Water Conservation in Santa Clara County Schools

Proposition 50
Water Code Chapter 7
2004 Water Use Efficiency

Grant Application Submitted To The:

California Department of Water Resources
Office of Water Use Efficiency
1416 Ninth Street, Room 338
Sacramento, CA 95814
Attention: Debra Gonzalez (916) 651-7026

By The:

Santa Clara Valley Water District

January 11, 2005

Santa Clara Valley Water District

Cover Letter

January 11, 2004

Debra Gonzalez
California Department of Water Resources
Office of Water Use Efficiency
PO Box 942836
Sacramento, California 94236-0001

Dear Ms. Gonzalez:

This proposal seeks grant funding to implement conservation measures in the schools of Santa Clara County. Elementary, middle and high schools have a large number of toilets, urinals, pre-rinse spray valves, showerheads, cooling towers, acres of irrigated landscape, and other technologies. Many of these schools are aging; however, school staff members have limited time and budget to efficiently retrofit plumbing and irrigation systems. Colleges and universities also present opportunities for conservation. We propose to co-fund conservation implementation at the schools with the requested grant funds and the ongoing SCVWD conservation programs.

Please contact us if you have questions or if we can provide additional information.

Thank you for your consideration.

Sincerely,

Hossein Ashktorab, Ph.D.

Manager, Water Use Efficiency Unit

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Project Information Form

Applying for: ☑ Urban ❑ Agricultural

1. (Section A) **Urban or Agricultural Water Use Efficiency Implementation Project**

   ☑ (a) implementation of Urban Best Management Practice
   ❑ (b) implementation of Agricultural Efficient Water Management Practice, #_____
   ❑ (c) implementation of other projects to meet California Bay-Delta Program objectives, Targeted Benefit # if applicable _____
   ❑ (d) Specify other: _____

2. (Section B) **Urban or Agricultural Research and Development; Feasibility Studies, Pilot, or Demonstration Projects; Training, Education or Public Information; Technical Assistance**

   ❑ (e) research and development, feasibility studies, pilot, or demonstration projects
   ❑ (f) training, education or public information programs with statewide application
   ❑ (g) technical assistance
   ❑ (h) other

3. Principal applicant (Organization or affiliation): Santa Clara Valley Water District

4. Project Title: Water Conservation in Santa Clara County Schools

5. Person authorized to sign and submit proposal and contract:

Name, title	Hossein Ashktorab, Ph.D., Unit Manager
Mailing address	5750 Almaden Expressway, San Jose, CA 95118
Telephone	
Fax.	(408) 265-2607, ext. 2291
E-mail	(408) 979-5639
	hashktorab@valleywater.org

6. Contact person (if different):

Name, title.	Karen Morvay, Water Conservation Specialist
Mailing address.	5750 Almaden Expressway, San Jose, CA 95118
Telephone	(408) 265-2607, ext.2707
Fax.	(408) 979-5639

E-mail	Kmorvay@valleywater.org

7. Grant Funds requested (dollar amount):	**$479,438.00**
8. Applicant funds pledged (dollar amount):	$666,746.00
9. Total project costs (dollar amount):	$1,146,184.00
10. Percent of State share requested (%)	42%
11. Percent of local share as match (%)	58%
12. Is your project locally cost effective? *Locally cost effective means that the benefits to an entity (whether in dollar terms or qualitatively) of implementing a program exceed the costs of that program within the boundaries of that entity.*	❑ (a) yes ☑ (b) no
13. Is your project required by regulation, law or contract?	❑ (a) yes ☑ (b) no
14. Duration of project (month/year to month/year):	12/05 to 12/08
15. State Assembly District where the project is to be conducted:	20,21, 22, 23, 24, 27 & 28
16. State Senate District where the project is to be conducted:	10, 11, 13 & 15
17. Congressional district(s) where the project is to be conducted:	14, 15, 16 & 17
18. County where the project is to be conducted:	Santa Clara
19. Location of project (longitude and latitude)	-121.87333 / 37.24806 (Santa Clara Co.) *Maps of the service areas are attached.*
20. How many service connections in your service area (urban)?	407,481 (Santa Clara Co.)
21. How many acre-feet of water per year does your agency serve?	400,000 AF Santa Clara Co.
22. Type of applicant (select one):	❑ (a) City

- ❑ (b) County
- ❑ (c) City and County
- ❑ (d) Joint Powers Authority
- ☑ (e) Public Water District
- ❑ (f) Tribe
- ❑ (g) Non Profit Organization
- ❑ (h) University, College
- ❑ (i) State Agency
- ❑ (j) Federal Agency
- ❑ (k) Other
- ❑ (i) Investor-Owned Utility
- ❑ (ii) Incorporated Mutual Water Co.
- ❑ (iii) Specify _____

23. Is applicant a disadvantaged community? If 'yes' include annual median household income.

    (Provide supporting documentation.)

- ❑ (a) yes, _____ median household income
- ☑ (b) no

Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the proposal;

The individual signing the form has the legal authority to submit the proposal on behalf of the applicant;

There is no pending litigation that may impact the financial condition of the applicant or its ability to complete the proposed project;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant;

The applicant will comply with all terms and conditions identified in this PSP if selected for funding; and

The applicant has legal authority to enter into a contract with the State.

_____	_____	_____
Signature	Name and title	Date

Statement of Work, Section One:
Relevance and Importance

Goals and Objectives

The Santa Clara Valley Water District (hereinafter referred to as the "District") manages Santa Clara County's wholesale drinking water resources, coordinates flood protection for its 1.7 million residents and provides stewardship for the county's 10 reservoirs and more than 700 miles of streams.

The goal of this project is to improve water use efficiency at the schools of Santa Clara County for the purposes of saving water, money, and to reduce the environmental impacts of water consumption.

Overarching Goals:

- Conserve water;
- Reduce impacts of over watering (contamination in runoff, hardscape damage, mosquitoes, etc.);
- Improve the environment of the Bay-Delta ecosystem;
- Provide leadership through example;
- Support BMP implementation and other existing programs; and
- Save the schools money by reducing water waste.

Specific Objectives:

- Conduct comprehensive indoor and outdoor water surveys at schools in Santa Clara County—focusing primarily on public schools, but not excluding private schools, colleges, and universities;
- Include landscape and indoor water use;
- Develop program to finance, implement, and maintain management of conservation measures recommended by the audit (District program funding, grant funding, or other sources);
- Continue coordination with each school starting before the audit and continuing after implementation; and
- Monitor progress and evaluate effectiveness in terms of achieving reliable water savings.

Need for the Project

The following need characteristics are most prevalent in the public schools, which are the primary focus of this proposal. Some private schools face similar challenges or otherwise present significant opportunities for conservation. Furthermore, institutions of higher education—community colleges and universities—also may present significant opportunities for conservation.

There is a real need for this project because schools:

- Have limited staff to plan, implement, and manage water conservation activities;
- Do not want to risk school disruptions during construction--they are risk averse;
- Do not have the time to investigate and navigate resources at SCVWD and other utilities (rebate programs, incentives, technical expertise, etc that exists already);
- Can hire a contractor to do a survey or to implement conservation measures, but do not: a) have the budget to do so, and b) know the ins and outs of the water/wastewater utilities, regulations, pricing structures; and c) have the staff resources to provide the follow through to assure it really works and stays working over time; and
- Have experienced significant growth in the school age population over the past decade.

Money is short in public schools. "Compared to the 10 most populous states, California ranks third from last in expenditures per pupil, lagging far behind the leader, New York, which spent $11,588 per pupil. California spent $7,244 per pupil." (Santa Clara County Office of Education Annual Report 2003-04).

