has been the least cost option when looking at new sources of supply. The City has implemented numerous programs over the years which have resulted in a dramatic decrease in per capita water use. When evaluating the potential yield from a new conservation measure, it is very important to factor in the reliability of the program to achieve the estimated savings. That is why, in the past, toilet and showerhead replacement had been the cornerstones of the Water Conservation Program. Pg. 11

"As previously stated, numerous studies statewide are currently underway which are evaluating new water conservation technology. Advancements in irrigation technology equipment appears to be the next major source of water savings." Pg. 12

"The third area of focus will be to continue to improve our conservation efforts. Efficient use of our resources stretches the availability of our water supplies and has proven to be very cost effective." Pg. 13

SLO Rates: website

SFR	Inside City	Outside City
1-5 ccf	3.28	6.56
5-25 ccf	4.11	8.22
>25 ccf	5.14	10.28
All Other Customers		
1 to 5 ccf	3.28	6.56
>5 ccf	4.11	8.22

SUMMARY: California could reduce residential outdoor water use by 25% to 40% through landscape management, hardware improvements, and landscape design. Improved efficiency and increased conservation are the cheapest, easiest and least destructive ways to meet CA's future water needs by using technology, economics, smart regulation, information, and integrated water management strategies.
--Gleick, P.H., Haasz, D. Waste not, want not. Pacific Institute. http://www.pacinst.org/reports/. 2003.

SUMMARY: Residential water demand in US averages 26 billion gallons per day, 7.8 billion gallons per day dedicated to outdoor use, primarily lawn watering, (USGS, 1998).
--Vickers, A. Water use and conservation. WaterPlow Press. Amherst, MA. 2001.

SUMMARY: In 1995 Albuquerque adopted the Water Conserving and Water Waste Ordinance that established a 20% turf limit for residences and required all new city properties except parks and golf courses to landscape with 100% low and medium water using plants. Combined with a new conservation-based water rate structure, a public education program, a high-efficiency plumbing program, they successfully slowed down the draw down of the groundwater supply and reduced per

person usage 23% from 250 gallons per person per day (946 liters) in 1995 to 193 gpcd (730 liters) in 2003.
--Albuquerque, New Mexico: Long-range planning to address demand growth. Cases in water conservation: how efficiency programs help water utilities save water and avoid costs. US EPA. July 2002. http://www.epa.gov/owm/water-efficiency/utilityconservation.pdf

SUMMARY: Volusia County has become the first in Florida to pass an ordinance requiring new homes to have less grass: at least 25% of new yards must have landscapes requiring little or no irrigation. According to the Orlando Sentinel, "Florida homeowners now maintain more than 3.8 million acres of lawn with 50,000 acres of new grass planted every year."
--Florida county restricts lawns. WaterWiser, American Water Works Association. http://www.awwa.org/waterwiser/watch/archive.cfm. September 2004.

SUMMARY: New single and multi-family residences will have no more than 50% of the total irrigated landscape dedicated to high irrigation water use zones including turf, annuals, and vegetable gardens. Website includes checklists, diagrams, basic Florida water info, and landscape design and irrigation info.
--Sarasota County (Florida) Water Efficient Landscaping Regulations (Ordinance #2001-081). http://sarasota.extension.ufl.edu/WEL/ord/docs/ord.htm. 2001.

SUMMARY: The comprehensive landscape code adopted in 1991 applies to new multifamily, commercial and industrial development. Limits non-drought tolerant plants to a small 'oasis' areas (less than 5% of total). Requires water-conserving irrigation systems and the use of storm water run-off.
--Tucson, Arizona xeriscape landscaping and screening regulations- ordinance 7522. http://www.tucsonaz.gov/water/ordinances.htm. 1991.

SUMMARY: Ordinance prohibits property associations, both residential and commercial, from requiring mostly high water-use grass in yards. Intends to ensure that all property owners can choose to plant a xeriscape if they wish. Up to 20% can be planted in high water-use grass. Legitimate public interest, avoiding environmental damage caused by over pumping Albuquerque's ground water supply, was justification for this action.
--Albuquerque halts requirements for turf. WaterWiser. American Water Works Association. http://www.awwa.org/waterwiser/watch/. April 2004.

SUMMARY: As part of Castle Rock's ongoing campaign to reduce water consumption, home owner association leaders could face a $1,000 fine and risk arrest if they penalized home owners who want to use less grass and more drought-tolerant plants. Colorado State law prohibits new developments from mandating irrigated turf or banning xeriscaping. Castle Rock's ordinance applies to existing communities as well.
--Bunch, J. Prospects greener for lawn alternatives in Castle Rock. Denver Post. November 9, 2004.

SUMMARY: Recommended water saving features for homeowner controllers: 3 independent programs; station run times from 1-200 minutes; three start times per program; odd/even, weekly and interval program capability up to 30 days; water budgeting from 0-200%; 365 day calendar; non-volatile memory or battery back-up; "Off", "Auto", and "Manual" operation modes without disturbing programming; rain shut-off device capability; diagnostic circuitry to notify homeowner when station is shorted or power failure has occurred.
--Irrigation controllers: timers for the homeowner. US Environmental Protection Agency et al. http://www.epa.gov/owm/water-efficiency/index.htm. July 2003.

SUMMARY: Most irrigation inefficiency occurred during the fall. Sites maintained by contract landscapers were irrigated less efficiently. Sites less than two acres achieved the highest

percentage water savings. Audit water savings diminished over time (20.1%, 7.6%, and 6.5% over three years.)
-- *Whitcomb, J.B. Landscape water audit evaluation. Contra Costa Water District. August 1994*

SUMMARY: Notes Santa Clara Valley Water District's Irrigation Technical Assistance Program: 55% decrease in water use (TriNet example); North Marin study: water conserving landscapes use 54% less water; and Irvine Ranch Water District: pricing, water budgets, rebate and loan program, education and outreach very effective bringing water application to 60% of ET since 1995.
--*Gleick, P.H.; Wong, A.K. Sustainable use of water: California success stories. Pacific Institute. http://www.pacinst.org/reports/. January 1999.*

SUMMARY: Homeowner associations, schools, commercial sites, and public parks at 25 sites covering 83 acres were retrofitted with weather-based irrigation technologies (WeatherTrak-Hydropoint and Water2save LLC). These technologies reduced water use from 17 to 28 percent. Landscapes with dedicated irrigation meters saved 56 acre-feet per year, those with mixed-use meters saved 26 acre-feet per year. Program success depends upon landscaper participation and support and convincing customers of the dollar benefits they will experience.
--*Bamezai, A. Los Angeles Dept. of Water and Power weather-based irrigation controller pilot study. LADWP. http://www.cuwcc.org/uploads/product/LADWP-IrrigationController-Pilot-Study.pdf. August 2004*.

