PROPOSITION 13 URBAN GRANT ET IRRIGATION CONTROLLER PROGRAM

Presented to:

California Department of Water Resources
Office of Water Use Efficiency
1416 Ninth Street, Room 338
Sacramento, CA 95814
Attention: Marsha Prillwitz

A-1 URBAN WATER CONSERVATION GRANT APPLICATION COVER SHEET

1.	Applicant (Organization or affiliation):	Metropolitan Water District of Southern California
2.	Project Title:	ET Controller Installation Project
3.	Person authorized to sign and submit proposal:	
	Name, Title	Stephen N. Arakawa, Group Manager Water Resource Management Group
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	Telephone	(213) 217-6052
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4.	Contact person (if different)::	
	Name, Title	John Wiedmann, Senior Resource Specialist
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	Telephone	(213) 217-6516
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	E-mail	jwiedmann@mwdh2o.com
5.	Funds requested (dollar amount):	$2,350,509
6.	Applicant funds pledged (local cost share) (dollar amount):	$1,623,595 (agency) & $160, 063 (customer contributions)
7.	Total project costs (dollar amount):	$4,134,167
8.	Estimated net water savings (acre-feet/year):	3,861.60
	Estimated total amount of water to be saved (acre-feet):	38,610
	Over ____ years_____	10
	Benefit/cost ratio of project for applicant:	4.81
	Estimated $/acre-feet of water to be saved:	$107
9.	Project life (month/year to month/year):	10/3 -9/04
10.	State Assembly District where the project is to be conducted:	37-66, 71, 73-80
11.	State Senate District where the project is to be conducted:	17, 19-32, 36-40
12.	Congressional District(s) where the project is to be conducted:	23-39,41-46,49-53,
13.	County where the project is to be conducted:	Los Angeles, Riverside, San Bernadino, San Diego, Ventura
14.	Do the actions in this application involve physical changes in land use, or potential future changes in land use?	No

A-2 APPLICATION SIGNATURE PAGE

By signing below, the official declares the following:

The truthfulness of all representations in the application;

The individual signing the form is authorized to submit the application on behalf of the applicant;

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 application on behalf of the applicant; and

The applicant will comply with all terms and conditions identified in this Application Package if selected for funding.

ORIGINAL SIGNED BY:
STEPHEN N. ARAKAWA, MANAGER
MWD WATER RESOURCE MANAGEMENT GROUP
DATED NOV 26, 2002

Signature	Name and title	Date

A-3 APPLICATION CHECKLIST

Complete this checklist to confirm all sections of this application package have been completed.

Part A: Project Description, Organizational, Financial and Legal Information

__x__ A-1 Urban Water Conservation Grant Application Cover Sheet
__x__ A-2 Application Signature Page
__x__ A-3 Application Checklist
__x__ A-4 Description of project
__n/a__ A-5 Maps
__x__ A-6 Statement of work, schedule
__x__ A-7 Monitoring and evaluation
__x__ A-8 Qualification of applicant and cooperators
__x__ A-9 Innovation
__x__ A-10 Agency authority
__n/a__ A-11 Operation and maintenance (O&M)

Part B: Engineering and Hydrologic Feasibility (construction projects only)

__n/a__ B-1 Certification statement
__n/a__ B-2 Project reports and previous studies
__n/a__ B-3 Preliminary project plans and specifications
__n/a__ B-4 Construction inspection plan

Part C: Plan for Environmental Documentation and Permitting

__x__ C-1 CEQA/NEPA
__n/a__ C-2 Permits, easements, licenses, acquisitions, and certifications
__n/a__ C-3 Local land use plans
__n/a__ C-4 State and local statutes and regulations

Part D: Need for Project and Community Involvement

__x__ D-1 Need for project
__x__ D-2 Community involvement, support, opposition

Part E: Water Use Efficiency Improvements and Other Benefits

__x__ E-1 Water use efficiency improvements
__x__ E-2 Other project benefits

Part F: Economic Justification, Benefits to Costs Analysis

__x__ F-1 Net water savings
__x__ F-2 Project budget and budget justification
__x__ F-3 Economic efficiency

Appendix: Benefit/Cost Analysis Tables

__x__ Benefit/Cost Analysis Tables 1; 2; 3; 4a, 4b, 4c, 4d; and 5

A-4 DESCRIPTION OF THE PROJECT

The Project entails the installation of 7,719 "Smart" irrigation controllers in residential and small commercial landscapes throughout Metropolitan's service territory and a final assessment report to address a variety of issues about this new generation of controllers. Numerous studies and water efficiency programs conducted statewide have demonstrated that significant water is lost due to over-irrigation. "Smart" controllers save water by changing irrigation schedules much more frequently and more accurately than controllers that are manually set and adjusted by end-users. Currently "Smart" controller irrigation schedules follow either average historical or real-time evapotranspiration (ET) data. Other control technologies introduced by manufacturers during the Project term may be installed if independent testing establishes their performance meets the Project's performance criteria.

Total water savings, at the optimal, higher level of implementation, projected over the 10-year life of the devices, is estimated at 38,616 acre-feet (AF) worth $19,377,439 in avoided regional cost. The total project cost is $4,134,167 of which $1,623,595 will be provided by Metropolitan and its member agencies in either hard dollars or in-kind services. Customer co-payments total $160,063. The balance of $2,350,509 is requested in Proposition 13 Grant funds. The expected Benefit/Cost ratio is 4.81.

Two primary program implementation methods will be used – Self-Install by the end user coupled with a training workshop and a voucher, and Direct Install by member agency staff and/or an independent, trained installation crew. Other variations on these two methods will undoubtedly evolve depending on local situations and resources of Metropolitan's member agencies.

Targeting of excessive users will be essential to achieve the highest level of Project cost-effectiveness. Targeting methods will vary depending on data available to member agencies. Selection criteria for recipients of ET controllers will depend on a variety of criteria, such as water used in excess of calculated water budgets, landscape area in excess of a specified threshold size, abnormally high water use for sites within specific lot-size categories, excess water use identified by on-site water use efficiency surveys, and categories of high water-using customers.

The Project includes a Final Report that will assess the Program's effectiveness. Effectiveness will be measured not only in terms of actual water saved versus Program expenditures, but also it will address the advantages and challenges experienced with each of the implementation methods, the relative effectiveness of various types of ET controllers to save water, the impact of signal fees on controller choice and long-term participation, the decline rate in savings over time and by type of ET controller, the ease of the end-user to install and program the controllers, etc.

Overall, the Project will have great value for its water savings, for the effect such savings will have on Bay-Delta demands, and for the knowledge gained about newly emerging approaches to efficient irrigation control.

Metropolitan Water District of Southern California is the Principal Applicant for this program and will act as Program Administrator. It is our intent to work in collaboration with East Bay Municipal Utility District, whose proposal is submitted under separate

cover.

The Metropolitan/EBMUD partnership will benefit all parties with program cost economies and management efficiencies. The alliance will offer significant negotiating and purchasing strength with the product manufacturers. Second, a common data tracking system will be developed that will result in common formatting and easier application. A third significant benefit will be the universal marketing message and strategy in customer outreach.

A-5 MAPS

Not applicable for this project. For reference attached is a map of Metropolitan's service area. This project is to be implemented throughout Metropolitan's service area, with exception of Orange County.

A-6 STATEMENT OF WORK, SCHEDULE

Project Plan

For this program, water agencies throughout California have come together to jointly develop a series of implementation methods that address residential and small commercial landscape applications. We propose to work with the East Bay Municipal Utility District (Program Administrator for the Northern program equivalent) and their co-operators to jointly develop a product specification, qualify ET controller products, and negotiate for and purchase the product for our two programs. The economies and synergies achieved through a multi-agency approach to implementing this Program will be reflected in a variety of ways:

- Coordinated and centralized procurements of product will achieve a more rapid transformation of the market.
- Centralized procurements of product will yield better pricing and terms from the manufacturers.
- Ongoing parallel agency programs throughout the state will provide the data and feedback necessary to properly evaluate and compare the effectiveness of the two methods of implementation within regions of varying demographics.
- Ongoing parallel agency programs will stimulate communication among the agencies and lead to beneficial synergies that might not otherwise occur.
- Development of a technical specification for ET irrigation controllers will enable manufacturers to produce appropriate products for all agency programs in the state.
- Quality assurance programs will become more cost-effective when implemented uniformly throughout the state.
- Consumer awareness will be enhanced and regional marketing will be more effective with a coordinated and focused marketing outreach.

Program Objectives

Goals	Installation of 7,719 ET Controllers Eventual market transformation, replacing standard controllers with ET controllers
Geographic Coverage	Service area of The Metropolitan Water District of Southern California (excluding Orange County, which is discussed in the text)
Program Timeframe	3 years (Savings benefits to extend for useful lifetime of ET controller devices, estimated at 10 years)
Savings	38,616 AF of water savings (over 10 years) Reduction in urban runoff with attendant pumping and treatment benefits
Target Market Segments	Residential and commercial customers who meet the following criteria: Irrigation area of 4,000 minimum and 8,000 square feet average for residential controllers. Irrigation area ranging from 20,000 minimum and 60,000 square feet average for 12-24 station commercial controllers Irrigation area ranging from 100,000 minimum and 150,000 square feet average for 24-48 station commercial controllers Customers with existing controllers Customers that do not currently deficit irrigate

Different implementation methods have been developed for this program. Metropolitan's member agencies will each select the best method(s) and adapt them to meet the needs of their own unique customer base. The customer intervention methods are as follows:

- Residential and Small Commercial Vouchers and/or Landscape Workshops
- Residential and Small Commercial Direct Installation

During the three-year program, Metropolitan will gather customer response data, costs, and technical feedback for each of the intervention methods. Logically, some service offerings will be more successful than others. The low–performing or unfeasible (for cost and/or technology reasons) options will be ramped down and replaced with one or more methods with a higher success.

On the following pages are cut sheets highlighting key information regarding the different implementation methods. However, each agency will customize the actual implementation method to suit the needs of its service area and customers. The

implementation methods described are general, and may be modified in order to maximize customer participation and water savings.