Student enrollment in Santa Clara County Public Schools (Kindergarten through grade 12) is 251,198 (*Education Outlook*, Fall 2004, SCCOE), representing about 4 percent of California's statewide school enrollment (SCCOE, 2004, URL: www.sccoe.k12.ca.us). Total enrollment in the public schools has increased by 6.7 percent in the past 10 years. Table 1 shows the number of public school districts and school sites in Santa Clara County. Figure 1 is a map of the County and its school districts.

Table 1 – Public School in Santa Clara County

Number of Public School Districts	
Elementary	21
High School	5
Unified	6
Community College	4
Total K - 14 Districts	36
Number of Public School Sites	
Elementary Schools	243
Middle Schools	59
High Schools	46
Total K - 12 Sites	348
Community Colleges	7
Total K - 14 Sites	355

Private schools have wide variation in enrollment and facilities. A total of 35,569 (12 percent) school-aged children in Santa Clara County are enrolled in private schools (*Education Outlook*, Fall 2004, SCCOE).

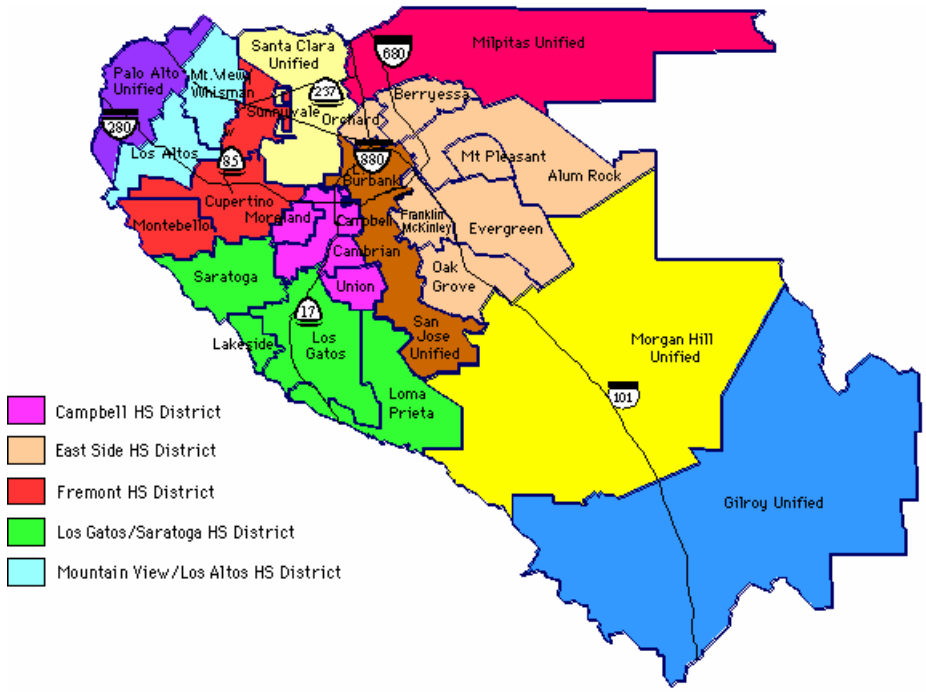

Figure 1 – Santa Clara County School Districts

Colleges and universities include more than just the community colleges listed in Table 1; these facilities commonly have extensive large landscape and numerous plumbing fixtures.

Consistency with Water Management Plans and Integrated Water Resources Planning Study

Integrated Water Resources Planning Study (2003). The Integrated Water Resources Planning (IWRP) document, developed with input from local stakeholders, is the district 's primary water supply management planning tool. The IWRP identifies maintaining a diversified water portfolio as an important element in meeting long-term water reliability, and local programs such as water use efficiency are recommended ways to diversify future investments. The IWRP analysis includes risk scenarios, and it then uses conservation to meet reliability targets. As such, the school water conservation project proposed herein would directly support the IWRP objectives by developing and disseminating water efficient technology and methods. The IWRP 2003 recommendations include a goal of 92,000 acre-feet in water conservation savings by year 2020 (as measured from a 1992 datum, the start of the district's water conservation programs) and 20,000 acre-feet of recycled water by year 2010.

Urban Water Management Plan (2001). The school conservation project is consistent with the conservation activities in the UWMP, in particular with the landscape conservation derived from implementing large landscape conservation (BMP 5) and CII ultra low flush toilet replacements (BMP 9). The UWMP provides a detailed description of the conservation activities at the District. The District's Water Conservation Program has been developed in large part to comply with the BMP commitments, as defined in the 1991 Memorandum of Understanding Regarding

Urban Water Conservation in California (MOU). The program targets residential, commercial/industrial, and agricultural water use. The District enjoys a special cooperative partnership with the water retailers in regional implementation of the BMPs. Several program elements have been developed in partnership with local retail water suppliers and the City of San Jose.

Other School Planning Activities. To assure consistency with other school planning activities, the project staff will coordinate with plant facility managers at targeted schools. The project will coordinate with existing school facility plans and maintenance activities. To increase coordination and to guide efforts to implement conservation in schools, the following will also be reviewed early on in the project: 1) Previous conservation activities by SCVWD and retailers with schools; 2) School renovation plans, and 3) Current landscape practices and contracting arrangements. The project team will coordinate implementation plans so as to minimize disruption to the school activities.

Implementation of Water Demand Management Activities

Table 2 (reproduced from UWMP 2001, Figure 4-7) provides a brief summary of implemented water demand activities in the past. The table shows the demand reductions resulting from both active and passive conservation. Using 1992 (the first year of the District's conservation program) as a baseline, year 2020 water demand in Santa Clara County is estimated to be approximately 67,000 to 72,000 af/year less than it would have been in the absence of water conservation activity. Changing the baseline year to 1997 (consistent with that used in the demand projection) reduces the range to approximately 53,000 to 58,000 af/year. Active savings account for 41 percent to 46 percent of the total projected demand reduction.

Table 2 – Demand Management Projections

Figure 4-7
Demand Management Projections Summary

Demand Component/ Conservation Program	Demand Reduction 1992-2020 (af/year)	Demand Reduction 1998-2020 (af/year)	Percent Attributed to Active Demand Reduction	Percent Attributed to Passive Demand Reduction
Residential Toilets	24,300	17,600	26%	74%
Residential Washers[1]	2,000-7,200	1,900-7,200	4-80%	20-96%
Residential Showers	7,000	4,200	3%	97%
Residential Faucets	4,000	1,600	0%	100%
Residential Leaks	2,300	2,300	100%	0%
Residential Landscape	9,200	8,800	100%	0%
CII[2] (all uses except toilets)	9,800	9,000	100%	0%
CII Toilets	7,400	6,200	9%	91%
Agricultural	1,000	1,000	100%	0%
Total	**67,000-72,000**	**53,000-58,000**	**41-46%**	**54-59%**

[1] The wide range for these figures is due to uncertainty regarding whether an efficiency standard for clothes washers will be adopted by the U.S. Department of Energy. Without a standard, 80 percent of savings will be active; with a standard only 4 percent will be active.
[2] Commercial/Industrial/Institutional

Outdoor Water Demand Management Activities:
Large Landscape. BMP 5 calls for agencies to commence assigning reference evapotranspiration-based (ETo) water use budgets to accounts with dedicated irrigation meters and providing water-use audits to accounts with mixed-use meters by July 1, 1999. Through the Irrigation Technical Assistance Program (ITAP), since 1995 the District has offered and provided large landscape water audits to sites in the County with one acre or more of irrigated landscape. A pre-screening mechanism was also incorporated which determines whether the site is over its ETo budget prior to conducting a full-scale audit. Landscape managers are provided with water-use analyses, scheduling information, in-depth irrigation evaluation, and recommendations for affordable irrigation upgrades. Each ITAP site receives a detailed report upon completion of the audit. An annual report is generated to recap the previous year's efforts. To generate several reporting and monitoring options, water use history, meter numbers, account numbers, and site contacts and addresses are captured for each site in a specialized database.