SUMMARY: Test controllers were installed in 40 homes. Compared to the reference group, the retrofit group had a 16% reduction in estimated outdoor use, 37 gallons per household per day. Post-trial survey indicated 97% of those with ET controllers found them convenient and improvement or no change to the appearance of the landscape.
--Hunt, T.; Lessick, D. et al. Residential weather-based irrigation scheduling evidence from the Irvine "ET Controller" study. Irvine Ranch Water District. http://www.irwd.com/welcome/FinalETRpt.pdf. June 2001.

SUMMARY: Chapter VII- Residential and Small Commercial Weather-Based Irrigation Controllers summarizes information about weather-based controllers. Irvine Ranch Water District estimated a 10% reduction in total household consumption with outdoor consumption reduced by 24%. Similar studies in Denver, CO, Sonoma, CA and Valley of the Moon, CA estimated 21%, 23%, and 28% declines in outdoor consumption. Programs must include significant levels of outreach and inclusion of green industry. Targeting of high-water users is important. Should tie to rates.
--*Koeller, J. A report on potential best management practices. Prepared for California Urban Water Conservation Council. August 2004*.

SUMMARY: Weather-based controllers resulted in water savings of 41 gallons per day in typical residential settings and 545 gpd for larger dedicated landscape irrigation accounts. Reduction in runoff was 50% comparing pre-intervention and post-intervention periods and 71% in comparison to the control group. In terms of cost effectiveness, initial targets for program expansion should be large landscapes such as parks and street medians.
--*Residential runoff reduction study. Municipal Water District of Orange County and Irvine Ranch Water District. http://www.mwdoc.com (Using Water Wisely). July 2004.*

SUMMARY: Best development practices that improve on-site management of storm water runoff include minimizing impervious surfaces, preserving native soil and vegetation, and establishing minimum soil quality and depth standards in landscaped areas. Requires a topsoil layer with a minimum organic matter content of 10 percent with a minimum depth of 8 inches. Subsoils to be scarified (loosened) at least 4 inches.
--*Manual 2002 guidelines & resources for implementing soil depth & quality. Washington State. 2002*.

SUMMARY: The District initiated the study to determine whether the installation of artificial turf impacts groundwater or surface water quality. Preliminary lab results indicated primary concern regarding heavy metals above secondary drinking water standards (zinc) and above current concentration in the groundwater basins (zinc, copper, barium, and chromium. Collection and treatment of water from sites where artificial turf is installed may decrease the water quality impacts of artificial turf. Other concerns include human health impacts and environmentally safe disposal.
--Ashktorab, H. Artificial turf. Santa Clara Valley Water District. Personal correspondence. 2/1/2005.

SUMMARY: Xeriscape sites used 17% less water than traditionally landscaped single family sites in a study of 382 homes.
--Nelson, J.O.; Kruta, J.C. Water saved by single family xeriscapes. 1994 Annual conference proceedings; American Water Works Association. June 1994.

SUMMARY: Study quantified savings estimates of what a xeriscape conversion facilitation program could yield under real world conditions. The Southern Nevada Water Authority's Water Smart Landscape Program produced a 37% positive return, bringing in $1.58 for each $1.00 spent on rebate incentives, freeing up local water resources for immediate use. The averages savings of 30% (96,000 gallons) annually for those who converted from turf to xeriscape. Residents applied 73 gal/sq ft/year to turf, 17.2 gal/sq ft/yr to xeric landscapes, a per unit area savings of 55.8 gal/sq ft/yr. The savings were most pronounced in summer. Total yearly savings neither eroded or improved across the years. The average cost to convert was $1.55/sq ft, homeowner installed $1.37, contractor installed $1.93. The xeric ETo was about 33% of the ETo of turf. The average savings in landscape management was 2.2 hours per month and $206 per year in maintenance expenditures.
-- Sovocool, Kent A. Xeriscape conversion study final report. Southern Nevada Water Authority. 2005

SUMMARY: In response to severe drought, Clark County School District is considering a plan to remove more than 2 million square feet of existing turf that could save an estimated 60 million gallons of water a year. With 289 schools and 189 acres of landscaping, the sixth-largest school district in the nation is the largest single water user in southern Nevada. Turf is being replaced with desert landscaping or artificial turf.
--Vegas-area schools consider removing turf to save water. WaterWiser, American Water Works Association from US Water News. http://www.awwa.org/waterwiser/watch/archive.cfm. September 2004.

SUMMARY: Metropolitan Water District of Southern California approved another $3.2 million for ongoing campaign to reduce outdoor water use by switching to drought-tolerant plants and setting sprinklers correctly. Outdoor water use can account for 40% to 70% of a home's total water use. The agency set up a website, www.bewaterwise.com, and partnered with The Home Depot and others to highlight drought-tolerant plants and offer classes. Cathedral City initiated a pilot program to offer residents up to $500 to transform front lawns to desert landscapes.
-- Bowles, J. Anti-drought push gets funds. Riverside Press-Enterprise. 10/13/2004.

SUMMARY: SNWA offers a range of free services and rebate programs to help homeowners and businesses become water smart including $1 per square foot for grass converted to xeriscape; irrigation clock upgrade rebates, a landscape awards program, and listing of water smart landscapers.
--Water Smart Rebates and Services. Southern Nevada Water Authority. http://www.lvvwd.com/html/ws_rebates.html. 2003.

SUMMARY: Provides comparative information on California water charges for a typical single family residence monthly water service charge for an assumed average water usage of 1,500 cubic feet

(11,000 gallons) per month. Of the 350 water purveyors surveyed, 49% used uniform rate structures, 41% tiered rates, 1% declining block rates, 9% some other rate structure. Down from 24% in 2001, 16% collected additional revenues from various sources such as grants, contributions from other funds, special assessments, general fund transfers and property taxes. The service charge is relatively comparable among the four regions of the state: Northern, Coastal, San Joaquin Valley and Southern, around $11 per month. The commodity charge is the main variant between typical bills in the four regions. Water costs for the San Joaquin Valley are one-fourth of that in the Coastal region and about one-half of that in Northern and Southern California.
-- *California Water Charge Survey 2003. Black and Veatch. 2003*.