Residential and Small Commercial Vouchers and/or Workshop	
Program Description	Voucher programs are designed to overcome the customer's capital outlay concern. Vouchers offer a point of purchase discount while still providing controls for customer qualification and participation tracking. For the current ET Controller market, the voucher design will model a fulfillment model. Water agencies will contract with the manufacturers and the manufacturers will perform the fulfillment services. Some agencies may offer voucher-only programs, others may offer workshops in conjunction with voucher programs. The workshops will demonstrate to the customer how to: • conduct a simple outdoor landscape survey (identifying soil type, plant type, sprinkler type, and microclimate) • remove the old controller • install new controller • program new controller
Start Up Requirements	Standard Program Start Up with Additional Requirements for: Contract Execution with Manufacturers Product Fulfillment thru Manufacturers Set Up Voucher Payment Processes for Manufacturers Customer Workshop Design Certified Landscapers Workshop Design
Marketing and Customer Education	Targeted Bill Inserts Targeted Direct Mail Targeted Newspaper Ads

Residential and Small Commercial
Vouchers and/or Workshop

Customer Enrollment	Customer Calls Agency or Contractor and Requests Application or receives a voucher application at a workshop. Agency/Contractor Qualifies Customer and Enrolls Customer in Program Agency/Contractor Sends Customer the Voucher - Customer Sends Voucher Application to Manufacturer And/or Customer is enrolled at the workshop and either provided a Controller at the completion of the workshop or provided a voucher.
Product Distribution	Vouchers will be processed as follows: • Manufacturer Sends Product to Customer • Customer Sends Completed Application to Manufacturer and Agency/Contractor • Manufacturer Bills Agency/Contractor
Installation	Customer Self Installs or Customer Hires Pre-Qualified Contractors for ET Controller Installation
Installation Verification	Minimum of 5-10% On-site Inspections

Residential and Small Commercial Direct Install

Program Description	Direct install programs are designed to overcome many traditional customer barriers – the customer simply calls for an appointment and the product is installed by a representative of the water agency. They are especially effective when dealing with hard-to-reach customers such as the small commercial and residential markets. This design is the most expensive option, but will produce the highest participation levels.
Target Customer	Single Family Homeowners – 4,000+ Sq. Ft. Landscape (or smaller, if sufficient excessive over-watering is identified) Small commercial sites, 12-24 stations – 20,000 + Sq. Ft. Landscape Small commercial sites – 24-48 stations - 100,000 + Sq. Ft. Landscape
Start Up Requirements	Standard Program Start Up and Additional Requirements for: Installer Training Process for Scheduling Installation Appointments Process for Handling Customer Installation Problems
Database and Administration	Standard Program Database with Scheduling Capabilities Track Installations Evaluate Quality of Installations Track Customer Installation Problems and Resolutions
Marketing and Customer Education	Direct Mail Telemarketing
Production Estimates	Continued customer participation, assuming funding and ongoing marketing efforts.
Customer Enrollment	Customer calls office and is Qualified and Enrolled during Scheduling Call Customer Qualification Criteria Will Be Stringent and must include: Working Controller and Minimum Irrigated Landscape Area Requirement Install Inside of Garage on Wall or Outside in a Weather-Proof Plastic Box

Residential and Small Commercial Direct Install

Product Distribution	Product Brought to Installation
Installation	Conduct Simple Outdoor Survey Second Round of Qualification Criteria Will be Applied on-site and Include: Assessment of Controller and Irrigation System If System Fails Test, Customer will Be Requested to Fix Before Installation Can Occur Precipitation Tests on 50% of Sites Field Personnel Removes Old Controller and Installs/Programs New Controller
Installation Verification	1-5% On-site Inspections Lower Inspect Rate Because Staff/Contractors Are Performing Installation
Pros/Cons	Cons Liability for Product Installation and Health of Plants Pros Highest Response Rate Because Customer Has to do Nothing Maximum Water Savings Because Trained Program Staff will "Customize" Settings as Necessary Lower Marketing Costs Because Customer Barriers Have Been Eliminated

ET Controller Pilot Studies

Several water agencies have been conducting testing and pilot studies of ET Controllers over the past few years. Western Policy Research conducted *the "*Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine 'ET Controller" Study" July 2001, on behalf of the Metropolitan Water District of Southern California, the Municipal Water District fo Orange County and the Irvine Ranch Water District. A test group of 40 homes were retrofitted with ET Controllers. Two other sets of households were included in the evaluation, a reference group and a postcard group. The postcard group was sent postcard announcements of recommended irrigation schedules in order to evaluate a different method of increasing household sensitivity to weather changes. Savings were estimated by comparing two years of pre- and one year of post-installation consumption data. The data was re-evaluated after a second year, in the ET Controller Savings through the Second Post-Retrofit Year, A Brief Update report. The study concluded that the water savings from ET Controllers were equivalent to 18% of outdoor water usage. The ET Controllers saved 57 gallons per day on lot sizes of approximately 2,000 sq. ft. The second-year post study also reported that there was no evidence of a savings decline over time.

Denver Water in Colorado is currently conducting a four-year study of ET Controllers. 37 ET Controllers were installed throughout the Denver Metropolitan Area. Water usage for a control group of 800 non-participant irrigation users was also evaluated. Results from the first year post-retrofit, weather-adjusted data show a 21.47% average decrease in outdoor water usage in comparison with five years of historic usage.

Valley of the Moon Water District and the City of Sonoma, both in Sonoma County, have initial data from their pilot ET Controller programs that shows a reduction of 28% and 23% respectively compared to historic usage. Valley of the Moon's usage was compared with previous 5-year historic average and City of Sonoma with the previous 2-year historic average. A total of 27 controllers were installed in the Valley of the Moon Water District and 10 in the City of Sonoma. It should be noted that the irrigation controllers in these two programs were installed after the irrigation season had started.

Excess Irrigation and Savings Potential

The 1999 AWWA Residential End Uses of Water Study found that a significant portion of residential consumption is devoted to irrigation (58%). The study also found that homes with automatic sprinklers use 47% more water than those without automated systems. Much of the problem is due to the complexity and time involved in developing irrigation schedules. The following information from Metropolitan Water District and from Contra Contra Water District illustrates the potential for water savings from more efficient irrigation use.

Metropolitan Water District Analysis of Excess Water Use

Metropolitan Water District of Southern California has analyzed data from landscape programs conducted within its service area. SDCWA's PALM Program, which primarily focuses on large, non-residential landscapes, performed detailed water efficiency

surveys on 107 sites in FY 2001-2002. The irrigation efficiency of the sites, expressed as a percent of evapotranspiration (ETo), ranged as follows according to different categories of land use: commercial - 173%, apartments – 138%, large residences – 114%, institutions – 99%, HOA's – 98%, and parks – 64%.[1] The total weighted irrigation efficiency for these sites is 116%, or 36% above the 80% ETo target for landscape with mixed plant materials, as specified in the Model Water Efficient Landscape Ordinance.

Contra Costa Water District Landscape Evaluation – Commercial Sites

Contra Costa Water District conducted an evaluation of its commercial landscape water audit program, Landscape Water Audit Evaluation, August 1994. The study evaluated 62 commercial sites that were targeted for participation in the landscape audit program based on high water usage. The study concluded that an average of 85.68" of irrigation water was being applied to the sites. The normal year ETo for Contra Costa is 53.48". That represents excess irrigation use of 32.2" per year. The Contra Costa sites were commercial sites with an average square footage of 74,891 and a median square footage of 41,330. Small commercial sites have traditionally been the most difficult sites to manage. Therefore, we expect that the potential for savings through installing ET controllers is higher than for residential sites.

Targeting

Targeting of high users for will be a key element of this program to ensure that we are maximizing the potential water savings. The participating agencies intend to use a variety of different strategies including the following:

- Using water use efficiency survey data, both residential and commercial, to identify targeted lot sizes and high water users (excess irrigation)
- Customers with landscaped area in excess of a threshold lot size
- Abnormally high water use for sites within specific lot size categories
- Grouping accounts with comparable lot sizes and selecting the customers with the highest water usage per lot size group.
- Water usage exceeding an allocated water budget

Preliminary Product Specifications

A project team will determine the exact product specifications of the ET controllers during the start-up phase of this program. However, there are certain basic requirements that will apply. Those include:

- Controller is self-adjusting based on ETo and/ or weather changes
- Local ET-based irrigation controller

[1] San Diego County Water Authority, PALM Program Annual Report, July 2001 – June 2002, page 5.

- Multiple start-times
- Multiple stations/valves
- Adjustable test cycle
- Microclimate adjustments
- Accumulation feature
- Residential grade models
- Commercial grade models

Technical Specifications

- Basic technical specifications are as follows:
- Industry standard hook-ups (replaces any controller)
- Operating Ambient Temperature: 0 to 50° C
- Input operating voltage: 105 V a.c. to 135 V a.c.
- Output: 24 V ac
- Minimum number stations – residential grade: 6
- Minimum number stations – commercial grade controllers: 12
- Weather-proof case for outdoor installations (as required)
- Non-volatile memory
- 9 V battery back-up

Manufacturer Capabilities

Existing ET Controller manufacturers have been contacted regarding their abilities to meet the production targets outlined in this proposal. We have received assurances from the manufacturers that they have the necessary resources to ramp up their manufacturing operations and that they can meet the stated production goals.

Task List and Schedule

The program is scheduled to begin in October of 2003 and run for three years, including a six-month start-up period.

For Metropolitan and its member agencies, marketing outreach and production will begin in October of 2003 and ramp up as each program intervention method is initiated.

- Voucher processing will begin in April 2004;
- Workshops will begin in May 2004;
- Direct installations will begin in May 2004;

- By July, 2004, we estimate that the program will reach full production levels.

Below is a detailed program implementation timeline:

Program Implementation Chart

Tasks	Schedule
DWR Selects ET Controller Program to be Funded	April 2003
Water Agencies Commit to Production Targets and Type of Interventions	May 2003
Water Agencies Obtain Cost-Sharing Commitment Letters	May 2003
Contract Negotiations Initiated between DWR and Principal Applicant	May 2003
MOUs and/or Agreements Prepared between Principal Applicant and Participating Member Water Agencies	Jun - Jul 2003
Contract Executed by DWR with Principal Applicant, Project Begins	October 2003
Program Operations, Monitoring and Assessment Plan Finalized	October 2003
MOUs and/or agreements Executed with Principal Applicant and Participating Water Agencies	October 2003
Product Specifications	
Product Specifications Developed in Conjunction with EBMUD	Oct – Nov 2003
Products and Technologies Evaluated and Tested Against Specifications and Approved	Nov – Dec 2003
Eligible Product List Generated	January 2004
Prices, Production and Delivery Schedules Negotiated with Product Manufacturers	January 2004*
Water Agency Personnel Trained on Approved Products	March 2004
Program Information Systems	
Required Program Data Identified	October 2004
Centralized Computer Tracking System and Database Developed and Tested	Nov 2003 – Apr 2004
Internet Services, Data Access, and Security Protocols for Customers and Water Agencies Created	Jan – Feb 2004
Data Transfer Protocol, Format and Frequencies Developed	December 2004
Program Forms, Reports and Invoices	

Tasks	Schedule
Standardized Program Forms Developed for Each Intervention Method	January 2004
Standardized Reports and Reporting Requirements Developed	January 2004
Standardized Invoices and Procedures Developed	January 2004
Water Agency Personnel Trained on: Form, Report and Invoice Completion Computer System Usage	March 2004
Program Marketing and Production Planning	
Marketing Strategies Created for Each Intervention Method	Nov 2003 – Jan 2004
Productivity Milestones Generated for Each Marketing Method	January 2004
Calendar of Outreach Campaign Generated	January 2004
Program Theme and Logo Developed	February 2004
Marketing Collaterals Developed for Each Intervention & Marketing Method	March 2004
Marketing Templates Created for Each Water Agency, including: • Calendar of Marketing Activities • Production Planner • Marketing Collaterals	March 2004
Water Agencies Trained on Marketing Tools	March 2004
Program Operations, Standard and Controls	
Operational Policies and Procedures Developed for Each Intervention Method	Nov – Jan 2004