This highly successful and well-received program has conducted over 600 audits to date. This program is achieving potential water savings of 1,921 af/year. These audits will be credited towards the new BMP requirement. The District's staff is currently working on a comprehensive program to develop ETo-based water-use budgets for dedicated irrigation meters by using aerial images and GIS techniques.

Indoor Water Demand Management Activities:
Commercial Toilet Program. A total of 5,000 toilets were replaced in CII sites during the District's toilet rebate program, which ran from 1992 to October 31, 1999. Nearly 2,000 have been installed in the last several years. Additionally, the District reimbursed the City of San Jose for toilets replaced through their institutional programs (City facilities and schools: 1,102 toilets) and CII voucher program (1,846 toilets) between January 1, 1998 and June 30, 2000. The District is currently developing a program to target replacement of toilets in restaurants, gas stations, and wholesale/retail establishments, where there are greater water savings opportunities.

Further Implementation and Addition of Conservation Activities

The District has shown and will continue to show steady commitment to conservation activities. The proposed school conservation program is one way the district is furthering implementation and adding to conservation activities over time. The proposed program addresses a shortfall of previous work in that it provides the outreach to address a customer class that has not fully utilized conservation technologies and methods that exist because of time and budget constraints.

The District has implemented a school education program that includes providing educational materials and instructional assistance. In 1994 the District's Public Information Office hired a full-time, fully credentialed educator who holds lifetime teaching and Administrative Services credentials to coordinate the school education programs. This included developing school programs, contracting with the Youth Science Institute for additional instructors, and supervising university student interns as classroom assistants. The District has been continuously active in this area by

providing free classroom presentations, puppet plays, and tours of District facilities to schools within the County. The objective is to teach students about water conservation, water supply, watershed stewardship and flood protection. The District also provides school curricula to area educators, including workbooks and videos, as well as hands-on training for teachers. The goal of the program is to reach 15,000 students per year, ranging from pre-Kindergarten through college.

The proposed program builds on the District's experience implementing the Water Efficient Technologies (WET) program to educational institutions. Schools have had very limited use of the WET program due to time and budget constraints. In FY 02-03,the district expanded the Water Efficient Technologies (WET) program to include Morgan Hill, San Martin, Gilroy, Palo Alto, Mountain View, Los Altos, Los Altos Hills and Sunnyvale. These cities join the rest of the county in the WET program, which for the last six years has been cost-shared by the district and the City of San Jose for users within the San Jose/Santa Clara Water Pollution Control Plant tributary area only. The district continues to cost-share the program with the City of San Jose, but covers total cost for the program expansion. The WET program offers rebates between $400 and $50,000 to commercial, industrial, and institutional water customers for making process and equipment changes which reduce water use and wastewater flows. Beyond the initial rebate amount, participants continue to save year after year on water and sewer fees; energy and chemical costs may also be reduced. The District's expanded WET program currently has four water conservation projects underway. Stanford University, Stanford Hospital, Advanced Micro Devices, and Palo Alto Unified School District are all in the final stages of the WET application process and are monitoring the water savings resulting from their projects.

Statement of Work, Section Two:
Technical/Scientific Merit, Feasibility

Methods, Procedures, Equipment, and Facilities

The methods included in this project include site identification; indoor and outdoor water surveys, landscape irrigation repair and upgrades, indoor plumbing replacements (ULF toilets), and monitoring and tracking.

Site identification and Outreach. The process of site identification is designed to locate the most fruitful targets for the program. For example, new facilities are more likely to have new equipment and may not have the most value added for a complete survey, although it may be purposeful to check irrigation schedules and distribution uniformity. Old facilities that have not been upgraded present the most opportunity for savings.

Water Efficiency Surveys. The process of surveying facilities includes sending trained conservation surveyors to the school sites to evaluate the potential for conservation savings for all indoor and outdoor plumbing fixtures (faucets, toilets, showerheads, pre-rinse sprayers in the kitchen, cooling towers, fountains, etc.), and irrigation methods, and to make recommendations. The surveys will include identifying old toilet fixtures and assessing the needs for toilet replacements, landscape irrigation distribution uniformity tests, and evaluation of irrigation schedules.

Equipment installation and startup. This is the process of selecting specific materials and installing them at the school site. Startup includes preparing the equipment for operation and assuring that the operators are familiar with the proper operation (e.g., controller settings).

Task List and Deliverables

TASK 1:

Site Identification and Outreach

To identify the sites to target and to coordinate with existing planners at the schools, the project team will contact the facility planners and managers at schools throughout the county. For example, the Santa Clara County Office of Education General Services Department provides both Facility Services and Maintenance and Operations Services. Facility Services includes providing assistance in maintaining school sites and oversees new construction. The department controls budgets and distributes the Deferred Maintenance Program. The Maintenance and Operations services include “planning, organizing, monitoring and implementation of a variety of maintenance and custodial services at the SCCOE office and outlying sites.”

Another component of site identification is billing record analysis. Assembling the historical record of water consumption in the billing history allows preliminary

assessment of the size of the facility in terms of total consumption and seasonal variation.

The project team will utilize conservation managers who can work with schools to manage and conduct the entire process from the first outreach contact to the five-year follow up. Their responsibility is really to manage the entire process, to bring the whole process together for the schools.

TASK 2:

Water Efficiency Surveys

After preliminary coordination with the school site, the surveyor will go to the schools and assess the total indoor and outdoor conservation potential savings from the measures included in the program. Surveys include checking and documenting water efficient equipment (landscape measures, ULF toilets, urinals, showerheads, pre-rinse spray valves, and cooling towers), recommending changes, and identifying appropriate district funding if available. The surveyor will spend enough time in the target schools to appreciate the use and timing parameters. Efforts will be made to not schedule toilet replacements during the peak use periods and to perform major landscape renovation in between sports seasons or during hours when the playing fields are not otherwise in use. Recommendations will be developed based on their data collection and analysis and presented in survey report to the school. The report will include a complete plan to manage the implementation and operation of the conservation measures. The survey team will have access to SCVWD and other expert resources when needed (e.g., ITAP landscape experts).

Surveys will be conducted during the first two years. During the initial period, frequent contact with the project manager and the school managers on site will speed our ability to “work out the kinks” and to more efficiently deliver the services at the rest of the schools.

TASK 3:

Equipment Installation and Startup

Landscape conservation measures’ implementation may include sprinkler system repair and replacement, controllers and irrigation timing, turf replacement, and water efficient plants. Indoor conservation measures may include, but are not limited to, low-flow faucet aerator installation, cooling tower retrofits, ULF toilet replacements, pre-rinse spray valves, urinals, and showerheads. Some or all of the installation may be contracted out to landscape or plumbing contractors. In all cases the project team will oversee the work, assure its proper completion, and train on-site staff as to the proper operation and maintenance.

The project team will also be tasked with completing and managing all the associated paper work to seek funding for the project. This may include ITAP program, WET program, or others. The survey will take recommendations and translate them into an action plan with appropriate new technology identified as needed. It will also identify and recommend existing conservation funding programs.