SUMMARY: This study ooks at the revenue and rate implications of conservation programs in the short and long term and how water suppliers respond to reduced sales. Water conservation can help utilities avoid both fixed capital and variable operating costs by avoiding investments in unnecessary capacity to meet inflated demand. Conservation should be viewed as a means to lower the long term cost structure and thereby reduce the revenue requirements of the water utility. It is important to communicate benefits to the customers. The revenue effects of water conservation are manageable when viewed from a planning perspective and when planning and ratemaking are integrated.
-- *Chesnutt, T. Beecher, J. Draft white paper: revenue effects of conservation programs: the case of lost revenue. March, 2003*.

SUMMARY: Conservation pricing, separate meters and public education resulted in a 43% water reduction in landscapes. Eighty percent of landscaped acres are served recycled water.
--*Highlights of Irvine Ranch Water District's landscape conservation program. Water Conservation News. July 1997*.

SUMMARY: End use of water consumes more energy than any other part of the urban water conveyance and treatment cycle. By reducing peak demand, water conservation can eliminate or delay the need for expanding treatment facilities or decrease the size of the expansion needed and help avoid power shortages. Peak demand for water coincides with peak seasonal demand experienced by electrical utilities.
--*Cohen, R.; Nelson, B.; Wolff, G. Energy down the drain: the hidden costs of California's water supply. Natural Resources Defense Council and Pacific Institute. August 2004*.

SUMMARY: About 2,000 landscaping jobs in Colorado were lost between 2002 and 2003 because of continuing drought conditions, in the $1.67 billion industry including landscaping, nurseries, garden centers and commercial florists with revenues dropping $60 million. To increase business, some landscapers have added artificial turf to their businesses as well as designing landscapes with drought-tolerant plants and emphasizing more efficient irrigation systems. Sales of container gardens and drought tolerant plants soared. S. Nevada Water Authority banned sod planting in new residential front yards, limited grass to 50% in back yards, and offered rebates of $1 per square foot for turf removal.
-- Shore, S. Landscapers suffer as drought lingers throughout the West, strategies for a water crunch. Associated Press. 5/16/2004.

Sovocal, Kent A. *Xeriscape Conversion Study, Final Report, 2005.* Southern Nevada Water Authority.

"The experimental study involved recruiting hundreds of participants into treatment groups (a Xeric Study and a Turf Study Group and control groups), as well as the installation of submeters to collect per unit area application data. Data on both household consumption and consumption through the submeters was collected, as well as a wealth of other data. In most cases, people in the xeric study group converted from turf to xeriscape, though in some cases recruitment for this group was

enhanced by permitting new landscapes with xeric areas suitable for study to be monitored. Portions of xeric areas were then submetered to determine per-unit area water application for xeric landscapes. The TS Group was composed of more traditional turfgrass-dominated landscapes, and submeters were installed to determine per-unit area application to these areas as well. Submeter installation, data collection, and analysis for a small side-study of multi-family/commercial properties also took place.

"Results show a significant average savings of 30% (96,000 gallons) in total annual residential consumption for those who converted from turf to xeriscape. The per-unit area savings as revealed by the submeter data was found to be 55.8 gallons per square foot (89.6 inches precipitation equivalents) each year. Results showed that savings yielded by xeriscapes were most pronounced in summer. A host of other analyses covering everything from the stability of the savings to important factors influencing consumption, to cost effectiveness of a xeriscape conversion program are contained within the report."…" In the Mojave Desert of the southwestern United States, typically 60 to 90% of potable water drawn by single-family residences in municipalities is used for outdoor irrigation."

Whitcomb, J., Water Price Elasticities for Single-Family Homes in Texas for City of Austin, Stratus Consulting, April 1999.

"Studies done within the region have shown a price elasticity of approximately -0.20. This means that for every 10 percent increase in water prices a resulting 2.0 percent reduction in water use may be anticipated. Increase in average income must be factored in by the utility to determine the actual net impact on consumer perception and response to price. For planning purposes this number may be used."

Urban Water Pricing and Drought Management
Moncur, JET
"In periods of drought, urban water systems commonly rely on nonmarket programs to induce temporary conservation, leaving the marginal price of water unchanged; an alternative is to raise the price. Using pooled cross-sectional and time series observations on single-family residential customers of the Honolulu Board of Water Supply (1982), demand for water is estimated as a function of price, income, household size, rainfall, and a dummy variable denoting a water restrictions program. Short-run elasticities suggest that an increase in marginal price of less than 40% would achieve a 10% reduction in water use, even during a drought episode. An accompanying conservation program would mitigate the necessary price increase , but only slightly."

Water Resources Research WRERAQ Vol. 23, No. 3, p 393-398, March 1987. 2 fig, 4 tab, 19 ref.

Water Conservation Measures. **Municipal Research and Services Center of Washington (http://www.mrsc.org/)**

"One of the most effective tools for water conservation is the rate structure. Rate structures and practices that promote the efficient use of water should be the goal to ensure sufficient resources to meet competing uses."

Vickers, Amy. *Handbook of Water Use and Conservation.* Amherst, MA: 2001.

"Increased block rate structures, seasonal rate charges, and other pricing strategies may be used to help reduce demand." Pg. 143

"The Irvine Ranch Water District (IRWD) in Irvine, California, has used pricing strategies successfully to discourage excessive outdoor water use. By implementing an increasing block rate structure, the IRWD has reduced outdoor watering among customers by nearly 50%." Pg. 144

"This [water conservation] approach has saved considerable capital and operating costs for utilities and consumers, avoided environmental degradation, and built political bridges instead of walls." (Preface)

Hutchins-Cabibi, Taryn (Western Resource Advocates). *Better Water Rate Structures Can Encourage New Mexicans to Conserve.* February 2006.

"In a new report, *"Water Rate Structures in New Mexico: How New Mexico Cities Compare Using this Important Water Use Efficiency Tool,"* Western Resource Advocates and Professor Denise Fort of The University of New Mexico, School of Law, take a close look at the wide variety of water rate structures in New Mexico cities, ranging from those that promote efficient water use to those that actually encourage wasteful use. Report findings show that, with some adjustment, new water rate designs in New Mexico cities can better protect water resources while meeting urban water supply demands. The clear conclusion: if designed appropriately, increasing block rate structures are most effective at encouraging efficient water use."
-- *Hutchins-Cabibi, Taryn (Western Resource Advocates). Better Water Rate Structures Can Encourage New Mexicans to Conserve. February 2006.*

***Nipomo Community Services District Water and Sewer Financial Plans, User Rates and Capacity Charges, Final Report*. The Reed Group, 2006. Pg. 36**

"The typical single family residential customer in the Town Division uses an average of 32 HCF per bi-monthly billing period. The typical single family customer in the Blacklake Division uses an average of 38 HCF per billing period." Per table, fiscal year 2006-2007 typical charges are Town $64.18, Blacklake $68.65.