Tasks	Schedule
Controls and Standards Developed for: • Customer Service • Processing/Fulfillment Turn-around Time • Verification Inspections • Fiduciary Processes • Security and Confidentiality of Data	Nov – Jan 2004
Create Master Program Flow Integrating Operational Processes and Controls	February 2004
Create Calendar for Audit Events	February 2004
Train Water Agency Personnel on Operational Procedures, Standards and Controls	March 2004
Monitoring and Assessment Plan	
Monitoring and Assessment Plan Finalized	November 2003
Develop Research Plan for Submission to Project Advisory Committee	November 2003
Water Agency Involvement in Monitoring and Assessment Outlined	December 2003
Conduct Workshop with Project Advisory Committee	January 2004
Water Agencies Training in Monitoring and Assessment Requirements	March 2004
Conduct Process Evaluation Develop Interview Instrument Conduct Interviews Compile and Analyze Responses Draft and Disseminate Results	All Three Years
Conduct Impact Evaluation Develop Sampling Plan and Consumption Data Protocol Collect Pre-installation Water Use and Other Data Clean Data, Draw Sample, Construct Sampling Weights Collect Daily Weather Data from Multiple Weather Stations Conduct Water Use Modeling Analyze Cost Effectiveness	All Three Years

Tasks	Schedule
Prepare and Submit Program Evaluation Results	End of Year 1 End of Year 2 End of Year 3
Modify Program Based on Evaluation Results	Ongoing
Customer Questionnaire Developed to Assess Customer Satisfaction	January 2004
Conduct Customer Satisfaction Surveys	All Three Years
Compile and Evaluate Customer Satisfaction Results	All Three Years
Modify Program Based on Customer Satisfaction Results	Ongoing
Implementation Contractor(s) Selection	
Water Agencies Each Determine Internal vs. External Program Implementation	November 2003
Standard RFPs Prepared by Water Agencies	December 2003
List of Qualified Implementation Contractors Created	December 2003
Water Agencies Conduct RFP Process and Select Program Implementation Contractor(s)	Jan – Feb 2004
Program Template Development	
Small Commercial and Residential Workshop Templates Developed	Jan – Feb 2004
Small Commercial and Residential Installation Guidelines Developed	Jan – Feb 2004
Small Commercial and Residential Installer Training Developed	February 2004
Water Agency Installer Training	March 2004
Program Kick Off	April 2004
Program Marketing Begins	April 2004
Voucher Processing Begins	April 2004
Small Commercial and Residential Landscape Workshops Begin	May 2004
Small Commercial and Residential Direct Installations Begin	May 2004
Weekly and Monthly Reporting	May 2004
Field Inspections Begin	May 2004

Tasks	Schedule
First Quarterly Report and Invoice Submitted to DWR	July 2004

Program Flexibility

This project is designed to offer flexibility of implementation methods to the participating agencies. As previously stated, the individual agencies will customize the general program methods to maximize the program effectiveness within their service areas. As an example, agencies with ongoing landscape water audit programs may opt to combine the ET Controller program with the audit program. Also, depending on how the numbers of installations of residential and commercial controllers develop, the project is designed to offer the flexibility to change the mix according to demand. We also propose building in flexibility within the coalition of agencies to reallocate the ET Controllers from one service area to another should the need arise. This would be done with the consent of the participating agencies.

Scalable Levels

We have considered two scalable levels of implementation for this project, as shown in the table below.

	High (Optimal Level)	Low Level
Total Installations	**7,719**	5,514
Total Project Cost	**$4,134,167**	$3,109,740
Expected Water Savings	**38,616 AF**	27,930 AF
Grant Funds Requested	**$2,350,509**	$1,778,700

The proposed Optimal Level is the higher level of 7,719 controller installations, however we have also evaluated implementing the project at a reduced Low Level of 5,514 controller installations. Details for costs related to the Optimal Level are shown in Appendix A. Cost details for the Low Level are shown in Appendix B. The lower level of implementation does raise the costs of program implementation, since some of the key functions are relatively fixed costs and are amortized over the total number of units, i.e. database design and development, project coordinator, industry liaison etc.

Projected Costs

On the following pages are tables indicating production estimates, program costs and quarterly expenditure estimates. The projected costs shown here are for the optimal level of implementation. Details for the costs related to the low level of implementation are shown in Appendix A. Listed below are the estimated production and costs per implementation method and customer target.

		Implement-ation	Central Admin	Start-Up	Monitoring & Assessment	# of Controllers Total	Extended Cost
Residential Controllers Cost	Direct Install	$439.00	$36.92	$16.84	$22.67	2,257	$1,163,400.71
	Self-Install	$357.75	$36.92	$16.84	$22.67	4,688	$2,035,403.93
Commercial Controllers 12-24 Station	Direct Install	$1,001.04	$36.92	$16.84	$22.67	156	$168,461.20
	Self-Install	$782.59	$36.92	$16.84	$22.67	286	$246,007.83
Commercial Controllers 24-48 Station	Direct Install	$1,456.91	$36.92	$16.84	$22.67	82	$125,801.61
	Self-Install	$1,238.46	$36.92	$16.84	$22.67	249	$327,708.21
						7,719	$4,066,783.49
Some error due to rounding, factoring etc.						Plus Year 1 Signal Fees	$67,408.19
						Total:	$4,134,191.68

Cost includes amortized start-up, program marketing, implementation, administration and equipment.

Listed in the table on the following page is the unit cost for each of the implementation methods.

Implementation Method	Est. Total Cost for Task	Self-Install Workshop with Voucher Residential	Direct Install Residential	Self-Install Workshop with Voucher Commercial	Direct Install Commer-cial	Self-Install Workshop with Voucher Commercial	Direct Install Commercial
Volume Basis for Estimated Costs		Residential Controllers Up to 12 Station 1000	1000	Commercial Controllers Up to 24 Station 1000	1000	Commercial Controllers 24 to 48 Station 1000	1000
Install		$0	$125.00		$ 250.00		$250.00
Voucher Processing & Admin		$10.00		$10.00		$10.00	
Vendor Negotiation	$2,000.00	$2.00		$2.00		$2.00	
Marketing		$7.00	$25.00	$10.00	$40.00	$10.00	$40.00
Workshop - Marketing ($750 X 40)	$30,000.00	$30.00		$30.00		$30.00	
Workshop- Development	$2,000.00	$2.00		$ 2.00		$2.00	
Workshop -Staff ($250 per 2 hr workshop	$10,000.00	$10.00		$10.00		$10.00	
Additional Program Administration (Data Entry, Tracking, Phones, Customer Service, Reporting)		$5.00		$5.00		$5.00	
10% Mail Distribution	$ 200.00	$0.20					
Certified Contractor Workshop 2000 develop + 2 x $2000 workshop	$6,000.00	$6.00		$6.00		$6.00	

Customer Serv/Liablitity			$6.00		$6.00		$ 6.00
Unit Cost Per Inspection (based on % inspected)		$5.00	$2.50	$5.00	$2.50	$5.00	$2.50
Customer Satisfaction - mail in postcard	$2,500.00	$2.50	$2.50	$2.50	$2.50	$ 2.50	$2.50
Sub-Total		$129.80	$211.05	$132.60	$351.05	$132.60	$351.05
Plus Central Admin		$2.50	$ 2.50	$2.50	$2.50	$2.50	$2.50
Product Cost-Modified Historical ET		$234.60	$234.60	$446.09	$446.09	$ 887.12	$887.12
Total Cost per Modified Historical ET unit		$366.90	$ 448.15	$581.19	$799.64	$1,022.22	$1,240.67
Product Cost Real-Time ET Cost		$222.50	$ 222.50	$1,125.77	$1,125.77	$1,616.25	$1,616.25
Total Cost Per Real-Time ET Unit		$354.80	$ 436.05	$1,260.87	$1,479.32	$1,751.35	$1,969.80

Quarterly Expenditure Projection

Listed in the table below are the estimated quarterly expenditures for the proposed program at the optimal (high) level of implementation:

	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Total
Year 1	$ -	$40,000	$351,980	$288,036	$680,016
Year 2	$432,185	$432,185	$432,185	$432,185	$1,728,740
Year 3	$432,185	$432,185	$432,185	$432,185	$1,728,740

Total Expenditures

$$4,137,497

Some errors due to rounding, factoring and allocation of costs

A-7 MONITORING AND EVALUATION

One of the key elements of developing a successful program is the ongoing monitoring and assessment of performance. In order to track and monitor program implementation performance, we propose four main components:

- Developing and maintaining a centralized relational program database;
- Performing verification inspections;
- Conducting customer satisfaction surveys;
- Administering a full-scale process and impact program analysis.

All of this information and feedback will be used to modify the program. Continual enhancement and changes will be made to program marketing and operations in order to ensure the highest potential for success.

Centralized Database

We propose to develop and maintain a centralized master program database for this project. Individual copies of the centralized database will be made available and required for use by individual agencies for their in-house needs or for their contractors where applicable. Each participating agency will be required to provide an updated copy of their local program database when submitting invoices for payment. The updated copies will then be merged into the master project database. This approach offers several benefits:

- Economies of scale with respect to database development and administration
- Consistent data structure and format

- Centralized reporting capabilities
- Ease of use for analysis and study purposes due to the consistent data structure and format
- Using a consistent structure and format, each participating agency will operate its own program database and will be able to incorporate supplementary features that may be required to accommodate conditions unique to its service area.

A project team will develop the specifications for the database during the start-up phase of the project. The data will include, at a minimum, the following information:

- Participating Agency
- Individual customer information (name, address, account number)
- Installation location
- Installation date
- Type of distribution method
- ET controller type and model
- Square footage of irrigated landscape at the site

Additional data fields, including detailed site information, will be determined during the planning phase.

Reporting

The database will be used to generate program status reports on a monthly and quarterly basis for comparison against program implementation targets. Yearly reports and a final project report will also be created. The monthly reports will show sub-total information for individual participating agencies, as well as for the program overall. Standard summary reports showing information for the reporting period, as well as cumulative information, will include, at a minimum:

- Total number of ET Controllers installed
- Number of ET Controllers by program implementation method
- Quantities of the types and models of ET-Controllers installed – totals as well as by implementation method
- Irrigated area

Detailed reports will be designed based on the specifications developed during the planning phase. Additional reports will be developed, as necessary, to facilitate program implementation and evaluation, throughout the progress of the project.

Customer and agency feedback will also be tracked and monitored in order to evaluate

the ongoing impact and effectiveness of the program.

Verification Inspections

Direct-installations amount to approximately 32 percent of all of the ET Controllers planned for installation on the proposed programs. For these installations, field reports from the installers (under contract to the water agency) are normally deemed to be sufficient evidence of installation, although random spot-checking will be performed for additional assurance of installation.

For the remaining 68 percent of installations, all of which rely upon the customer for ET Controller installation (self-install and voucher methods), an independent (third-party) verification process will be implemented.