TASK 4:

Monitoring, Assessment, and Reporting

Monitoring, Assessment, and Reporting will take place throughout the project term. Water use before and after the conservation activities will be tracked. The exact conservation measures implemented will be tracked including number and type or repairs, replacements, and adjustments. Status reports will be prepared for internal use monthly and for external use quarterly for submission as part of the grant requirements. An independent evaluation will be conducted to assess the costs, benefits, and overall performance of the program.

Schedule

Table 3, below, shows the schedule and associated budget items. Additional cost detail is contained in the Cost and Benefit Section of this proposal. Figure 2 shows the timeline.

Preliminary Plans and Specifications

Not applicable. There are no structures on the site.

Environmental Documentation

Not applicable. This is not a “project” as defined by CEQA.

Table 3 - Schedule

Task	Start Date	End Date		Budget
Site Identification and Outreach	1-Dec-2005	1-Jun-2006	$	56,000
Water Efficiency Surveys	1-Jun-2006	1-Jan-2008	$	88,000
Equipment Installation and Startup	1-Sep-2006	1-Jul-2008	$	858,875
Monitoring, Assessment, and Reporting	1-Dec-2005	1-Dec-2008	$	70,000
		Total	$	1,072,875

Figure 2 -- Timeline

	'05	2006												2007												2008											
Task	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Site Identification and Outreach																																					
Water Efficiency Surveys																																					
Equipment Installation and Startup																																					
Monitoring, Assessment, and Reporting																																					

Statement of Work, Section Three: Monitoring and Assessment

Pre-Project Conditions and Baseline

The pre-project condition of the schools with regard to conservation appears to be that there is significant potential for water conservation savings. Generally speaking, a large portion of the school infrastructure is aging and in need of rehabilitation, including landscape upgrades, ULF toilet replacements, pre-rinse spray valves and other improvements outside the scope of this project. Clearly this picture is not universal. New buildings in the education sector have up to date equipment, rehabilitation has taken place to some extent, and conservation activities have occurred in the past.

Moving beyond generalizations, each site targeted will have a documented pre-project assessment providing a baseline for understanding program savings. This will include fixture inventory for indoor conservation, as well as assessment of the condition and operation of landscape irrigation systems. In addition, customer-billing records will provide historical records indicating pre- and post- project water consumption.

Monitoring Methodology and Data

Monitoring will take place throughout the project term. Water use before and after the conservation activities will be tracked. The exact conservation measures implemented will be tracked, including number and type or repairs, replacements, and adjustments. Status reports will be prepared for internal use monthly and for external use quarterly for submission as part of the grant requirements. In sum, the monitoring will consist of:

- Tracking landscape conservation activities;
- Tracking ULF toilet and pre-rinse spray valve replacements;
- Tracking water consumption over time with billing history;
- Continually coordinating with school administrators

How to Evaluate Success

The work described in this proposal is all about achieving verifiable conservation with a good deal of reliability. Success will be measured in terms of acre-feet of water saved and dollar savings on behalf of water customers. Costs of surveying and implementing conservation will be consistently documented and summarized. Efforts will be made to distinguish, at least approximately, conservation savings from indoor and outdoor use to indicate wastewater volume savings. The plan includes

implementation of known, current technology, conservation methods for which savings and reliability have been established in the past.

An independent evaluation will be conducted to assess the costs, benefits, and overall performance of the program.

Accounting for External Factors

Variations in school enrollment affect indoor water consumption in that it determines fixture utilization. Thus, absolute savings needs to be gauged with a specified enrollment in mind, or controlled for enrollment. Further, schools can be hostile environments for conservation measures due to misuse and vandalism.

Variations in weather need to be controlled for in assessing the effectiveness of the outdoor conservation portion of the program. For example, month-to-month, or year-to-year comparisons of water use need to account for rainfall and temperature to be commensurate.

Data Storage and Reporting

Water use before and after the conservation activities will be stored in project data files as well as the exact conservation measures implemented, including number and type or repairs, replacements, and adjustments. All records will be maintained and organized for ready access. A maintenance site log will be maintained to track repairs and changes in methods. Periodic reports will provide tracking information on a monthly basis for internal use and more comprehensively on a quarterly basis associated with the grant funding schedule (or otherwise required by the conditions of the grant).

Costs of Monitoring and Evaluation

This proposal includes a $50,000 line item for evaluation. A $20,000 line item has been included for reporting. Ongoing monitoring is included in project team hours in the budget.

Qualifications of Applicants and Cooperators

Resume of Project Manager/s

Resumes of key SCVWD staff participating in this project are attached to the back of this proposal. In addition, the District has a number of staff members with expertise in the following areas:

Karen Morvay, Conservation Specialist
Jerry De La Piedra, Conservation Specialist (Commercial programs)
Kevin Galvin, Conservation Specialist
Jeannine Larabee, Conservation Specialist (Commercial programs)

Role of External Cooperators

Potential external cooperators include:

- Wastewater agencies
- Recycled water agencies
- Landscape organizations
- Local school districts and parent associations
- Santa Clara County Office of Education
- State education agencies

To conserve water and meet future demand for recycled water, the district pursues partnerships with area cities, water retailers and wastewater treatment facilities to expand the county's recycled water systems. In addition, water retailers and the district have a cooperative partnership that helps retailers fulfill the Best Management Practices of the CUWCC 1991 MOU. Besides these entities, some of the most vital district partnerships are with the residential, commercial and agricultural customers who conserve by updating water use devices and implementing water efficient practices.

The City of San Jose–South Bay Water Recycling Collaborative Effort was established to develop a partnership with South Bay Water Recycling that provides the most efficient services and expands recycled water use within and beyond the San Jose and Santa Clara recycled water service area.

The district collaborates with universities and state agencies to provide large landscape managers and agricultural water users with professional workshops that help them increase irrigation efficiency. These partnerships also support the California Irrigation Management Information System, which provides growers with climatic data to make efficient irrigation scheduling decisions. The district's board of directors has created eight advisory committees that assist in developing policies to guide district operations.

Previous Water Use Efficiency Grants

The district relies on grants from state and federal agencies to help fund program expansion and vital research. The following table summarizes recent grant activity that funds water use efficiency programs and studies (Table 3).

Table 3 – Previous Grant Activity

Program	$ Amount FY 01/02	$ Amount FY 02/03	$ Amount FY 03/04	$ Amount FY 04/05
Regional Irrigation and Fertilizer Management Program - Regional Prop 13 grant - SCVWD is the lead agency in this five county regional program to disseminate technical assistance in the areas of agricultural irrigation and fertilizer management.			$450,000	$450,000
Residential Clothes Washer Rebates (EGIA) - Regional CALFED grant - SCVWD participated in this regional grant program to promote the purchase of high-efficiency clothes washers.	$675,000			
Landscape and Agricultural Area Measurements - CALFED grant - A multi-spectral image mapping project to design optimum water budgets and promote irrigation efficiency.	$406,000			
Commercial Clothes Washer Rebates (Energy Solutions) - Regional CPUC grant - Regional grant to promote high-efficiency clothes washers through rebates.		$150,000		
Dedicated Landscape Meters - DWR Prop 13 grant - Promotes the retrofitting of mixed use landscape meters with dedicated landscape meters.		$100,000		
Water Softener Rebate Program - DWR Prop 13 grant - This program offers a financial incentive to residents who replace their old timer-based water softeners with efficient, demand-based ones.		$60,000		
Pre-Rinse Sprayers (CUWCC) - Regional CPUC grant - Regional program that provides free efficient pre-rinse spray valves to restaurants and commercial kitchens.		$60,000		
Commercial, Industrial and Institutional Water Use Surveys - DWR funded - This program offered free water use surveys for businesses, recommending improvements.		$100,000		
ET Controllers (EBMUD) - Regional DWR Prop 13 grant - This regional program offers funding for weather-based irrigation controller retrofits.			$475,000	
Residential Clothes Washer Rebates (EGIA) - Regional DWR Prop 13 grant - This regional program promotes the purchase of high-efficiency clothes washers for residents.			$618,750	
Irrigation Retrofits - DWR Prop 13 grant - This project is targeted at installing upgraded irrigation hardware for sites previously identified as having high, unrealized conservation potential.			$100,000	
Pre-Rinse Sprayers - Regional CPUC grant - This regional program offers free high-efficiency pre-rinse spray valves for restaurants and commercial kitchens.			$75,000	