"*Where does my water come from?"* Water Education Foundation (http://www.water-ed.org)

About 30 percent of California's total annual water supply comes from groundwater in normal years, and up to 60 percent in drought years.

Stallworth, Holly. *Conservation Pricing of Water and Wastewater.* April, 2000. Environmental Protection Agency.

"The most frequent economists' response to the imperatives of environmental protection and resource conservation is to use the price mechanism more strategically. "Full costs" refers to the complete societal costs (environmental, social and actual) that pertain to the production and consumption of a good or service. Economics shows us that social welfare is maximized when all costs are reflected in prices. This is sometimes referred to as "full cost pricing" or the "polluter pays principle." Only then do our production and consumption decisions take into account all costs to society, resulting in the most appropriate balance of supply and demand. When prices are artificially low, we tend to consume too much. When prices are artificially high, we tend to consume too little…

"…From an environmental economics perspective, pricing can be an extremely valuable public policy tool. Prices can be more than a means of meeting revenue requirements or even turning a profit. Environmental economists have long advocated bringing the price mechanism more fully in line with "full costs" so that "users" might respond to "market signals" – reflecting the true and full costs of production and consumption. Since water is basic to life, and certainly to our quality of life, the pricing of water can be a powerful means of signaling this importance and scarcity to water users, most of whom experience very little connection between their water usage and their total bill. In our current era in which water demands are increasing while water supplies are constant or diminishing, it is important to apply economic tools to communicate the true value of fresh water. Pg. 4, 5

"…Water's importance to our survival renders it, quite literally, "priceless" but this intrinsic value of water is frequently left out under the traditional pricing method -- known as cost-based pricing -- which is an accounting system designed to ensure the financial self-sufficiency of water and wastewater systems.

"This pricing method quantifies the costs of capture, treatment and conveyance. As such, this method can often obscures the larger but less quantifiable societal interests in preserving our water resources. Moreover, given the very high fixed costs associated with water and wastewater facilities, cost-based pricing can predispose rate setting against variable (i.e. commensurate with usage) charges and thus can run counter to conservation goals.

"Cost-based pricing does not to be in conflict with conservation pricing. Supplementing cost-based pricing with incentives for consumers to manage demand is a combination that serves both financial and environmental goals. Another term that is sometimes used is "demand management pricing" to reflect the underlying motivation to lower water demand (or slow the rate of demand growth).

"Water and wastewater demand can be manipulated by price *to some degree*. Water for necessities (sanitation, cleaning and cooking) is far less responsive to price than water for more discretionary uses (lawn watering, car washing, swimming pools)…. Pg. 13, 14

"…Clearly, water is "inelastic", meaning that when the price increases, consumption decreases but at a lower rate than the increase in price. Unlike such large factors as the weather, population growth, local geology and hydrology, and the economy; water managers can influence water rates, albeit with an appreciation for the consumers' response. Moreover, utility managers need to consider that price increases will not likely affect the behavior of many middle and upper income groups. For these groups, stiffer price increases or other conservation strategies might be tried…. Pg. 14

"Prices can be used to modify customer behavior to use less water at the tap, stop and prevent leakage and waste, and send less wastewater for treatment. To achieve the efficiency gains that will enable water system managers to postpone the need for new capital outlays, water utilities and local governments will need to expand their toolkit to include the widest array of conservation-oriented initiatives using prices as well as measures like universal metering, water accounting and use audits, retrofitting and public education…Pg. 14

"…In addition to the politics of competing interests that can dominate rate setting, three key issues emerge: the service population's ability to afford higher rates, the effects of conservation rates on a utility's revenues, and their actual effectiveness in reducing water demand….Pg. 16

A&N Technical Services, Inc. ***BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.*** **March 2005.**

"An important step in conservation pricing is accounting for water demand's reponse to charges in the real price of water. A "first-order" estimate of demand response can be obtained by multiplying the scheduled change in price by a price elasticity (assuming Eta_{price} approx.=.09) to produce a predicted change in use. For example, 10 percent increase in price would yield approximately one percent decrease in use (DeltaP x Eta_{price} = .10 x (-.09)).

"The reason why predicting demand response is difficult is obviously not due to the intricate algebra—change in price times the price elasticity. Instead, demand response predictions go wrong because inaccurate values are used in the prediction. The change in price, DeltaP, should be expressed in inflation-adjusted "real" terms. When wastewater costs are recovered through a commodity charge on water use, this adds an additional price to water consumption that needs to be incorporated into the measure of price. The other parameter in the equation (the price elasticity parameter Eta_{price})

"Persistence: There are two applicable estimates of water savings that can result from conservation pricing:

1. Water reductions that can be expected in the long run, and
2. Water reductions that can be expected in the short run.

"Table 2 is an often-cited summary of empirical price elasticity estimates, taken from Dziegielewski, et al. (1991), refers to **long run** price estimates.

Table 2: Summary of Long Run Elasticity Estimates for Planning Purposes	
Single Family Residential Customers	Range of Estimates
Winter season	-.10 to -.30
Summer Season	-.20 to -.50
Multiple Family Residential Customers	
Winter season	-.00 to -.15
Summer season	-.05 to -.20
Source: Dziegielewski, et al. (1991)	

"Analysts should note that these ranges apply to long run price elasticity estimates for the purpose of long run water planning. These are the estimates that would be required for estimates of the long run costs that are avoided by implementation of conservation planning. *They are not sufficient for rate design and financial planning.*

"Revenue prediction for rate design requires a short run price elasticity estimate that would reflect the demand response possible within a one- or two-year period. Most of the published empirical literature on price elasticity focuses on long run estimates. Estimates of short run price elasticities are not as common. Table 3 is from CUWCC's Handbook on *Designing, Evaluating and Implementing Conservation Rate Structures*. It provides the following recommended ranges for short run price response.

Table 2: Summary of Short Run Elasticity Estimates for Planning Purposes	
Single Family Residential Customers	Range of Estimates
Winter season	-.00 to -.10

Summer Season	-.10 to -.20
Multiple Family Residential Customers	
Winter season	-.00 to -.05
Summer season	-.05 to -.10
Source: Designing, Evaluating, and Implementing Conservation Rate Structures, July 1997	

"In rate design, it is important not to make the mistake of using long run response estimates developed for planning purposes…"

Cases in Water Conservation. **U.S. Environmental Protection Agency, July 2002.**

Turf Replacemen: "Padilla and Torres (2004) report 398 gallons per day participant-weighted average savings at commercial and residential sites from a turf rebate program. Sovocool and Rosales (2004) report 33% reduction average, and 39% reduction in the summer months in terms of "main meter" overall consumption at single family residences. More relevant for large landscape is the decrease in mean irrigation use only. Irrigation use, in gallons per square foot per year, was 79 at turf sites and 17 at xeriscape sites. The City of Austin (1999) reports average water savings per participant site of 214 gallons per day in the summer compared to preexisting landscapes as a result of their landscape rebate program."
"Goleta established a water efficiency program that emphaxized plumbing retrofits, including high-efficiency toilets, high-efficiency showerheads, and increased rates. The program was highly successful, resulting in a 30% drop in district water use. Goleta was able to delay a wastewater treatment plant expansion."