This verification process will involve the random selection from the universe of reported installations a sample of installations for field inspection. Samples will be stratified in accordance with method of implementation (voucher, direct install, etc.) and the intended end-use (residential, commercial) and will be based upon a 95% confidence level that the result will be within ±2% of the actual installation percentage. In the event that, during Year 1 of the Program, in excess of 99 percent of the reported installations are found to actually be installed, the independent verification process may be temporarily modified or suspended (with the prior approval of the DWR).

The independent verification process will begin field inspections of the randomly selected sites no sooner than 45 days and no later than 90 days following the date of reported ET Controller installation2. Results of the independent verification process will be reported on a quarterly basis.

Process and Impact Evaluation

There are three very different types of questions raised by this study. One type of question is practical—how well are the different programs/intervention methods doing at getting customers to adopt the ET controllers? The second type of question is empirical--what is the net change in water use attributable to ET controllers? A related question, of course, pertains to the costs and benefits of ET controller programs—are they worth doing?

There are relationships between the questions. The design of ET controller programs can minimize unnecessary costs, increase the likelihood of customer participation and retention, and, thereby, increase the benefits produced by these programs. The magnitude of water savings is a key determinate how ET controller programs can benefit water/wastewater utilities, the Bay-Delta, and society. An integrated evaluation approach is proposed to address these interrelated issues.

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[2] A minimum period of 45 days is proposed to assure that the customer has ample opportunity to install and operate the ET Controller and provide the inspector with customer feedback. A condition of the installation will be that the old irrigation clock/timer be removed by the customer and provided to the water agency.

Overall Evaluation Approach

The research approach is designed to be both flexible and dynamic. A brief summary of the recommended approach—subject to input from the Project Advisory Committee and possible major revisions—partitions the research into three phases:

Phase I would be conducted in six months and would develop the research approach, draft interview instruments, develop a consistent consumption data submission protocol, and define expect results.

Phase II will seek to provide the earliest possible set of evaluation results that could feed back into improving program design and, thereby, program effectiveness (months 7-18).

Phase III would involve a higher resolution examination of these ET controller programs and intervention methods, to provide the most definitive answers about the sample of participating customers and address questions of potential effects of these programs if scaled to additional water agencies and other customers (month 19 to project conclusion.)

In the following section, a more detailed topology of questions is developed. Thereafter, methods are proposed to develop a corresponding set of answers.

Questions to be Addressed

There are two dimensions that we would like to divide the questions about ET controller program impacts--internal versus external validity. Another division is the feasibility of implementation (customer acceptance, industry support, and sustainable financing) versus the effectiveness (what benefit at what cost).

Questions of internal validity refer to what may be inferred about the feasibility and impact of programs that are implemented:

Feasibility - Implementation Success

How satisfied were participating customers?

- How would the programs be changed to increase the probability of participation?
- How would the programs be changed to decrease the attrition probability?
- How did different intervention methods (direct versus self-install) differ?

Effectiveness - Benefits and Costs

- How much water was saved by ET controller participants (gross savings).
- How much water was saved by non-participant control group (ongoing non ET controller savings).
- How much additional water was saved by ET controller participants (net savings).
- Are there any “spillover” effects of program participation?

- What is the relationship between savings and wastewater flow/urban runoff?
- How do savings vary:
    - By type of controller used?
    - By intervention type (direct versus self-install)?
    - By customer segment (residential vs. commercial)?
    - By size of irrigated area?
    - By climate zone (inland versus coastal, north versus south)?

Questions of external validity refer to what inference may be extended outside the sample of participants. These could include:

- The effects of the same program targeted toward other customers.
- The effects of the same program expanded statewide.
- The potential effect of a differently configured program (e.g., small vs. large lots)
- The projection of water savings into the future (persistence).

The questions of external validity are naturally more conjectural and are an inherently riskier inference. Nonetheless, these questions are also the ones most important to provide answers to sustain the scope and scale of this market transforming efficiency program.

Decisions over how to allocate analytic resources must address how much effort is allocated to each question? Of the questions listed under the internal validity label, the implementation feasibility and the variation in water savings deserve the largest allocation of research effort. The magnitude and persistence of water savings are the most contentious issue in estimating cost-effectiveness; variation in water savings is the critical knowledge needed to improve cost-effectiveness (through better program design.) Under the external validity label, we believe the extrapolation of conservation potential and the persistence of water savings deserve a greater allocation.

Methods

Given the differences among types of ET controller programs, a single cookie-cutter analytic approach is inappropriate. We propose this adaptive research design using the following multiple data collection methods.

Process Evaluation – The process evaluation addresses the questions of how well the different programs achieve program participation and retention. This assessment of the implementation success of the ET controller programs/intervention methods has been budgeted at approximately $30,000.

Implementing Staff Interviews - In-person focused interviews with agency staff responsible for implementation (program success, factors important in success,

weaknesses, strengths, and areas for improvement.)

Other Water Agency Staff Interviews - In-person focused interviews with agency financial and managerial staff (revenue effects, assessment of financial planning complications, program success, factors important in success, weaknesses, strengths, direct and indirect program costs, and areas for improvement.)

Interviews with other Stakeholders - In-person focused interviews with representatives of the green industry, landscape professionals, and environmental advocates.

Customer Satisfaction Survey – The results of the survey of customer perception of program (strengths, weakness, customer satisfaction, and suggestions for improvement) to be integrated into the process evaluation of program/intervention method effectiveness.

Quarterly Progress Reports – The results of the quarterly progress reports would be integrated into the process evaluation with an eye to developing an understanding of the reasons why differences may be observed in program progress.

Impact Evaluation - The impact evaluation addresses the questions of whether the different programs achieve their intended effect. The impact evaluation has been budgeted at approximately $145,000.

Water Use Analysis - Using historical account level water use records and multiple climatic measures, climate-adjusted estimates of water savings will be developed using regression methods. To the extent that comparable non-participants exist at some of the agencies, an assessment of net conservation could be attempted. The amount of additional effort allocated to this question will be determined after issues of data availability have been settled. This evaluation proposes providing the earliest possible indicators of differences in water savings by intervention method (Phase II). These results will be labeled as preliminary and subject to confirmation in the last year of the study (Phase III).

Cost-Effectiveness Analysis - A cost-benefit analysis will be performed and presented in a form compatible with CUWCC CEA guidelines. This will explicitly address additional indirect benefits of reduced urban landscape runoff, seeking to define a methodological overlap with existing studies measuring urban runoff that could provide the necessary baseline data (IRWD study.)

Tasks

Task 1: Develop Final Research Plan This evaluation proposes developing a stratified sample of individual customers across the different program types and intervention methods. Traditionally, the bulk of the technical literature on developing sample has primarily focused on ensuring representativeness of a sample to the population from which it is drawn through randomization. Representativeness of a sample is, of course, an extremely important concern, but one that can be addressed through the methods of scientific sampling. A formal sampling plan will be developed in Phase I.

The evaluation will be coordinating with numerous water agencies having potentially different characteristics in terms of population, distribution of population among different customer classes, climate, and lot size. All of these factors affect water use patterns and have a bearing on the extent and type of intervention methods that are likely to succeed in each area. Because of these agency-specific differences, stratification by agency will improve the representativeness for a given sample compared to a simple random sample.

Over time we have found that theoretical calculations of required sample size are misleading and risky for several practical reasons (see Chesnutt et al. 1998 "A Primer on Sample Size Calculations"). The theoretical calculations are misleading because the questions asked of the evaluation can be more involved than simply measuring a mean change in water use. How does the mean change in water saving itself change over time? How do different program participants save differently? What explains differences in water savings? The theoretical calculations are risky for a different reason. A certain fraction of water consumption histories will not prove usable. This data attrition can leave the evaluator with an insufficient sample to draw robust conclusions. The sampling plan developed in Phase I will account for these practical considerations in developing a sampling approach.

Task 2: Process Evaluation – The process evaluation combines data generated by program implementers (progress reports, customer surveys) with structured interviews of implementers, other water agency staff, and other stakeholders. These focused interviews target the agency staff responsible for implementation (program success, factors important in success, weaknesses, strengths, and areas for improvement), financial and management staff (revenue effects, assessment of financial planning complications, program success, factors important in success, weaknesses, strengths, direct and indirect program costs, and areas for improvement.), and other stakeholders including representatives of the green industry, landscape professionals, and environmental advocates. A complete sampling of the first two groups will be attempted (two dozen interviews.) The interview protocol with agency will end with a collection of agency-specific information. A list of individuals in the third group (other stakeholders) will be developed in cooperation with the project administrator and representatives from the agencies.

Task 3: Water Use Analysis and Cost-Effectiveness Analysis. The water use analysis seeks to develop sound empirical answers to the following questions:

- What was the change in water use at one site attributable to ET controller installation?
- What explains the magnitude of the observed change?

The answer to the first question is simpler and requires less data (consumption records, the time of the change over). The answers to the second questions are necessarily more complex and require more data.

Using historical account level water use records and multiple climatic measures, the water use analysis would develop climate-adjusted estimates of water savings using panel data (time series cross section) regression methods. A comparable "control group" of non-participants must be developed to permit an assessment of net conservation. The amount of additional effort allocated to this question will be determined after issues of data availability have been settled. This evaluation proposes a cost-effective approach to water consumption sampling. It proposes to obtain a large sample of consumption histories for participating customers. Appropriate panel data estimators can ensure that unbiased estimates of water savings can be made without cross-sectional data on customer characteristics. Data on customer characteristics would be added later to answer the additional and more involved questions of how the water savings vary across customers and intervention methods. In this way the analysis of water savings using consumption histories can be made independent of available measures of customer characteristics. This makes the impact evaluation more robust. Contrariwise, the measures of customer characteristics, where available, can powerfully explain differences in observed water savings.

The water use analysis in Phase II will provide the earliest possible evidence of differential savings effects for linkage back into ongoing program design. These results would be narrowly disseminated and clearly labeled as preliminary. The water use analysis in Phase III could confirm hypotheses developed in Phase II and test for broader threats to inferential validity and reliability. Phase III will also include a cost-benefit analysis conducted in a form compatible with CUWCC CEA guidelines.

Task 4: Report and Dissemination Draft and final report, including process and impact evaluations.

- Web sites and water planning conferences.
- Discuss opportunities for expansion and applicability to other service areas.
- Dissemination of study results will be done via:
- Final report
- AWWA conferences
- CUWCC web site committees
- Agency boards of directors
- Press releases

Program Feedback and Mid-Course Changes

We fully expect that as implementation proceeds and the customers in the marketplace provide feedback to us, fine-tuning of the marketing, training, and installation processes will be required. This includes a possible re-focusing of efforts into areas more likely to yield higher water savings per program dollar invested.

In addition, as our relationships with the controller industry solidify and mature, we also expect that their very enthusiastic support and assistance will become more evident.

Because this Program's outreach efforts will be tailored (by the implementing water agency) to the specific local area in which it is operating, significant benefits will accrue as successful marketing outreaches in one local geographic area are exported to other local areas and used by other Program implementers.

For these reasons, our Program calls for an ongoing (monthly) formal review of successes and failures in the areas of outreach and installation in order that the entire Program would operate at the most cost effective level possible.