CII Washers (Energy Solutions) - Regional CPUC grant - This regional program promotes high-efficiency clothes washers through rebates.			$100,000	
CII Innovative Retrofits - DWR Prop 13 grant - This program promotes innovative high-efficiency equipment, such as High-Efficiency Toilet installations and medical equipment rebates.			$496,000	
Totals ($Thousands)	**$1,081**	**$470**	**$2,315**	**$450**

Disadvantaged Community

Not applicable.

Outreach, Community Involvement, and Acceptance

Coordination with Local Entities

The most important of the local entities to coordinate with for this project are the school districts and the schools themselves. Coordination will take place in the form of planning, permissions, scheduling of surveys and implementation, and managing the conservation activities on behalf of the schools.

The County Office of Education, the school districts, and even parent groups may have plans for landscape improvements that exist already. This project needs to be coordinated with whatever plans are in existence for that site under consideration.

Plan for Public Outreach

Outreach for this program is focused on the school districts and schools with whom collaboration is needed to get the work done. This may involve not only the County Office of Education, but also local school districts and the personnel at the individual schools selected for participation. Further, since external groups often participate in school landscape planning, parent associations and fundraising groups may also need contact and discussion.

The project will work with the District's award-winning School Education Program, managed by the District's Community Relations Unit. The SCVWD school education program, in conjunction with this project, will create educational activities around the conservation measures at the schools. A teaching segment could be developed by the education group that would cover indoor and outdoor conservation at schools, and then the students could observe conservation in action at their school.

Interested Parties and Level of Support

It is expected that the Santa Clara County Office of Education, the local school districts, and individual schools will all be interested parties and show support for the program.

The Landscape Advisory Committee may develop interest in the landscape component of the schools conservation program. The Committee represents a wide variety of related interests. The membership includes school representatives as well as the following categories:

1. Golf courses, cemeteries, turf producers, schools, parks, sod producers
2. Educators and horticulturists
3. Nurseries
4. City/County Public Works
5. Landscape Contractors
6. Irrigation Designers and Suppliers

7. Landscape Architects and other designers

Third Party Impacts

We do not foresee significant negative third party impacts for the school conservation activities.

Number of People Receiving Benefits

The immediate beneficiaries are the schools and the students and parents who enjoy a healthier and more attractive landscape. Further, cost savings will be welcome in terms of reduced water bills for school districts.

These are not the only beneficiaries, however. The entire Bay Delta ecosystem benefits from reduced water demand and reduce contamination from runoff. In other terms, the benefits are widely received. Nearly half of the SCVWD water is pumped from the Sacramento-San Joaquin River Delta. The numerous water suppliers that rely in the same water source all benefit in terms of reliability improvements from reduced demand—and ultimately the customers they serve.

Opposition to the Project

The project does not involve particularly controversial conservation measures, so substantial opposition is not expected at this time. Any opposition that comes to fore will be addressed immediately by the project team and school contacts.

Innovation

Innovative Technologies and Methodologies

Since there is considerable homogeneity at school sites, the project will seek to be innovative in the efficient deployment and finance of the conservation tasks described in this proposal.

The conservation measures expected are those that are the best current practices. When new and innovative technology emerges over the course of the program, it will be evaluated for incorporation into the program. Some technology that is innovative, such as ET Controllers, the District's web-based water budget program (based on aerial multi-spectral imaging), one-gallon-per-flush high-efficiency toilets, waterless urinals, and pre-rinse spray valves, will be incorporated into the program from the start. The most innovative aspect of this program, though, is its design to efficiently and effectively implement the current best practice methods in a setting where resource constraints have limited past conservation.

Perhaps the most important innovation is in the area of conservation management. The program seeks to provide coordinated conservation management to the schools not only in initial implementation, but also follow up to maintain savings over time. The program will make particular strides in its integration with school programs and staff. The project team members will work closely with the schools to understand not just their plumbing and irrigation systems, but also the way in which the management of those systems affects water conservation. Are there routine periodic checks to monitor water consumption at the school? Does the staff have the time and resources needed to get involved with outside conservation education efforts or funding sources? These and other questions must be addressed for the schools to maintain conservation savings over time.

Benefits and Costs

Qualitative Description of Benefits

Benefits to schools. For school water customers, the program will provide cost savings from reduced water consumption. In addition, turf areas that see heavy traffic will be healthier and more durable. Depending on the extent of landscape modifications, the program may add significant aesthetic qualities to a school campus. Further, should the schools integrate an education component into their curriculum, the schools are training the future leaders in the conservation field. Landscape conservation has significant additional benefits for the schools in the form of reduced hardscape damage due to over irrigation. Sidewalks, parking lots, school buildings, and fences all fare better without over irrigation.

Benefits to water and wastewater agencies, governments, community organizations, and environmental and resource groups. Water and wastewater agencies gain benefits in terms of reduced demand on their system and avoided costs of capacity investments in the future and operating costs currently. Increase in landscape efficiency also means a decrease in non-point source pollution. The program can be developed into a good public relations activity as well.

Benefits to water supply and reliability. Landscape irrigation is a major component of water demand and a sector where conservation practices are often not widespread or consistent. Further, human behavior is a large component of conservation in addition to technological fixes. Timers need to be adjusted, sprinklers tested, adjusted and repaired, and soil moisture needs to be monitored. These characteristics have been the source of challenges in achieving widespread conservation savings that can be relied upon for years to come. With the emphasis on modern methods, plant health, and maintenance, the objective is to achieve not just immediate savings, but continued savings over time as conservation methods be come standard practice. The fact that landscape irrigation needs peak in the summer gives conservation savings in this sector particular leverage in terms of benefits. Summer peak needs are at the low point of seasonal rainfall in the region. Summer savings reduce the likelihood of shortage during the time when it is most needed. Further, since many components of the supply system are sized at a maximum capacity, peak demand reduction can have substantial infrastructure benefits.

Landscape water conservation is strongly consistent with CALFED objectives because it is a major source of irrecoverable losses. Losses to evaporation are great in landscape applications because of its distribution and exposure to seasonal high temperatures and winds. Percolation into groundwater is recoverable only in those basins with developed groundwater storage. Landscape conservation also reduces the runoff of freshwater into saltwater bodies.

With regard to indoor conservation derived from ULF toilets and pre-rinse spray valves, water savings produces an increment of cost savings due to reduced wastewater flow as well as reduced water demand.

Benefits to water quality. Landscape runoff is a significant vehicle for contaminant transportation into sewer drains, creeks, and rivers. Fertilizer, pesticides, animal waste, motor oil and other road dirt all can be carried by runoff.

Insect control. With concern over West Nile Virus growing, reducing runoff can eliminate one more potential source of breeding environments.

Benefits to ecosystems. More generally, reducing water demand has the potential to allow more water to support natural ecosystems, including not just the local environments, but also the whole Bay Delta region.