"IRWD's primary conservation strategy was a new rate structure instituted in 1991. The five-tiered rate structure rewards water-efficiency and identifies when water is being wasted. The goal is to create a long-term water efficiency ethic, while maintaining stabile utility revenues. After the first year of the new rate structure, water use declinded by 19%. Between 1991 and 1997, the district saved an estimated $33.2million in avoided water purchases.
--*Cases in Water Conservation.* U.S. Environmental Protection Agency, July 2002.

"Since 1989, Tampa's water conservation program has included high efficiency plumbing retrofits, an increasing-block rate structure, irrigation restrictions, landscaping measures, and public education. Particular emphasis has been put on efficient landscaping and irrigation. Tampa's landscape evaluation program resulted in a 25% drop in water use. A pilot retrofit program achieve da 15% reduction in water use.
--*Cases in Water Conservation.* U.S. Environmental Protection Agency, July 2002.

HDR Engineering, Inc. **"Utility Billing System Enhancements, City of San Luis Obispo, Volume 1 – Utility Rate Structure Evaluation." March 2006.**

"Today, water conservation is more important due to constrained water resources in the west. In addition, as the cost of wastewater treatment has increased, many utilities have moved away from flat charges for residential sewer customers and have focused more on volumetric sewer rate structures, out of "fairness or equity" concerns on customer bills…."

"The State of California Urban Water Conservation Council (Water Council) was created to increase efficient water use across California. The Water Council's goal is to integrate urban water conservation with Best Management Practices (BMP's) into the planning and management of California's water agencies/utilities…since the early 1990's, there has been a fairly significant amount of research on the response to water demands, as a result of price. The Water Council

noted the following “lessons learned” concerning prices and demand in their recently drafted policy statement concerning water rate structures:

Lesson 1: Rates influence demand.
Lesson 2: “Price elasticity” is the percentage change in demand induced by a one percent change in price, all other factors being constant.
Lesson 3: Demand can be thought of as a sum of demand for different end-uses of water.
Lesson 4: Demand for outdoor use is more price elastic than demand for indoor uses.
Lesson 5: Demand for water during peak (summer) periods is greater than demand during off-peak (winter) periods.
Lesson 6: Reidential water demand is relatively inelastic. The response of residential demand to rate changes, though not zero, is relatively small.
Lesson 7: Demand is more elastic in the long-run than in the short-run.
Lesson 8: Demand is influence by forces other than price –including population growth, the economic cycle, weather fluctuation, and income growth.
Lesson 9: The response of demand is more difficult to predict for large changes in price….

“Water pricing in California does not generally reflect the true cost of water, nor the next increment of water supply.
Consumers generally pay relatively low rates for water, especially when compared to other resources such as electricity and gas.
If an individual user or business does not feel a personal responsibility for the amount of water used montly or annually, teghre is very little motivation to conserve.
New landscape water conservation technologies, design and plant alternatives, and metering options will not achieve the potential water savings unless the water customer is motivated personally or economically to reduce water use…
“…The Water Council’s draft policies do provide a definition of a conservation-based rate structure. It is as follows:

‘*A conservation rate structure encourages efficient water use and discourages waste by ensuring that customer bills communicate the full cost of providing water services, including the cost of new water supplies. A conservation rate structure shall: 1) provide a price signal to customers to reduce average or peak use, or both, and financial consequences for inefficient use; and 2) takes into account the long-term marginal cost rate structure options, water agencies should consider the feasibility of incorporating a peak season or excess use surcharge to encourage appropriate use throughout the year, taking into account the range of climatic and other conditions in their service area. Conservation rates shall be designed to recover the cost of providing service and billing shall be based on metered water use. A conservation rate structure shall also be fair and equitable across customer classes/sectors.’…*

“…The Water Council encourages utilities to incorporate a customer education process regarding the environmental and resource value of pricing for conservation and efficiency. It is also necessary to provide the customer with education as to how the rate structure works, resolving allocation variances and in remedying high water use….

“…The Calfiornia Urban Water Conervation Council does provide guidelines encouraging the adoption of volumetric-based sewer utilities. The water Council and other conservation experts believe that having volume-based sewer rates, where the billing is based upon water consumption, may encourage water conservation…”

“…The Water Council and other conservation experts believe that having volume-based sewer rates, where the billing is based upon water consumption, may encourage water conservation…”

"…In contrast to the water utility, implementation of the sewer rate structures, particularly for single-family residential customers, will require more thought. It is difficult to transition from a 10)% fixed rate to a 100% volumetric rate. Therefore, the City should consider some transition period where the fixed charge is reduced and the volumetric charge increased over time. The city certainly could implement a 10)% volumetric charge immediately but HDR's sense is that the City would receive a number of customer complaints concerning the change in the size of the bills. Customer education and information about the change in billing approaches will be an important element of the rate transition plan."

Water Conservation Programs—A Planning Manual (M52). **American Water Works Association. 2006.**

"Conservation-oriented water rate structures by themselves do not constitute an effective water conservation program. Rate structures work best as a conservation tool when coupled with a sustained customer education program. Customer education is important to establish and maintain the link between customer behaviors and their water bill. Utility customers require practical information about water-conserving practices and technologies. Participation in other water conservation programs, such as plumbing-fixture retrofit and replacement programs, can also be enhanced by rate incentives and customer education. Finally, public acceptance of rate structure changes is often enhanced if customers understand the need for and benefits of water conservation."

Wastewater User Charge Survey F.Y 2006-07. **State Water Resources Control Board, California Environmental Protection Agency, May 2007. http://www.swrcb.ca.gov/**

In a State Water Resources Control Board Wastewater User Charge Survey F.Y 2006-07, 926 surveys were sent, 753 agencies submitted completed surveys, 625 (83%) reported a fixed (flat rate) fee for residential customers. For San Luis Obispo County, 67% (12 of 18 agencies) use a flat fee for residential customers. Arroyo Grande, Avila Beach CSD, Cambria CSD, Grover Beach, Morro Bay and San Simeon use commodity-based charges.