A-8 QUALIFICATION OF THE APPLICANT AND COOPERATORS

JOHN P. WIEDMANN

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
Senior Resource Specialist

Key Experience:

7/01 – Pres. Large Landscape Program Manager

Administration of approximately 30 agreements for projects involving centralized irrigation control systems, moisture sensor pilot projects, and other landscape projects.

8/94 – 7/01 Residential Programs Manager

Formed RESPAC (Residential Project Advisory Committee) to develop resource manuals for initiating and implementing residential surveys of single family residences. The project team (7 member and subagencies) received an award from USBR for its cooperative venture.

Executed and administered agreements with seven member agencies and subagencies for water use efficiency surveys of single family residences.

Oversight responsibility for execution and administration of agreements for High Efficiency Clothes Washer rebate programs, including regional programs with Southern California Edison and San Diego Gas & Electric.

Oversight responsibility for the Residential ULF Toilet Program, which provided funds for approximately 175,000 ULF toilets annually at $60 each. Approximately 25 member agencies participated. Responsibilities included agreement execution, invoice approval and payment, and administration of a program for verification of ULF toilet installation.

Oversight responsibility for $3.65 million grant from USBR for 66 separate conservation projects, managed by both Metropolitan and its member agencies.

02/92 - 07/94 General program development responsibility for landscape and commercial/industrial/institutional programs.

Initiated Metropolitan's cooperative relationship with California Polytechnic State University at San Luis Obispo for expansion of Protector del Agua classes.

1982 - 1992 Agent, Northwestern Mutual Life Insurance Company.

Provided business and personal risk management services for professional clients.

1973 - 1982 Rain Bird International, Inc., Area Manager, Sales and Marketing Manager, and Product Development Manager

Developed international markets for distribution of sprinkler and drip irrigation equipment.

1963 - 1971 Geologist, Atlantic Richfield Company.

Explored for oil and gas in California, Alaska, Libya and England.

Education:

1957 – 1963 Bachelor and Master of Science, Geology, Stanford University
1971 – 1973 Master of Business Administration, Stanford University

DANIEL R. CARNEY

City of San Diego Water Department

Registered Landscape Architect

Bachelor of Science, Landscape Architecture
Licensed Landscape Contractor
Certified Irrigation Auditor

Landscape Management Experience

Landscape Architect
Dates of Employment: 1998–Present

Duties:

- •Program design and project management responsibility for the City's landscape water conservation programs
- •Subject matter advisor to Management
- •Project coordination with regulatory and resource management agencies and City departments
- •Educational presentations to schools, community and professional groups
- •Design multi-media slideshows, publications, internet applications, and the Water Resources Landscape Database
- •Prepare technical reports on wetland restoration, reclaimed water, and landscape best management practices
- •Design and implement pilot research projects
- •Utilize multiple computer applications including PowerPoint, ArcView, Microstation, and standard City software programs

Landscape Architect

Schmidt Design Group, Inc.

Dates of Employment: 1995–1997

Duties:

- •Project design and administration for multi-acre park and recreation, commercial, and municipal projects
- •Preparation of landscape construction drawings and specifications, cost estimates, bid documents and contracts
- •Construction administration and inspection
- •Coordination with multi-disciplinary design teams, government agencies, and contractors
- •Development of specific plans for fire zone, brush management and revegetation projects
- •Process regulatory agency approvals, and prepare resource management plans

- •Write technical reports and develop educational materials
- •Manage the Large Turf Water Management Program

Water Conservation Specialist

Irvine Ranch Water District

Dates of Employment: 1994–1995

Duties:

- Implemented District's landscape water management program
- Performed construction inspections to monitor program compliance
- Completed technical reports and provided customer support
- Processed capital improvement proposals, prepared consumption analysis reports, developed a mainframe data base program, and designed landscape improvements for District facilities

Additional Qualifications

- Instructor, Cuyamaca Community College Horticulture Department– Advanced Irrigation System Design
- Instructor, San Diego County Water Authority - Reclaimed Water Certification Program
- Presenter, City of San Diego Water Department – Speakers Bureau

VICKIE V. DRIVER

San Diego County Water Agency

SKILLS AND EXPERIENCE

- Strong program and contract management skills
- Strong analytical skills
- Strong technical and life science background
- Familiar with Urban and Agricultural MOUs, BMPs and other relevant local, state and federal regulations
- Familiar with public health and environmental issues

QUALIFICATIONS

Currently manage landscape and agricultural conservation programs totaling $780,000 in value of services to member agencies. Additionally, manage special projects for Xeriscape, irrigation training and several studies. In the past, managed the Commercial, Industrial, Institutional (CII) Voucher Incentive Program and the Residential Survey Program.

Worked to make the conservation programs more cost-effective and more responsive to the needs of the member agencies and their customers.

Researched and developed an incentive for coin-operated, H-axis clothes washers through the CII Voucher Incentive Program. Successfully submitted a proposal to SDG&E for $200,000 for coin-operated, H-axis vouchers.

Developed strong working relationships with member agencies, MWD staff, SDG&E, the military, the Department of Environmental Health, Storm Water Co-Permittees and contractors, California Landscape Contractors Association and the Farm Bureau.

Represent the Authority on the California Urban Water Conservation Council's (CUWCC) Landscape and Research and Evaluation sub-committees, MWD's landscape committee and the Agricultural Water Management Council.

Analyzed IID's agricultural conservation report, wrote the RFP and contract for an analyst for IID agricultural conservation, acted as the Authority contact for the AWWARF arsenic study, End Use Studies for Residential and Commercial-Institutional customers and participated in Public Affairs' trihalomethanes effort.

THOMAS GACKSTETTER

Los Angeles Department of Water and Power

Current Position: Water Conservation Manager (September, 1994 to Present)

- Water conservation program design, development and implementation for the City of Los Angeles, including a current pilot program installing ET-based irrigation controllers in large multifamily residential/small commercial sites, high efficiency clothes washer rebate program, ultra-low-flush toilet replacement programs, water use survey programs for all customer sectors.
- Management of staff and resources in the implementation of comprehensive conservation programs and overall customer service. Management and oversight of $16 million annual budget.
- Development and implementation of the Los Angeles Department of Water and Power Supplemental Purchase Specification for ultra-low-flush toilets. The SPS exceeds current national standards to ensure long-term water savings.
- Contract work bid solicitations, contract negotiation and management, contractor oversight.
- Liaison to other California water agencies and state/federal agencies.
- Member of California Urban Water Conservation Council's Steering Committee

Demand-Side Management Planner, (January, 1989 to September, 1994)

- Energy efficiency program design and development, including customer market research (surveys, interviews, focus groups), program policy and guideline development, consensus building, and program implementation.
- Liaison to other City departments, State regulatory agencies, and other electric utilities.
- Account Executive for large energy customers (March, 1989 to July, 1989)

Los Angeles Department of Transportation (July, 1981 to January, 1989)
Position: Traffic Signal Electrician

- Installation, maintenance and repair of traffic signal systems and equipment.
- Maintenance and enhancement of traffic signal equipment database.

Los Angeles Department of Building and Safety (August, 1977 to July, 1981)
Position: Electrical Equipment Tester

- Ensured electrical equipment conformance to applicable Underwriters Laboratories Standards, Los Angeles Electrical Code, and other City requirements.

Education: Bachelor of Arts – Business Administration [Finance]

Role of External Cooperators

This program will be implemented in partnership Metropolitan's member agencies, as well as the California Urban Water Conservation Council.

The California Urban Water Conservation Council was formed in 1991, as a result of the signing of the Memorandum of Understanding Regarding Urban Water Conservation. Since then the Council has played a key role in promoting statewide water use efficiency. Its membership includes water agencies, environmental organizations and other interested parties. The Council is a consensus organization and represents the interests of all its members. The majority of the participating agencies are signatories to the Urban MOU, and members of the CUWCC. Developing a program of this broad scope will require many of the skills that the Council brings to the table. The Council provides a forum for information transfer and coordination of resources amongst its members. The Council anticipates providing program co-ordination and support for this project.

A-9 INNOVATION

ET Controller Technology

In California, landscape water usage for single family and small commercial customers is an opportunity that has largely gone untapped. For years water agencies have been attempting to find a service or technology that could be cost effectively implemented and desired by customers.

Until recently, there was no viable controller product that caught the consumers' attention and yielded durable water savings. Water surveys that provided customers with customized irrigation schedules also did not result in long-term savings.

The EvapoTranspiration (ET) controllers to be offered through the proposed program offer a technology that will stimulate customer interest and achieve long-term savings. In this program, it is intended to replace the common "clock-type" irrigation controllers with controllers possessing this new technology that adjusts irrigation schedules automatically.

EvapoTranspiration (ET) is the combined process of water evaporating from the soil and water transpiring from plants. ETo, or reference evapotranspiration, is based on calculated values of several factors, including solar radiation, temperature, relative humidity and wind speed. ET can vary considerably from week to week, so to maximize water use efficiency with existing, standard controller technology, one needs to adjust irrigation schedules and re-program controllers on at least a weekly basis. This real time ET can be downloaded from local weather stations located throughout California.

The average ETo for a specific location is referred to as normal year ETo, or historical ET. It reflects the amount of water that is both transpired and evaporated from a plot of tall fescue grass. It is used to develop an irrigation schedule. However, because it is

based on a normal year, adjustments have to be made to the schedule to compensate for variations from normal year ETo.

The amount of water that a plant needs can be scientifically calculated based upon the ET and a factor that is specific to plant or crop types (known as the crop coefficient). An appropriate irrigation schedule for a specific site is developed from a combination of the local ET value (ETo adjusted by the crop coefficient) and other site variables, such as plant types, soil type, sun exposure, amount of slope, etc. The challenge is in getting residential customers and landscape site managers to make the appropriate calculations and adjust their irrigation schedules appropriately as ET changes. Traditionally landscape water management has been poor because the process of developing irrigation schedules is time-consuming and sophisticated. As a result, over-watering of landscape sites is very common, and results in several problems:

- Most plants cannot store more water than they need to meet evapotranspiration needs; water applied in excess of their needs is wasted
- Over irrigation causes excessive run-off that contributes to non-point source pollution
- Over-irrigation tends to result in poorer plant health and increased site maintenance costs
- Summer peak demands on water distribution systems are exacerbated by excessive irrigation

The existing ET controllers on the market are large, centralized systems that cost thousands of dollars. They are usually not cost-effective for smaller commercial sites, and certainly not for residential customers. However, new technology exists that incorporates ET-based irrigation scheduling into cost-effective residential and commercial controller models. They either use real-time ET transmitted by signal to the controller on a weekly basis, or they use irrigation schedules based upon adjusted historical ET. ET-based irrigation controllers remove the need for customers to make scheduling adjustments, while ensuring that the landscapes receive the appropriate amount of water. This cost-effective technology finally addresses the gap between the science of irrigation scheduling and the ability and time required of customers to implement it. Once installed, ET-based controllers automatically adjust the irrigation schedule for the site. The benefits of this breakthrough are multiple and far-reaching in scope, and include:

- Water savings
- Improved plant health
- Reduced non-point source pollution
- Reduced green waste

- Reduced "summer peaking" problems resulting from excessive irrigation

The Project will install "smart" irrigation controllers on residential and smaller commercial sites. This new and emerging generation of controllers has differing degrees of "smartness". Currently there are two versions of production-ready residential "smart" controllers that have been used in California and other western states.