Quantified Benefits

For the purpose of quantifying benefits expected from the proposed school water conservation activities proposed herein, a model of the potential target sites and conservation savings was developed as follows. Note that the pubic schools were used as the subject of this model because they are the focus of this proposal. However, private schools, colleges, and universities will be eligible for this project as well.

First a model of the inventory of fixtures, irrigated acres and sites was developed as shown in Table 4:

Table 4: Site Inventory Model: Santa Clara County Public Schools

School Type	Number of Public School Sites	Student Population	Toilets	Urinals	Irrigated Acres	Pre-Rinse Spray Valves
Elementary Schools	243	83,736	4,187	2,093	729	486
MiddleSchools	59	83,736	4,187	2,093	177	118
High Schools	46	83,736	4,187	2,093	138	92
Total K - 12 Sites	348	251,208	12,560	6,280	1044	696

The number of school sites and the total number of students is reported in SCCOE (2004). The other key assumptions are as follows:

- The total student population is split evenly between elementary, middle, and high schools.
- Each school has on average 3 acres of irrigated area
- Each school has on average 2 pre-rinse spray valves.
- On average there are 20 students per toilet and 40 students per urinal.

Table 5 shows the target inventory of fixtures and acres assuming that 25 percent of the total inventory is candidates for replacement or upgrade.

Table 5: Target Fixtures and Acreage Model: Santa Clara County Public Schools

School Type	Number of Public School Sites	Student Population	Toilets	Urinals	Irrigated Acres	Pre-Rinse Spray Valves
Elementary Schools	61	20,934	1,047	523	182	122
MiddleSchools	15	20,934	1,047	523	44	30
High Schools	12	20,934	1,047	523	35	23
Total K - 12 Sites	88	62,802	3,141	1,569	261	175

Table 6: Saving Model for Target Fixtures and Acrage (AFY)

School Type	Number of Public School Sites	Student Population	Toilets	Urinals	Irrigated Acres	Pre-Rinse Spray Valves	Total AFY
Elementary Schools	61	20,934	17.6	1.8	60.7	6.8	86.8
MiddleSchools	15	20,934	17.6	1.8	14.7	1.7	35.7
High Schools	12	20,934	17.6	1.8	11.7	1.3	32.3
Total K - 12 Sites	88	62,802	52.8	5.3	87.0	9.8	154.8
Total Indoor Savings							67.85

Finally, Table 6 shows the savings derived from the conservation measures for the

- Average Savings per ULFT Replacement: 15.0 gpd
- Average Savings per Urinal Retrofit: 3.0 gpd
- Average Savings per Irrigated Acre / Year: 4.0 inches/acre
- Average Savings per Pre-Rinse Spray Valve: 50.0 gpd

Although these tables are clearly rough, they provide a reasonable first approximation of the conservation potential savings from the program proposed in this document. The project team will conduct further assessment of the conservation potential as part of the process of site identification and outreach early on in the program. In that process, facilities managers will be able to provide better estimates of fixtures and irrigated acres without the need—for example—a questionnaire pre-survey conducted before the water surveys.

Indoor water savings that can be considered wastewater volume saved is the sum of indoor water savings from toilet and urinal replacements, in combination with pre-rinse spray valves.

Project Implementation Cost Table

For this Section A proposal, the elements of the Project Implementation Cost Table that are required in the PSP are presented in what follows. Tables 7 and 8 provide the line items by year and the staff hours that are the bases of the figures entered into Table C-1.

For Table C-8, the cost share is derived by assessing the share of water supply that would be saved given conservation in the SCVWD service area. Nearly half of supply is from local groundwater aquifers, and more than half is imported fro the Sierra Nevada through pumping stations in the Sacramento-San Joaquin River Delta. The District supplies water to local water retail agencies, which in turn provide it to their customers in Santa Clara County. In order to maintain maximum efficiency and

flexibility, the water supply comes from a variety of sources. Both groundwater and imported water are sold to retailers. The District also manages the groundwater basin to the benefit of agricultural users and other independent groundwater pumpers.

The District's water distribution system is schematically represented in Figure 3 (reproduced from UWMP 2001, Figure 3-1), and the facilities to store, treat and distribute water are shown in map format in Figure 4 (reproduced from UWMP 2001, Figure 3-2).

Table 7 - Line Items in Proposed Budget

Site Identification and Outreach	Item	Cost/Unit	Year 1: Quantity	Year 2: Quantity	Year 3: Quantity	Cost
1 - Outreach materials preparation			$ 20,000			$ 20,000
2 - Customer records analysis			$ 20,000			$ 20,000
3 - Contact and preliminary outreach	contractor hours	$ 80	200	-	-	$ 16,000
Subtotal						$ 56,000
Water Efficiency Surveys						
1 - First year surveys	survey (indoor/outdoor)	$ 1,000	14	-	-	$ 14,000
2 - Second year surveys	survey (indoor/outdoor)	$ 1,000	-	30	-	$ 30,000
Subtotal						$ 44,000
Equipment Installation and Startup						
1 - Toilets	fixture and installation	$ 150	785	1,571	785	$ 471,150
2 - Urinals	fixture and installation	$ 150	392	785	392	$ 235,350
3 - Irrigated Acres	equip. & installation / acr	$ 500	65	131	65	$ 130,500
4 - Pre-Rinse Spray Valves	valve and installation	$ 125	44	88	43	$ 21,875
Subtotal						$ 858,875
Monitoring, Assessment, and Reporting						
1 - Monitoring and Assessment			$ 15,000	$ 15,000	$ 20,000	$ 50,000
2 - Report Preparation			$ 6,000	$ 6,000	$ 8,000	$ 20,000
Subtotal						$ 70,000
Total Capital Cost						$ 1,028,875

Table 8 - SCVWD Staff Labor

Position	Hours	Budget Item	Salary, Fringe	Total Cost
SCVWD: Water Use Efficiency Unit Manag	100	Salaries, wages	$ 63.73	$ 6,373
		Fringe benefits	$ 73.79	$ 7,379
SCVWD: Water Conservation Specialist 1	300	Salaries, wages	$ 36.66	$ 10,998
		Fringe benefits	$ 42.44	$ 12,733
SCVWD: Water Conservation Specialist 2	300	Salaries, wages	$ 40.47	$ 12,141
		Fringe benefits	$ 46.86	$ 14,057
Subtotal		Salaries, wages		$ 29,512
Subtotal		Fringe benefits		$ 34,169
Total	700			$ 63,681