What is the Infrastructure Problem, and What are the Solutions? **H2O Coalition. February 2001.**

"Even though water services have generally been under priced in this country relative to other utility and related services, raising rates significantly for water and sewer is at a minimum a major political and marketing challenge for utilities."

"To minimize any future drain on the Treasury, we believe the water industry should move toward becoming self-sustaining, like the electric, gas, and telecommunication utilities. Since this can happen only if utilities charge their customers full cost of service rates, any assistance program for the industry should be structured to assure water utilities, if they are not already doing so, eventually charge rates that cover the full cost of service. An additional benefit of full cost of service rates is they send the proper economic signals to consumers, helping to assure they make appropriate market choices."

Stavins, Robert. *As Reservoirs Fall, Prices Should Rise, an Economic Perspective.* Environmental Law Institute (The Environmental Forum, November/December 2006.

"…I can refill an eight-ounce glass 2,500 times with water from the tap for less than the cost of a single can of soda. Under these conditions, it is hardly surprising that we have so little incentive to conserve our scarce water supplies. Throughout the United States, water is under-priced. Efficient use of water will take place only when the price reflects the actual additional cost of making water available. Lest one fear that higher water rates would mean that Americans would go thirsty, take note: On average, each of us uses 183 gallons of water a day…There is plenty of margin for change if people are given the right price signals.

"Fifty years of economic analyses have demonstrated that water demand si responsive to oprice changes, both in the short term, as individuals and firms respond by making do with less, and in the long term, as they adopt more efficient devices in the home and workplace…

"But prices are typically set well below the social costs of the water supplies since historical average costs are employed rather than true additional (marginal) costs of new supplies….Although water scarcity typically develops gradually across seasons of low rainfall and low accumulations of snow pack, pronounced droughts are usually felt in the summer months of greatest demand. The economically sensible approach is to charge more at these times, but such "seasonal pricing" is practiced by less than 2 percent of utilities across the country."

"A reasonable objection to jacking up the price of water is that it would hurt the poort. But we can take a page from the playbook of electric utilities who subsidize the first kilowatt hours of electricity use with very low "life-line" rates. Indeed, the first increment of water use can be made available free of charge. Whatmatters is that the right incentives are provided for higher levels of usage.

"Droughts, like so many public policy dilemmas, present both challenges and opportunities. Inevitably, citizens and businesses do their best to cope with mandatory restrictions. And with equal inevitability, once droughts have passed and the restraints are lifted, they return to their previous habits of water use and abuse.

"….the affected areas can introduce progressive water pricing reforms that send the correct signals to individuals and businesses about the true value of this precious resource."

Simmons, Ann. *Palmdale Water Board Orders Conservation Measures.* Los Angeles Times. 08/30/2007

"The Palmdale water board voted unanimously Wednesday to clamp down on customers who ignore the city's voluntary water conservation policy, but rejected a resolution that would have imposed mandatory rationing -- at least for now… In May, the district asked its 25,000 customers to reduce water usage by 15% by voluntarily adopting many of these conservation policies, said General Manager Dennis LaMoreaux. But only a 5% reduction was achieved. The agency is now demanding that customers reduce their usage by at least 10%..."

Dobuzinskis, Alex. *Court Could Devastate Water Supply: Half of Southland's Imported Resources from North at Risk.* Los Angeles Daily News, 08/30/2007.

"Southern California officials are bracing for a federal judge's ruling that could cut back the local water supply from Northern California by up to 50 percent. U.S. District Judge Oliver Wanger could rule as early as today after hearing evidence this week in a case brought by the Natural Resources Defense Council that, to protect the endangered smelt fish, could force th state to temporarily shut down pumps in San Joaquin-Sacramento River Delta…Two-thirds of the Southland's imported water comes from the delta via the north-south California Aqueduct, up from ore than one-third several

years ago. The rest comes from the Colorado River, which used to provide 60 percent of the district's imported water but is now going through an unprecedented dry spell…"

If the Levees Fail in California. **Business Week (www.businessweek.com), 08/20/2007.**

"If you were to draw up a list of the most worrisome infrastructure risks facing America, the leak-prone network of levees that run east from the San Francisco Bay up to Sacramento would rank right near the top. This 2,600-mile-long system of berms protects half a million people, 4 million acres of farmland, and the drinking water supply for most of Southern California. Vulnerable to either an earthquake or flooding, it is "like a ticking time bomb," warns Lester Snow, director of the California Water Resources Dept. "

Duarte, Jesse*. Water shortage hurts Upvalley vineyards; St. Helena's lower reservoir at less than half its capacity.* Napa Valley Register, 08/31/2007.

"Water conservation measures and the threat of rationing have made St. Helena residents aware of the drought's effect on Bell Canyon reservoir. But the city's lower reservoir is hurting even more. Spring Mountain Vineyard and Robert Louis Stevenson Middle School have agreements with the city to use water from the lower reservoir. After the last rainy season yielded little rainfall, Public Works Director Jonathon Goldman told the vineyard and school that 2007 would be a difficult year. Unlike typical years when the lower reservoir spills over, it never got beyond 38 percent of its 160-acre-foot capacity this year, said Ron Rosenbrand, vineyard manager at Spring Mountain Vineyard. According to Rosenbrand, the drought will result in a 10 percent to 15 percent crop reduction at Spring Mountain Vineyard, although quality is not expected to suffer…"

Atagi, Colin. ***New Plans to Curb Water Usage.*** **Desert Sun, 08/31/2007.**

"As drought conditions continue to plague Southern California, Coachella Valley water suppliers have created conservation plans that will change how local developers landscape their projects. A revised Coachella Valley Water District landscaping ordinance, which goes into effect Oct. 1, reduces the amount of water new developments can use to create features within their existing plans. Under the new plan, a project site can have enough water for areas equivalent to 25 percent of the overall project…. It also regulates sprinkler systems, which - under the new plan - need to be 24 inches from curbs and driveways to prevent water from running off into streets. The sprinklers have to be operated by control systems that adjust to climate changes. The revised ordinance is expected to save 1,770 acre feet of water per year… Experts say water conservation in the desert is a top priority because of increased demand due to a combination of drought and development….In addition, the Colorado River's water supply has diminished, and levee problems have affected the Sacramento-San Joaquin river delta, which supplies much of California with water….The agency also is installing water-efficient landscaping outside its building. "You would certainly understand people's disdain if you say, 'Do as we say, not as we do,'" Luker said….Under CVWD's ordinance, golf courses are limited to 4 acres of grass per hole. "For an average golfer, that's what you need," La Quinta Resort and Club Golf Course Superintendent Glenn Miller said. He added golf courses around the valley support water conservation installed sprinkler systems with lower trajectory. Also, many use water-efficient turf. "It is our part. We're on board with it," Miller said.