One version includes a chip with 10 years of historical evapotranspiration (ET) data from 13 different regions in the country. Given several inputs, the controller associates the site location with a specific ET region and then adjusts the irrigation schedule (which initially has to be input by the end user or an installation contractor) as the average historical ET values change. The controller provides a temperature sensor option designed to modulate the average historical ET data to make it more closely reflect actual local weather conditions. This controller is totally self-sufficient. It requires no outside inputs after it is set up.

The second version of a "smart" controller is more sophisticated than the historical model. It requires responses to a series of questions about each zone of landscape controlled by each station of the controller. Those questions refer to site-specific variables such as plant type, soil type, sun/shade exposure, type of irrigation system, slope of terrain, and the zip code for the controller's location. A more data intensive programming option for turfgrass zones requires input about plant root depth and the irrigation system's precipitation rate. With this data the controller computes an irrigation schedule for each station. Thereafter, it collects local ET data on a weekly or more frequent basis and then remotely adjusts the schedule via a satellite paging technology as ET data changes. This version of "smart" controller, commonly referred to as a "real-time" controller, requires an on-going remote signal (at a fee) to adjust the irrigation schedule as local ET changes.

Currently these two ET controller versions are the primary production-ready "smart" controllers being used and tested. However, several irrigation equipment manufacturers have also expressed desire to introduce "smart" controllers. It is unknown what technologies they and other manufacturers will incorporate in their ET controllers. Those technologies may be different than the technologies currently available.

Large landscape sites in California have been targeted for programs by water agencies and, to a great degree are market driven. Water purchases for large sites can be a major line item cost for the customer and these economics drive the customers' motivation to participate in conservation programs. On the other hand, residential and small commercial sites are generally perceived as hard-to-reach markets, with economics that do not send a strong conservation signal to the customer.

The single family and small commercial customers make up a large percentage of the overall water demand yet, to date, water agencies have had few services or products of interest to customers. As a result, these markets have long been under-addressed.

The ET controller products and technology will allow the water agencies to offer their customers an effective way to save significant water and improve the health of their landscape.

The California water agencies are determined to be the impetus that motivates irrigation equipment industry to manufacture and market ET Controllers as a principal item in their product line. Our program model is based on the highly successful toilet market transformation process of the past ten years. Our major goal is to transform the residential and small commercial irrigation market with the same vigor and success that occurred with ultra-low-flush toilets. The plumbing industry was permanently changed as a result of the water agencies' toilet replacement program initiatives. We intend to replicate this model of success and drive the irrigation product industry in a similar direction.

Early Program Barriers	ULFT Market Issues	ET Controller Issues	Solutions used in the ULFT program and included in the ET Controller Program
Devices not widely known or accepted by customers	✓	✓	Water agencies create an offer that is hard to turn down. Initiate targeted marketing campaigns to increase customer awareness and provide education regarding product benefits
Product manufacturers have little incentive to modify their product offerings for new technology	✓	✓	Educate forward-vision manufacturers about market potential. Create market potential by placing large orders for product
Distributors experienced little or no demand for the new product	✓	✓	Help viable manufactures to link up with distributors Create demand through program production
Early models experienced performance problems	✓	✓	Test models and select products with quality performance. Select at least two products for program.

			Maintain stringent quality assurance practices for the program to identify and resolve product problems. Provide market and technical feedback to manufacturers and distributors.
Installers did not believe that the technology could work	✓	✓	Initially work with a select group of installers. Educate wider circle of installers utilizing performance statistics and hands-on workshops.

Metropolitan believes that the best way to initiate market transformation is with this proposed ET controller program. Customers will respond to the attractive program offerings and high level of customer convenience. Following is an overview of the program's goals and objectives:

This program is the critical first step in Metropolitan's campaign to drive ET controllers into the market. It is our belief that the eventual downstream result, in years to come, will be that…

- The customer will elect to pay retail price for the ET Controller because of customer's desire for the product, i.e., no water industry incentives will be required.
- Product selection will increase and prices will decrease due to customer demand.
- Manufacturers will substantially reduce or discontinue the production of inefficient controllers in lieu of ET controllers.
- Governing bodies will enact legislation requiring ET controllers for landscape in new construction projects.

A-10 AGENCY AUTHORITY

1. **Does the applicant (official signing A-2, Application Signature Page) have the legal authority to submit an application and to enter into a funding contract with the State? Provide documentation such as an agency board resolution or other evidence of authority.**

Yes. MWD's Administrative Code (§ 8115), as last amended by MWD's Board of Director's by Minute Order 44582 (August 20, 2001), provides that "[i]f the amount payable or expected to be paid by the [Metropolitan Water] District under the terms of a contract is less than $250,000, the contract my be executed by the Chief Executive Officer unless otherwise directed by the Board." (MWD Admin. Code § 8115 (c).) Because Metropolitan will not be required to make payments of $250,000 or more under the terms of a funding contract with the State, Metropolitan's Chief Executive Officer or his delegate are authorized to submit this application and to enter into the funding contract.

2. What is the legal authority under which the applicant was formed and is authorized to operate?

Metropolitan is a quasi-municipal corporation created in 1929 pursuant to the Metropolitan Water District Act. (Stats. 1927, ch. 429; City of Pasadena v. Chamberlain (1928) 204 Cal. 653, 663); Metro. Water Dist. v. County of Riverside (1943) 21 Cal.2d 640, 642.) Operating under the authority of the Metropolitan Water District Act (Stats. 1969, ch. 209, as amended; Water Code App. §109), Metropolitan's primary responsibility is to acquire and develop water for delivery for municipal and domestic uses within Metropolitan's service area. (See Water Code App. § 109-25.)

3. Is the applicant required to hold an election before entering into a funding contract with the State?

No. See the Response to 1, above. No action by Metropolitan's Board of Directors is required for Metropolitan's Chief Executive Office or his delegate to enter into a funding contract with the State.

4. Will the funding agreement between the applicant and the State be subject to review and/or approval by other government agencies? If yes, identify all such agencies (e.g. Local Area Formation Commission, local governments, U.S. Forest Service, California Coastal Commission, California Department of Health Services, etc.).

No.

5. Is there any pending litigation that may impact the financial condition of the applicant, the operation of the water facilities, or its ability to complete the proposed project? If none is pending, so state.

No. While Metropolitan is a party to various legal proceedings, Metropolitan does not believe an adverse ruling in any pending litigation would substantially impact Metropolitan's financial conditions or materially impair the operation of Metropolitan's water facilities or its ability to complete the proposed project. However, in the interest of

full disclosure, the following three cases are noted.

In February 2001, a case entitled Dewayne Cargill et al. v. Metropolitan Water District of Southern California et al. (Los Angeles Superior Court No. BC 191881) was filed against Metropolitan. This case is a class action lawsuit brought by various categories of temporary workers and certain temporary agencies, claiming that Metropolitan misclassified them to avoid providing them the same rights and benefits given to regular employees. In the first phase of the case, the trial court ruled for the plaintiffs. Metropolitan appealed the ruling to the California Court of Appeal, which upheld the lower court ruling in favor of the plaintiffs. The California Supreme Court granted Metropolitan's petition for review. Oral argument is expected in late 2002 or early 2003. The outcome of this litigation is uncertain; a result adverse to Metropolitan could have an adverse effect on Metropolitan's financial condition.

In April 2000, the Soboba Band of Mission Indians filed a lawsuit against Metropolitan in Federal district court regarding the affect of a Metropolitan water tunnel on reservation groundwater. The lawsuit seeks an injunction to halt the flow of groundwater, unspecified damages, or restitution in lieu of damages. The outcome of this litigation is uncertain; a result adverse to Metropolitan could have an adverse effect on Metropolitan's financial condition and could potentially obligate Metropolitan to deliver some amount of water to the reservation.

In September 2000, the Third District Court of Appeals issued its decision in Planning and Conservation League v. California Department of Water Resources. This case was an appeal of (i) a challenge under the California Environmental Quality Act (CEQA) of the adequacy of the environmental documentation prepared with respect to certain amendments to the State Water Contract (the "Monterey Amendments") and the selection of the proper CEQA Lead Agency and (ii) the transfer by the Department of Water Resources of the Kern County Water Bank from the State to the Kern County Water District. The appellate court agreed with the trial court that the Department of Water Resources should have been the lead agency and reversed the trial court's holding that the environmental documentation was adequate. The matter is now in confidential mediation proceedings and principles for settlement have been reached. However, if a final settlement is not reached and litigation proceeds, a final decision to invalidate all or a portion of the provisions of the Monterey Agreement could have an adverse impact on the allocation of State Project water to Metropolitan.

A-11 OPERATIONS AND MAINTENANCE

Not applicable

APPLICATION PART B- NOT APPLICABLE

This section is not applicable for this application.

APPLICATION PART C

C-1 CEQA/NEPA

The proposed project is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed project involves the funding and minor alterations of existing private or public facilities, along with minor modifications (e.g., new landscaping and supporting irrigation system) in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees. These activities would result in negligible expansion of use and no possibility of significantly impacting the physical environment. As such, the proposed project qualifies under both Class 1 and Class 4 Categorical Exemptions (Sections 15301 and 15304 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed project qualifies under two Categorical Exemptions (Class 1, Section 15301 and Class 4, Seciton 15304 of the State CEQA Guidelines).

C-2 Permits, easements, licenses, acquisitions, and certifications

N/A

C-3 Local land use plans

N/A

C-4 State and local statutes and regulations

N/A

APPLICATION PART D – NEED FOR PROJECT AND COMMUNITY INVOLVEMENT

D-1 Need for the Project

A. Statewide Perspective

The efficient use of California's limited water supplies is a critical local, regional and statewide water issue. The Bay-Delta supplies 22 million people in the state with water. However, there is a mis-match between the available supplies and beneficial uses of the Bay-Delta system. CALFED's water management strategy is to reduce that mis-match in order to improve the overall health of the Bay-Delta, increase supply reliability and improve water quality. Water use efficiency is one of the strategies that will help to meet this objective, as stated in the CALFED's Record of Decision (ROD).

CALFED has established an aggressive water use efficiency program that encompasses urban and agricultural conservation, and urban recycling. The estimated potential for urban conservation is nearly 2 million acre-feet per year. Among the various urban uses of water, landscape irrigation is one that offers significant opportunities for savings. CALFED estimates that residential landscaping statewide is currently irrigated at about 1.2 times the ETo, which suggests that over watering is a major cause of water waste. Metropolitan's proposal to install and monitor 7,719 self-adjusting irrigation controllers represents a significant step toward achieving the conservation potential sought by CALFED.