Figure 3-1
Santa Clara County Water Supply and Use Schematic

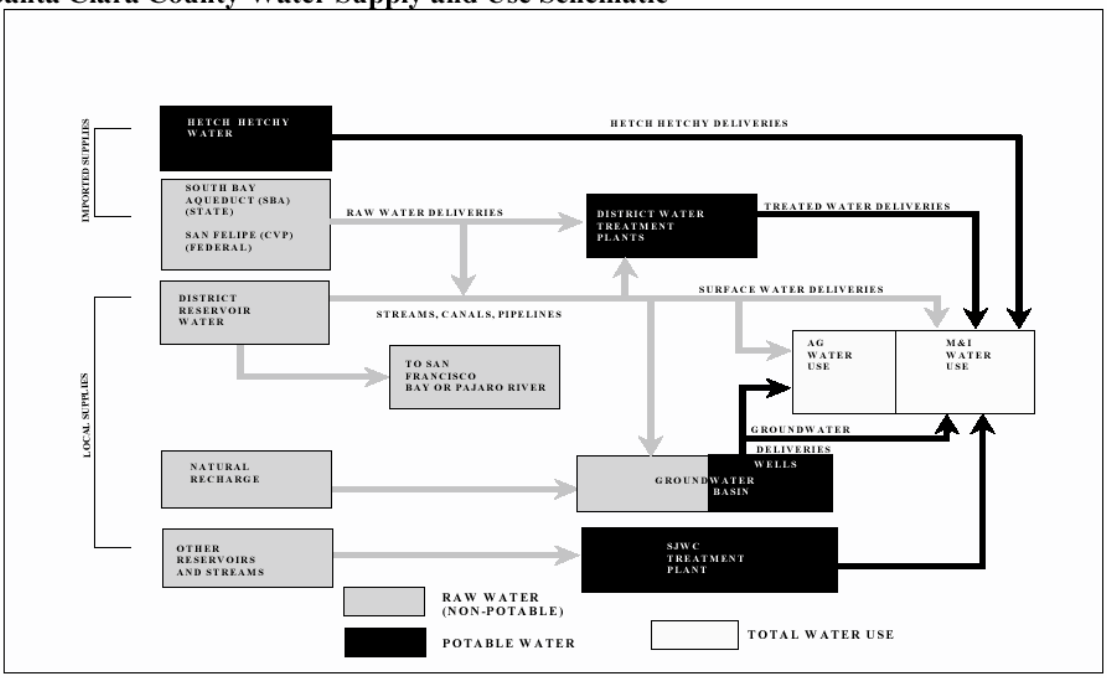

Figure 3 – Water Supply Schematic Diagram

Figure 3-2
District Water Supply Facilities Map

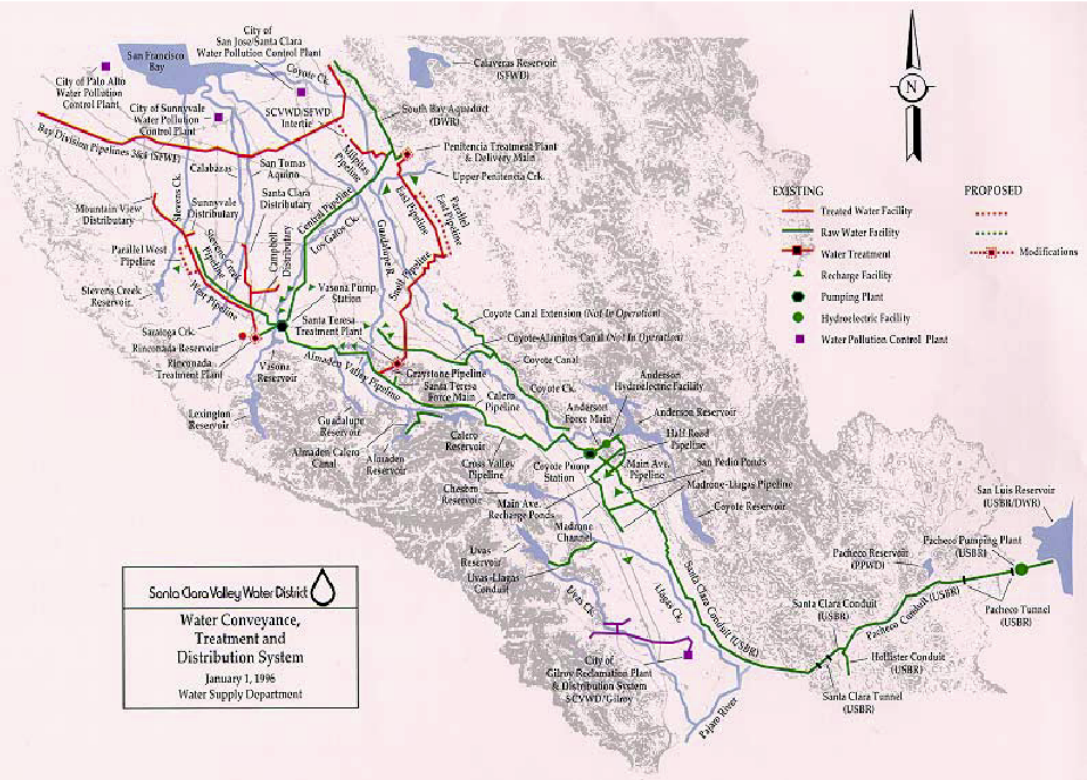

Figure 4 – Water Supply Facilities

Project Implementation Cost Table

Table C-1: Project Costs (Budget)

Applicant: **Santa Clara Valley Water District**

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY
Section A projects must complete Life of investment, column VII and Capital Recovery Factor Column VIII. Do not use 0.

Table C-1: Project Costs (Budget) in Dollars)

	Category (I)	Project Costs $ (II)	Contingency % (ex. 5 or 10) (III)	Project Cost + Contingency $ (IV)	Applicant Share $ (V)	State Share Grant $ (VI)	Life of investment (years) (VII	Capital Recovery Factor (VIII)	Annualized Costs $ (IX)
	Administration[1]								
	Salaries, wages	$29,512	5	$30,988	$30,988	$0	20	0.0872	$2,702
	Fringe benefits	$34,169	5	$35,877	$35,877	$0	20	0.0872	$3,129
	Supplies	$0	0	$0	$0	$0	0	0.0000	$0
	Equipment	$0	0	$0	$0	$0	0	0.0000	$0
	Consulting services	$0	0	$0	$0	$0	0	0.0000	$0
	Travel	$0	0	$0	$0	$0	0	0.0000	$0
	Other	$0	0	$0	$0	$0	0	0.0000	$0
(a)	Total Administration Costs	$63,681		$66,865	$66,865	$0			$5,831
(b)	Planning/Design/Engineering	$0	0	$0	$0	$0	0	0.0000	$0
(c)	Equipment Purchases/Rentals/Rebates/Vouchers	$0	0	$0	$0	$0	10	0.0000	$0
(d)	Materials/Installation/Implementation	$958,875	5	$1,006,819	$527,381	$479,438	20	0.0872	$87,795
(e)	Implementation Verification	$0	0	$0	$0	$0	0	0.0000	$0
(f)	Project Legal/License Fees	$0	0	$0	$0	$0	0	0.0000	$0
(g)	Structures	$0	0	$0	$0	$0	0	0.0000	$0
(h)	Land Purchase/Easement	$0	0	$0	$0	$0	0	0.0000	$0
(i)	Environmental Compliance/Mitigation/Enhancement	$0	0	$0	$0	$0	0	0.0000	$0
(j)	Construction	$0	0	$0	$0	$0	0	0.0000	$0
(k)	Other (Specify)	$0	0	$0	$0	$0	0	0.0000	$0
(l)	Monitoring and Assessment	$50,000	5	$52,500	$52,500	$0	20	0.0872	$4,578
(m)	Report Preparation	$20,000	0	$20,000	$20,000	$0	20	0.0872	$1,744
(n)	**TOTAL**	$1,092,556		$1,146,184	$666,746	$479,438			$99,947
(o)	Cost Share -Percentage				58	42			

1- excludes administration O&M.

Tables C-2 and C-3

Applicant: **Santa Clara Valley Water District**

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

Table C-2: Annual Operations and Maintenance Costs

Operations (1) (I)	Maintenance (II)	Other (III)	Total (IV) (I + II + II)
$0	$0	$0	$0

(1) Include annual O & M administration costs here.