Curiel, J. ***Forced water conservation could follow dry winter*. San Francisco Chronicle. 09/05/2007**

“A federal judge’s ruling that limits the amount of water that can be pumped out of the San Joaquin-Sacramento River Delta increases the likelihood of rationing in much of the Bay Area if the coming winter is as dry as the last one, water officials said Tuesday.

Agencies that supply water to millions of customers in Santa Clara County, the Livermore area and other places dependent on the delta described Friday's court decision as the back half of a double whammy that started with last winter's skimpy storm totals.

"We are looking at the potential for mandatory conservation, but we're not going to know until we get into late January or early February," said Susan Siravo, a spokeswoman for the Santa Clara Valley Water District, which serves 1.7 million residents and gets half its water from the delta. "Here in Silicon Valley, people don't connect the delta to the Bay Area. They think, 'What does that have to do with me?' But it does."…”

Rogers, P. ***Water rationing could be on horizon; Ruling on delta fish may limit supply pumped to valley.*** **San Jose Mercury News. 09/05/2007**

“Silicon Valley may be heading toward its first mandatory water rationing in 16 years, after a federal judge's decision to protect a tiny endangered fish by reducing the amount of water that can be pumped from San Francisco Bay's delta.

Santa Clara Valley Water District officials said Tuesday that they will produce a range of options - including mandatory rationing - by November for the district's board to consider for 2008. …”

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1 Weiser, M. ***Less Delta water means dry times; Calls to redesign the estuary follow order to curtail pumping.*** **Sacramento Bee. 09/06/2007**

2

“….Stephen Patricio, chairman of the Western Growers Association, estimated economic effects in the farm sector from the court order could reach $400 million next year -- if the state is blessed with normal rainfall. Zlotnick said his agency may have to reduce the amount of water projected to be available for new housing and commercial development. While some blamed the judge and environmental laws for causing the cutbacks, others said it was only a matter of time. Rep. George Miller, D-Martinez, said California has long relied too heavily on the Delta as a water supply even as danger signs mounted. A longtime Delta advocate, he said the solution involves prioritizing how we use water and adopting aggressive conservation measures….

"We're going to have to call for unprecedented levels of conservation from our 18 million customers," said Roger Patterson, assistant general manager of the Metropolitan Water District of Southern California, the largest urban consumer of Delta water.

Not everyone sees the pumping cutbacks as a calamity. Peter Gleick, president of the Pacific Institute, a nonprofit think tank in Oakland, said the pumping slowdown represents a prime opportunity to reconsider how water is used in California. Gleick said it is critical for urban and agricultural interests to use water more efficiently. "There's enough water for healthy agriculture and a healthy economy, but there's not enough to waste or use inefficiently," he said. He gave numerous examples: Replace 6-gallon-per-flush toilets with 1.6-gallon models and top-loading washing machines with more efficient front-loaders. Use precision sprinklers to irrigate fields and shift from growing crops that use lots of water to those that require less.

Gleick noted that four farming staples -- rice, cotton, alfalfa and irrigated pasture -- use about half of the agricultural water in the state but produce a small fraction of agricultural income.

"I'm not saying, 'Don't grow cotton or alfalfa' " Gleick said, "but it is worth discussing how much we grow. These have been taboo discussions in the past."…'

Dobuzinski, A. *Water shortage ominous; Rationing may surface in Southland next year.* LA Daily News. 09/05/2007

"Southern California water officials are drawing up plans that could force rationing in some cities as early as next year, officials said Wednesday. For now, residents are being asked to voluntarily use less water, but the Metropolitan Water District of Southern California warned that mandatory rationing could become necessary for the first time since 1991. …. The MWD is preparing an allocation plan that would spell out how much water it might be able to provide the 26 cities and water agencies that it serves in six counties, including Los Angeles and Ventura counties, said Roger Patterson, the district's assistant general manager.

If the district tells its members it has less water to provide them, it would be up to them to decide how to ask residents to cut back. "The question is how soon do we need to go into that kind of decision-making. Do we have to do that in 2008, or do we rely on our reserve account - or (banked water) savings - to not do that in 2008? Those are the policy decisions that will be made." The district imports about 50 percent of the water used by member agencies. About two-thirds of the water comes from the delta and the rest from the Colorado River. The amount of water the district stands to lose from the court decision amounts to more than 10 percent of all the water its members use in a typical year. In the city of Los Angeles, which relies on the district for nearly 70 percent of its water, officials already are asking residents to use 10 percent less water this year. But it's a voluntary program. "If we have rationing in Los Angeles, it won't be the first time that that has happened," said David Nahai, president of the board of the Los Angeles Department of Water and Power Commissioners. "If that is what will be needed in order to safeguard our water supplies, well, so be it. But we'll have to see just what this plan is that Metropolitan Water District will be putting forward." …"

J. Bowles, J. Miller. *Ruling spurs 'great deal of uncertainty' over water supply*. Riverside Press Enterprise. 09/05/2007

"Another dry winter coupled with a judge's ruling that will severely reduce water supplies coming to the Inland region could lead to mandatory conservation measures in some areas, officials said Wednesday.

But most agencies said they would drill new wells, possibly increase water rates to customers who use large amounts and take other steps before forcing residents to conserve…. Metropolitan Water District, whose customers include suppliers in western Riverside County and southwestern San Bernardino County, said it will create an emergency plan by November for possible cutbacks to its member agencies. The Inland area gets about one-third of its water from the delta. Board members "want to have that tool available in the event we don't see a very good winter and we find ourselves wanting to use it," said Roger Patterson, MWD's assistant general manager. "The bottom line on this is that we moved into an area of tremendous uncertainty as to where we go from here," Patterson said. "It makes it hard for us to provide a reliable water supply to our customers."… John Rossi, general manager of Western Municipal Water District, said a cutback of 20 percent or more will spur the district that serves the western half of western Riverside County to look at some sort of mandatory conservation. He said it's likely to focus on outdoor watering, which can account for 60 percent of a home's water use…. Tim Quinn, president of the Association of California Water Agencies, said that while the judge's order will last a year, "the crisis is indefinite." Randy Van Gelder, general manager of San Bernardino Valley Municipal Water District, which imports delta