This project is intended to significantly increase urban water use efficiency through the installation of ET-based irrigation controllers. Residential water demand in California accounts for 54% of total urban water demand and is forecasted to reach 58% by the year 2020 as a result of population growth, primarily in the hotter, inland areas of the state. The 1999 AWWA Residential End Uses of Water Study found that a significant portion of residential consumption is devoted to irrigation (58%). The study also found that homes with automatic sprinklers use 47% more water than those without automated systems. Much of the problem is due to the complexity and time involved in developing irrigation schedules. That is why the ET-based irrigation controller technology is so exciting. It removes that barrier by automatically adjusting the schedule based upon either real-time or historical ET. Small commercial landscape sites also represent a significant potential for water savings. These sites tend to be not as well managed as the larger commercial sites, many of which have an expensive centralized irrigation controller. The ET-based irrigation controllers proposed in this project make ET-based scheduling a cost-effective option, even for the smaller sites.

The proposed project provides water use efficiency beyond the level of the existing BMPs. Although BMPs 1 and 5 do address landscape water use, all measures do not necessarily result in effective water savings with long-term persistence. We expect that the installation of ET-controllers will generate long-term water savings that have persistence.

The water savings from this project would help offset growing demands on the Bay-Delta system, thereby contributing to statewide water management strategies and objectives. On a regional and local level, they contribute to improved water reliability resulting from more efficient use of available resources.

This project is consistent with the Integrated Resources Management Plans of the participating agencies that include demand-side management through water conservation efforts as part of the long-term water supply mix. It is also consistent with the Urban Memorandum of Understanding (MOU) and associated BMPs. The participating agencies in this project are signatories to the Urban MOU, and have committed to implementing cost-effective conservation measures.

Finally, many of the urban agencies are also facing local problems resulting from non-point source pollution and excessive run-off. Over-watering is a key source of urban run-off. Therefore, irrigation scheduling based upon ET, and the reduction of excess irrigation will also contribute to reduced levels of urban run-off and non-point source pollution.

B. Southern California Regional Perspective

The proposed Project stems from several over-riding issues, including the need to: 1) minimize Metropolitan's demand on Bay-Delta supplies, 2) offset regional supply/demand imbalance, and 3) create a reliable source of water via increased landscape water use efficiency.

Need to Minimize Demand on Bay-Delta Supplies

Within Metropolitan's Integrated Resource Plan, adopted in 1996, a key objective is to reduce demand on its Bay-Delta supply during periods of critical drought from 35 percent of its total supply in1996 to 12 percent by the year 2020. Currently landscape irrigation accounts for approximately one-half of the total urban demand in Metropolitan's service area. It is Metropolitan's firm commitment to reduce landscape irrigation demand by achieving more efficient use of landscape water via the installation of ET controllers.

Need to Offset a Regional Supply and Demand Imbalance

Metropolitan is facing a significant decline in its imported water supply at the same time demand is increasing due to population growth. A historic water accord was recently negotiated between Metropolitan, the Coachella Valley Water District, the Imperial Irrigation District and the San Diego County Water Authority. Assuming the accord is officially ratified by all the participants by December 31, 2002, Metropolitan will have 15 years to wean itself of 750,000 acre-feet (AF) of water it now draws annually from the Colorado River. This supply reduction represents approximately 22 percent of total urban demand in Metropolitan's service area (currently about 3.5 million AF/year). Concurrently, population in Metropolitan's service area is projected to grow by 4 million people between years 2000 to 2020, resulting in an increase in demand of approximately 1 million AF. The net result would be an annual shortfall of 1.75 million AF (0.75 MAF plus 1.0 MAF) by year 2020 if nothing were done to remedy the situation.

Metropolitan's Integrated Resouce Plan includes a number of different solutions to meet the shortfall. Improving landscape irrigation efficiency with "smart" controllers is one such solution that can significantly reduce that shortfall and also offset growing demands for Bay-Delta supply.

Need to Create a Reliable Source of Supply via Increased Irrigation Efficiency

Implementation of the proposed ET Controller Grant Program is a means of developing a reliable source of supply by increasing irrigation efficiency through better scheduling. To the extent ET Controllers are able to remove the end-user from performing irrigation scheduling, the more efficient will be the use of landscape water. The following summarizes key findings of several studies and/or programs that highlight landscape irrigation efficiency problems.

Over the last decade, the San Diego County Water Authority (SDCWA) and the City of San Diego (CSD) have conducted water use efficiency surveys for residential and large landscapes. Also, the Municipal Water District of Orange County (MWDOC) has implemented a residential survey program for about five years. These programs have all documented a serious deficiency in landscape irrigation - improper system control.

Most end-users (landscape maintenance firms as well as homeowners) establish irrigation schedules that have excessive run times, and they adjust schedules too infrequently to reflect changing plant/soil water demands as weather changes. Most people do not understand the principles of good landscape water management. Setting controllers properly is difficult for many and changing schedules is an unwanted hassle. Also, the water bill ranks too far down the list of household expenses for them to be overly concerned. For landscape maintenance firms, frequently changing irrigation schedules to meet changing weather demands is an unwanted expense that reduces their profit margins, especially when many controllers are involved. Also, since these firms do not pay the water bill, the cost of excessive watering is not of concern. Their primary goal is to retain the client by maintaining a lush landscape, which is often accomplished by over-irrigating to avoid the landscape from becoming stressed and unattractive during the hot summer months. Likewise, these excessive watering schedules are not reduced until well into the fall when temperatures have cooled and plant water demands have diminished significantly. The following studies exemplify this overuse.

Water use efficiency surveys of 1557 single family residences in CSD in Fiscal Year 1995 – 1996 revealed that 55% of the customers were advised to reduce their irrigation schedules.[3] The survey data indicated that by correcting inappropriate irrigation schedules, the average CSD customer's use could be reduced by 61 gallons per day (gpd).[4]

As pointed out in Section A-6 in the discussion about Excess Irrigation and Savings Potential, the data from SDCWA's PALM Program Annual Report for FY 2001-2002

[3] City of San Diego, Residential Water Survey Program Final Report for Fiscal Year 1995-96, page 3
[4] City of San Diego, Residential Water Survey Program Final Report for Fiscal Year 1995-96, page 17

also demonstrates over-watering. [5] The survey data indicates excess water use averaged about 36% across all sites (excluding parks, which show deficit irrigation). Although this is just a local snapshot and the overuse by landscape category will vary from area to area, this data represents a common problem throughout Metropolitan's entire service area.

A study conducted by Metropolitan in 1991 (and repeated with similar results in a separate study conducted in Phoenix, Arizona, in 1994 [5]) revealed a high correlation between excess irrigation and the use of automatic irrigation controllers.[6] The study also concluded that approximately 60% of 830 randomly selected single family residences were watering in excess of 80% of ETo, with the top 10% irrigating above 80% ETo by 120 to 300 percent.[7]

At the time of Metropolitan's 1991 study, only 17% of the residences had either fully or partially automated irrigation systems. During the intervening years since this study was conducted, the percentage of automated systems has increased dramatically. In the CSD study in FY 1995 – 1996, 48 % of single family residences had automatic controllers [8]. In 2001, a saturation study of plumbing devices in 800 residences selected at random across Orange County revealed automatic irrigation controller saturation averaged 50.2%, with some communities having saturations ranging between 60 – 90+% [9]. To add greater emphasis to the prevalence of automatic controllers, in the hottest inland portions of Metropolitan's service area, where large residential and commercial developments are rapidly occurring, essentially all these sites are landscaped and all must have automatic controllers to maintain the landscape in the hot inland climate. In these areas annual ETo measures 55-60 inches of water. Combining these high ETo requirements with inappropriate irrigation schedules results in landscape water use that greatly exceeds the water required for healthy landscape. Using five feet (60 inches) of water per year per square foot of landscape is significant. Using several feet or more in excess is unacceptable.

In summary, the health and welfare of Metropolitan's residents depend on a supply of high quality water, and southern California's economy must be assured of a reliable supply of water. No other resource is as essential to the overall well being of the people and industry in Metropolitan's service area as its water supply. Equally important, water savings achieved by the installation of "smart" controllers will help Metropolitan manage its demands for Bay-Delta in a manner consistent with CALFED's objectives, thereby creating a more secure supply of water for aquatic life and recreation.

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[5] City of Phoenix, Water Use Monitoring Program: A Multiobjective Study of Single-Family Household Water Use, January 1994,

[6] Metropolitan Water District of Southern California, Analysis of Residential Landscape Irrigation in Southern California, page xv

[7] Ditto, page 30.

[8] City of San Diego, Residential Water Program Final Report for Fiscal Year 1995 – 1996, page 30

[9] Metropolitan Water District of Southern California, Orange County Saturation Study, July 24, 2002. Statistic not specified in the study report, which focused on interior plumbing devices, but derived from additional data collected by the site surveys (source: Joe Berg, MWDOC)

D-2 Outreach, Community Involvement, Support and Opposition

Metropolitan and its member agencies enthusiastically support the installation of "smart" controllers to save water. The proposed project is regional in geographic scope and already has the commitment from numerous water agencies and the California Urban Water Conservation Council as external cooperators. To date, the following water agencies in Metropolitan's service area have requested participation in the Project and provided data input: City of Pasadena, City of San Diego, City of Santa Monica, Inland Empire Utilities Agency, Los Angeles Department of Water and Power, San Diego County Water Authority, and Three Valleys Municipal Water District. Other agencies have also expressed interest in participating. The Municipal Water District of Orange County is also supportive, but has excluded itself from this application because it was recently awarded Prop 13 grant funding for ET controller installations as part of a watershed management project.

Additional support has been received from environmental groups that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California (Memorandum) as well as other entities. Community involvement is particularly important for the Direct Install version of program implementation. To assure controllers are properly installed and programmed, the Project intends to use students from the Horticultural and Landscape Architectural departments of local colleges. California State Polytechnic University, Pomona has already expressed interest in participating in the project

The budget for this project includes an industry liaison staff member who will work closely with the irrigation controller manufacturers and distributors, to address any concerns they may have and to develop their support for the program

The Applicant is unaware of any opposition to the proposed project.

APPLICATION PART E – WATER USE EFFICIENCY IMPROVEMENTS AND OTHER BENEFITS

E-1 Water Use Efficiency Improvements

Basis for Estimating Savings

The key water use efficiency improvement is the use of "smart" controllers. Pilot studies as well as analysis of other data on excess irrigation demonstrates the huge potential for water use efficiency in urban landscape sites.

For the purposes of our analysis, we have used the water savings estimates from the Irvine Study study since it has been the most comprehensive, in-depth pilot study to date. The Irvine Study documented water savings of 57gpd for an average irrigated area of 2000 sq. ft. We believe that the other studies cited in Part A-6 and briefly repeated below support the findings of the Irvine study and strongly suggest that savings on commercial sites are even greater than the Irvine savings value.

In addition to the Irvine Study and SDCWA's PALM Program results, the study conducted by the Contra Costa Water District clearly substantiates the problem of excessive watering. The study identified excess water use of 32.2 inches per year. Although the study was conducted in 1994, we are today still dealing with the same generation of "non-smart" irrigation controllers and the same human behavior limitations that existed at the time of the study. Undoubtedly a portion of the excess use highlighted by the Contra Costa study is attributable to inefficient irrigation system distribution, the majority of it is due to improper irrigation control. If one applied the Irvine Study results to the Contra Costa situation, a very substantial portion of the potential water savings would have been captured via the installation of ET controllers.