Table C-3: Total Annual Project Costs

Annual Project Costs (1) (I)	Annual O&M Costs (2) (II)	Total Annual Project Costs (III) (I + II)
$99,947	$0	$99,947

(1) From Table C-1, row (n) column (IX)
(2) From Table C-2, column (IV)

Table C-5: Project Costs (Budget)

Applicant: **Santa Clara Valley Water District**

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

Table C-5 Project Annual Physical Benefits (Quantitative and Qualitative Description of Benefits)

	Qualitative Description - Required of all applicants[1]				**Quantitative Benefits - where data are available [2]**
	Description of physical benefits (in-stream flow and timing, water quantity and water quality) for:	Time pattern and Location of Benefit	Project Life: Duration of Benefits	State Why Project Bay Delta benefit is Direct[3] Indirect [4] or Both	Quantified Benefits (in-stream flow and timing, water quantity and water quality)
Bay Delta	Reduced demand for water. Reduced runoff contaminants.	Reduction of demand in peak season.	Savings from major hardware upgrades is expected to be for 10 - 20 years with maintenance follow up.	The project will result in both direct and indirect benefits. Savings will be achieved that contribute to a CALFED objective within the Bay-Delta system during the life of the project. Savings are indirect benefits in that they reduce dependency on the Bay-Delta system and are realized over time.	155 AFY total savings, of which 68 AFY are indoor savings with wastewater benefits.
Local	Reduced demand for water. Reduced runoff contaminants.	Reduction of demand in peak season.	Savings from major hardware upgrades is expected to be for 10 - 20 years with maintenance follow up.	**Not applicable.**	155 AFY total savings, of which 68 AFY are indoor savings with wastewater benefits.

[1] The qualitative benefits should be provided in a narrative description. Use additional sheet.

[2] Direct benefits are project outcomes that contribute to a CALFED objective within the Bay-Delta system during the life of the project.

[3] Indirect benefits are project outcomes that help to reduce dependency on the Bay-Delta system. Indirect benefits may be realized over time.

[4] The project benefits that can be quantified (i.e. volume of water saved or mass of constituents reduced) should be provided.

Table C-6, 7, and 8

Applicant: **Santa Clara Valley Water District**

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

Table C-6 Project Annual Local Monetary Benefits

ANNUAL LOCAL BENEFITS	ANNUAL QUANTITY	UNIT OF MEASUREMENT	ANNUAL MONETARY BENEFITS
(a) Avoided Water Supply Costs (Current or Future Source)	154.8	AFY	$66,585
(b) Avoided Energy Costs	0		$0
(c) Avoided Waste Water Treatment Costs	67.85		$0
(d) Avoided Labor Costs	0		$0
(e) Other (describe)	0		$0
(f) Total [(a) + (b) + (c) + (d) + (e)]			$66,585

Table C-7 Project Local Monetary Benefits and Project Costs

(a) Total Annual Monetary Benefits [(Table C-6, row (f)]		$66,585
(b) Total Annual Project Costs (Table C-3, column III)		$99,947

Table C-8 Applicant's Cost Share and Description

Applicant's cost share %: (from Table C-1, row o, column V)	**58**
supply is from local groundwater aquifers, and more than half is imported fro the Sierra Nevada through pumping stations in the Sacramento-San Joaquin River Delta.	
See the text above for more detailed narrative description.	

HOSSEIN ASHKTORAB
Santa Clara Valley Water District
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San Jose, CA 95118-3614
(408) 265-2600

EDUCATION:

Ph.D., University of California, Davis, 1989. Plant, Soil and Water Science.
Master of Science, California State University, Chico, 1981. Irrigation.
Bachelor of Science, University of Mazandaran, 1979. Agriculture Engineering.

PROFESSIONAL EXPERIENCE:

Unit Manager, Water Use Efficiency Unit, Santa Clara Valley Water District, Jan. 2001- Present

Responsible for managing the District's Water Use Efficiency Unit, providing technical direction, coordinating its activities with other District units, and external stakeholders including 11 water retailers. The water conservation program is a long-term commitment of the District, which provides the highest quality programs and educational opportunities to residents, businesses and agriculture in Santa Clara County.

Managing the implementation of all 14 BMPs required by the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). In addition, managing the adopted Water Conservation Plan (including an agriculture water conservation program) to comply with US Bureau of Reclamation mandate as required by the Central Valley Project Improvement Act (CVPIA).

Manage and participate in the development, implementation and administration of the water conservation and water recycling programs with more than $9 million annual budget in Santa Clara County. Additionally, managed numerous grant funded programs, which, in FY 03/04 alone, totaled over $2.8 million.

Develop partnership with local and regional cities, including various water conservation programs with City of San Jose, with more than $3 million cost-sharing budget.

Participate and engage in the recycled water partnership such as the South Bay Water Recycling cost sharing agreement for the $50 million in projects in the Santa Clara County.

Participate and coordinate with local, regional and statewide water conservation and recycling organizations. Member of CUWA water conservation committee and CUWCC steering committees.

Responsible for implementation of CALFED grants for the District Agricultural and Urban Water Use Efficiency programs. Developed proposals and received grant fund for two District's water recycling projects from Propostion13 grant funding.

In partnership with the Santa Clara County Farm Bureau, UC Cooperation Extension, Department of Agriculture, Department of Water Resources, and Santa Clara County Natural Resource Conservation Service, developed and conducted nine Agricultural Irrigation and Nutrient Management seminars for the County growers and interested groups

Water Conservation Specialist, Water Conservation & Recycling Unit, Santa Clara Valley Water District, Jan. 1997 - Jan.2001

Developed and managed water conservation programs including programs for agricultural and large landscape water users.

Technical staff to District Landscape Water Advisory Committee, and District Agriculture Water Advisory Committee.

RESEARCH AND TEACHING EXPERIENCE:

Researcher/ Assistant professor, University of California, Davis. June 96 - Dec 1997.
Crop water requirement and water management
3-D Aerodynamic latent heat flux research studies
Field research study on irrigation systems and evaluations.

Assistant Professor, Dept. of Irrigation Eng., Shiraz University. Sept.93-June 96.
Lectured on urban water use and conservation
Lectured on crop water requirements and evapotranspiration.
Lectured on irrigation systems and design.
Directed related laboratories and field trips.

Associate Land Water Use Analyst, California Department of Water Resources, Dec. 1986–Sep. 1993.

Technical coordinator for the Assembly Bill 325 Task Force Advisory Committee in 1991 and 1992 and facilitated the development of the State Landscape Water Conservation Model Ordinance. Assisted water agencies, cities and counties to develop and implement landscape water conservation guidelines and ordinances.

As a member of the State Water Conservation Advisory Committee, participated in the development of the Best Management Practices (BMPs) in water conservation.

Participated in the negotiation with the agricultural stakeholders and U.S. Bureau of Reclamation for the State Department of Water Resources Drought Water Bank. Developed a new method using nonlinear regression model to estimate crop water requirement values for major crops in the Delta's agricultural area which was the bases for the negotiation of the irrigation water use.

Supported agencies in the development of their water management plan, implementation and evaluation of various water conservation programs such as the ULF toilet replacement, toilet displacement devices, low flow shower heads and outdoor water audits.

Developed a new method using nonlinear regression model to estimate historical ETo values in the Delta’s agricultural area.

Member of the 1989 and 1992 Xeriscape Conferences Steering Committee and chaired the Award Subcommittee meetings.

Research Assistant, University of California, Davis. September 1981-May 1982 and April 83-Dec.86

Field laboratory investigations related to the separation of soil evaporation and transpiration of tomato plants. Studied the evaporation rate under different plant growth stages and soil moisture contents using highly sensitive Lysimeter.

Collected and interpreted weather station data at U.C. Davis field station. Worked extensively with instruments, soil moisture and particle size analysis.