water for several cities, said unlike a natural drought, this decision can have lasting impacts. "We've had droughts that have lasted one or two or three years, the potential here, though, because you're dealing with saving an endangered species, this could become a permanent way of life, not just a temporary drought," said Van Gelder…. Wanger's ruling "introduces a great deal of uncertainty into the water supply," Snow said. "This won't be the last court case, it won't be the last disaster in the delta, unless we proceed in a very, very comprehensive fashion dealing with conservation, storage, conveyance, wastewater recycling -- the entire package."… Even before the ruling, the Inland region's major water sources were in bad shape. The Colorado River is gripped by an eight-year drought; the water content of the Sierra Nevada snow pack was at its lowest level since 1990; and snowfall in local mountains that feed aquifers was 30 percent of normal. Rainfall this past season in Riverside was 1.93 inches, making it the driest year since at least 1883. Typically, it averages 10 to 12 inches. If the dire water situation persists, agencies might consider an increase in rates as an incentive to get people to conserve. "You see a number of areas in Southern California where they're talking about adopting a rate structure that if you use more than a certain amount of water, you pay a penalty," Van Gelder said. "We're not looking at that yet."… Susan Lien Longville, director of the Water Resources Institute at Cal State San Bernardino, said Inland agencies have increased their water-conservation activities. But she said it's also hard to talk conservation to residents when they see large parks and other public places irrigating several acres of water-thirsty grass. "We need to set a good example," she said. "I suspect you'll see that more."…"

***Valley Farmers May Have To Cut Back With Water Reduction Plan*. ABC Channel 30. 09/05/2007**

"A federal judge's decision to protect the threatened Delta Smelt put a limit on the amount of water released from the reservoir. But farmers in central California worry there won't be enough water for crops next year. Farmers continue to flinch at the news their water supply could be cut considerably next year. 25 million Californians rely on Delta water but maybe none more than local growers…. Stephen Patricio, Western Growers Association, says "When farm workers don't go to work the entire economy feels it."… Meanwhile Beene says he and other farmers have to go back to the drawing board and find ways to stretch out what little water's available. The federal judge has order the water reduction plan to begin in December. Beene says unless the valley receives plenty of rain this winter, he will consider cutting jobs…."

***Mandatory water restrictions for San Lorenzo Valley residents*. Associated Press. 09/06/2007.**

"BOULDER CREEK, Calif. -- A dry winter and failure by residents to conserve water have led officials to impose mandatory restrictions that include a ban on daytime outdoor watering. This week's restrictions follow requests by the San Lorenzo Valley Water District that residents voluntarily reduce water usage by 15 percent. Usage by customers in Boulder Creek, Brookdale, Ben Lomond, Zayante and Scotts Valley dropped only 2.5 percent. "Apparently, there's just not enough of the people who are doing their part," water agency director Jim Mueller said. The district sent letters to its 5,900 customers telling them it was necessary to cut water consumption 20 percent, and that the mandatory restrictions were now being imposed.
Mueller said water rationing and fines would come next if the newest conservation effort didn't work. The mandatory restrictions include no outdoor watering between 9 a.m. and 6 p.m., no washing at all of sidewalks, patios, decks, driveways and exterior building walls, and no car washing except with a bucket and hose with a shut-off nozzle…"

***Contingency plans drawn up for possible SoCal water rationing*. Associated Press. 09/06/2007**

“LOS ANGELES—Contingency plans currently being drawn up could force Southern California water officials to order rationing next year. .. "If we have rationing in Los Angeles, it won't be the first time that that has happened," said David Nahai, president of Department of Water and Power commissioners. "If that is what will be needed in order to safeguard our water supplies, well, so be it. But we'll have to see just what this plan is that Metropolitan Water District will be putting forward." …”

DRAFT BUDGET: CONSERVATION AND PUBLIC OUTREACH SPECIALIST, FY 2007 - 2008

WATER CONSERVATION SHARED EXPENSES:

Publications/ Outreach Literature

Bill Stuffers (12 mailings, $800 ea	$9,600
Brochures/Flyers (out-source print)	$7,000
PrePrinted Materials	$4,000
Postage & mailing svc. (2/yr) 8000 @ $1.00 ea	$8,000
One-time charge for WUIW logo rights	$2,500
	$31,100

WORKSHOPS

Irrigation x 2		
Stipend x 2		$600
Hospitality x 2		$100
Advertisement	($400 ea)	$800
Support Materials		$100
Soil/Compost x 2		
Stipend x 2		$600
Hospitality x 2		$100
Advertisement	($400 ea)	$800
Support Materials		$100
Xeriscape, California Natives x 2		
Stipend x 2		$600
Hospitality x 2		$100
Advertisement	($400 ea)	$800
Support Materials		$100
Water Conservation x 2		
Stipend x 2		$600
Hospitality x 2		$400
Advertisement	($400 ea)	$800
Support Materials		$100
		$6,700

Advertisement

$12,000

Customer Promotional/Giveaway Items

$8,000

Water Audits

Up to 120 SFR audits. **$14,175**

Free Small Area Landscape Designs for Customers

$1,000

School Outreach Program

STUDENT ART CONTEST

Prizes	$600
Publicity/ads	$300
Calendar production from 12 winners	$500

CLASSROOM SUPPORT

Environthon, Nipomo HS	$500
Science Discovery	$4,000
Student Books, Materials	$500
Educational DVD's for borrowing	$500
	$6,900

Events

Entry Fees	$1,000
Misc. Supplies	$500
	$1,500

WATER CONSERVATION SHARED EXPENSES TOTAL: $81,375

WATER CONSERVATION REBATES/ GIVEAWAYS:

Rebates/ Giveaways

Washing machine rebates, $100 ea (365)	$36,500
Outdoor (nozzle, soil moisture probe, rain guage, lawn sprinkler timer, water-drop wheel) 250 sets @ $18.19 ea.	$4,548
*Indoor (showerhead replacement, teflon tape, toilet leak detector, faucet aerator, shower timer) 250 sets @$24.84 ea.)	$6,210
PILOT PROGRAM: Turf replacement program ($0.48/ft2, max. 1000 ft2=$480), (10)	$4,800
	$52,058

WATER CONSERVATION REBATES/ GIVEAWAYS: $52,058

OTHER:

PROFESSIONAL DEVELOPMENT

Conferences	
Fees	$1,000
Lodging	$1,000
Transportation	$600
Sustenance	$500
Water Conservation Practitioner Certification	$600
Books, Magazines	$300
Membership, Professional Organizations	$300
Water Audit Certification Maintenance	$500
	$4,800

PROFESSIONAL DEVELOPMENT TOTAL: $4,800

TOTAL BUDGET FOR PROGRAM: $138,233

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Volumetric: Rate charged per increment of sewer flow; based on metered volume (water consumption).

Volume Based: Calculated based on average water usage during winter months (flat rate based on average water usage during winter months)..