Landscape Area and Controller Coverage

The table below represents broad ranges for coverage by a controller, based on an assessment of meter sizes, flow rates and sprinkler head type. However, it is important to recognize that individual sites will vary considerably depending on the existing landscape, irrigation system design and meter size. We have also assumed that, on average, not all stations on a controller would be used. It is common practice among irrigation system designers to leave some unused stations to allow for future renovations to the landscape (more hydrozones, larger irrigated area etc.). It should also be noted that residential grade 12 station controllers can function well in smaller commercial applications. We estimate that approximately 20% of small commercial sites can be managed by a residential controller, based on in-field experience.

We have calculated the estimated water savings based upon the average square footage of the targeted sites within Metropolitan's service areas, extrapolating the savings per square foot data from the Irvine Study. The average square footage for the targeted sites is based on data from residential and non-residential landscape surveys, from information supplied by landscape owners, from estimates based on known lot

sizes, etc.

Type of Controller	Number of Stations Available	Number of Stations Used	Gallons Per Station	Spray Heads Coverage Range (Sq. Ft)	Rotors Coverage Range (Sq. Ft)
				Area Per Station (sq.ft) 600 – 1000	Area Per Station (sq. ft) 10,000 – 25,000
Residential Grade	12	10	12-18 gpm	Up to 12,000	Up to 30,000
Commercial	12 - 24	20	30-50 gpm	40,000 – 60,000	60,000 – 100,000
Commercial	24 - 48	40	30-50 gpm	80,000 – 120,000	120,000 – 200,000

Sensitivity Testing

We tested the analysis using the data from the Irvine Study. At the expected level of savings, the cost benefit ratio is 4.81. The cost benefit of a 20% lower level of savings is 3.72. The lower savings level assumes an average savings of 45.6 gallons per day on an average lot size of 2000 sq. ft.

E-2 Other Project Benefits

Market Transformation:

A key benefit expected to arise from the proposed program is one of providing significant impetuous to the transformation of the types of controllers used for landscape irrigation. Major irrigation equipment manufacturers are taking notice of the growing water agency demand for “smart” controllers. Providing a significant statewide ET controller installation program in the state in which most major landscape irrigation equipment manufacturers are headquartered will definitely provide a clear signal that this type of controller is essential for the future of landscape water conservation.

Reduced Non-Point Pollution

An urgent problem faced by water purveyors, municipalities, end-users and landscape maintenance firms is the need to control non-point source pollution. Due to decreasing water quality of waterways, wetlands, beaches and groundwater caused by polluted, dry-season runoff, the Environmental Protection Agency has mandated that local Water Resource Control Boards implement programs to monitor pollution and assess fines against municipalities that fail to comply with local watershed regulations. Although

fines have not yet been issued, they are looming ominously on the horizon. Municipalities in Orange County face the prospect of fines of $10,000 per day until cases of non-compliance are brought under control. This dry-season runoff is often largely due to excessive landscape over-watering that carries pesticides, insecticides and animal fecal matter into streams and storm channels. Much of that over-watering is caused by improper irrigation control.

MWDOC has been conducting a Residential Runoff Reduction (3R) study in the City of Irvine, using about 135 real-time ET controllers to provide accurate control of irrigation (both residential and commercial sites). Preliminary data indicate that these controllers have reduced runoff by as much as 80%. (See page 73 for graph titled "Flow Volume Comparison".[10]) The reduced runoff also equates to water conserved.

We have not quantified the benefits of run-off reduction in our analysis since the final study results are not complete. Statistically valid data for run-off reduction and water quality benefits should be available at the end of 2002.

Reduced green waste in landfills:

Excessive irrigation promotes excessive plant growth, which then must be cut (pruned, mowed, etc.) and hauled to landfills that are becoming scarcer as they are progressively filled. Municipalities have been mandated by state ordinances to reduce green waste or face penalties. More accurate and conserving irrigation will reduce plant growth and reduce the green waste dumped in landfills. Also, lowering the amount of green waste will lower gases generated by the green waste biomass and enhance air quality.

Improved Compliance with Assembly Bill No. 325

Since its adoption in 1993, the State Model Water Efficient Landscape Ordinance (AB 325) has fallen short of its goal to require new landscape projects meet 80% of reference evapo-transpiration. Self-adjusting controllers will help customers manage both new and existing landscapes closer to this target. Most customers only adjust irrigation run times once or twice a season. Even conscientious water managers seldom adjust controllers more than once a month. Most self-adjusting technology available today will adjust daily or hourly, resulting in significant water savings and help meet AB 325 goals.

Reduction of Peak Demand and Drought Management Control.

ET controllers that receive an external signal to adjust irrigation schedules also provide an opportunity to reduce peak demand during the hot summer months by scheduling controllers to irrigate during early hours of the morning when little water use is occurring. The remote signaling feature could also be used by retail water agencies to conserve water during periods of severe drought by remotely reducing customers' irrigation schedule run times. The latter use of these controllers would obviously have to be exercised with due caution. Also, controllers that use other types of technology to

[10] Graph provided by Mr. J. Berg, Municipal Water District of Orange County.

automatically change irrigation schedules according to changes in ET will reduce peak demand by not over-watering during the hot summer months.

Reduction of Plant Loss Due to Over-watering.

A key cause of plant death reported by nursery retailers is over-watering. The incidence of plant death increases when landscape is planted with native plants that are watered like non-native plants. The ET curves of the two different plant groups are strikingly different. Some "Smart" ET controllers are capable of scheduling irrigation by both an ET curve for native plants and another ET curve for non-native plants. Metropolitan is actively promoting the use of native plants in many different landscape applications to reduce landscape water use and lower overall urban demand. It would be detrimental to its efforts if native plants died because controllers are incapable of irrigating to native plant ET requirements.

Jobs and Training

This project is anticipated to create jobs throughout the state. They include:

- ET-Controller assembly and production workers
- ET-Controller installation crews
- Administration
- Data entry positions
- Out-sourced program implementation will require project coordinators, administrators etc.

APPLICATION PART F- ECONOMIC JUSTIFICATION: BENEFITS TO COSTS

F1 Net Water Savings

The goal of the proposed ET Controller Program is to improve landscape irrigation efficiency by frequently changing irrigation schedules to reflect changing seasonal plant/soil water use requirements. Landscapes watered with non-ET controllers are manually programmed and often have schedules with excessive irrigation run times. These generous watering schedules create two types of inefficiency – water lost to runoff and water lost to deep percolation below the plant root zone. In Metropolitan's densely populated urban area, runoff water is collected by storm channels that drain to the ocean and is permanently lost.

Without question, a portion of excess irrigation percolates into reusable aquifers, but how much water is lost in this manner is unknown. What is known is that significant portions of Metropolitan's service area have very limited groundwater aquifers. Also, there are significant areas that have highly impermeable clay soil and/or sloping terrain. In areas with these latter two conditions, the portion of excess water lost to percolation is minimized and the portion lost to runoff is maximized. With proper irrigation scheduling that provides water when the plant needs it, irrigates only to the depth of plant root, and accounts for slopes and soil types, water lost to deep percolation is minimized.

The analysis includes a 20% reduction in estimated water savings, in part to account for percolation to reusable groundwater basins and other uncertainties. It should be noted that even with a 40% reduction, the Program would still be cost effective (B/C = 2.9). For the above reasons, the Program analysis contends the expected water savings are net water savings.

F-2 Project Budget and Budget Justification

The project costs have been developed based on the higher/optimal level of implementation. A detailed line-item budget is shown in Section A-6 and Appendix A. In addition, line-item budgets for the start-up costs and ongoing central administration of the program are also found in Appendix A.

In summary, the 3-year budget for the elements of the program is as follows:

Start-Up Costs-Year 1

Certain Start Up Costs will be incurred during the first year to establish relationships with the equipment manufacturers, and developed a technical specification covering the minimum requirements for the products to be used in the program. Anticipated start-up costs are as follows:

Start Up Costs	Cost
Development of product specifications and coordination of procurement practices and pricing options with manufacturers and vendors	$20,000
Development of standard marketing templates for each of the six implementation methods	$10,000
Database development; reporting and recordkeeping forms development	$100,000
Total estimated start-up costs	$130,000
Amortized cost per ET Controller unit**	$16.84

**-Total start-up costs of $130,000 amortized over all 7,719 (optimal level) controllers planned. Note: The cost per ET Controller unit for the low level of implementation is $23.58, based on amortizing the total cost over 5,514 units.

Central Program Administration:

Because of the geography of the program and the large number of water agencies participating, it will be cost-effective to perform certain common program functions through a central administrative office. Costs of those centralized functions are estimated as follows:

Central Administration Tasks	Cost
Central Program Coordinator (3 yrs @ $60,000)	$ 180,000
Customer Service Administration	$7,500
Industry Liaison	$50,000
Central Administrative Overhead (20%)	$47,500
Total Central Program Administration*	$285,000
Per Unit Administration**	$ 36.92

Central administration costs of $285,000 amortized over all 7,719 (optimal level) controllers planned. The cost per ET Controller unit for the low level of implementation is $51.69.

Program Evaluation - Monitoring and Assessment

Ongoing monitoring and assessment during the period of program implementation is forecasted to cost $350,000 for both companion programs (Metropolitan and East Bay MUD), one-half of which ($175,000) has been allocated equally to each of the two programs.

Monitoring and Assessment Tasks	Cost
Process Evaluation	$45,000
Impact Evaluation	$130,000
Total Monitoring and Assessment*	$175,000
Per Unit Monitoring and Assessment**	$ 23

Program Implementation and Operation

Costs of program implementation and operation are detailed by fiscal quarter within Appendix A and summarized as follows:

Cost Category	Cost
Materials/Installation	$ 341,379
Equipment Purchases	$2,237,197
Other (includes Program marketing, user training, user workshops, field inspections of installed controllers)	$1,555,231
Total Program Implementation and Operation*	$ 4,134,167
Per Unit Program Implementation and Operation	$535.58

*Cost includes pro-rata share of start-up costs and central program administration costs shown above and covers the installation of 7719 controllers over the three-year program period.

Cost-Sharing

Metropolitan and its member agencies have committed the following per controller unit as a program cost share.

	Self-Install	Direct Install (melded)
Residential Controllers	$115	$145
Commercial Controllers <24 Stations	$230	$280
Commercial Controllers, 24 – 48 Stat.	$345	$410

In addition, customers receiving a controller under one of the direct install or small commercial implementation methods will be required to provide a co-payment as a condition for receiving a controller. Residential customers will not be required to make co-payments. Commercial customer co-payments are scheduled as follows:

	Self-Install	Direct Install
Small commercial up to 24 stations	$200	$300
Small commercial 24-48 stations	$200	$300

Customers will also pay signal fees for years 2-10, as applicable.

Therefore, program implementation costs will be partially offset through participant funding as follows:

Cost/Funding Category	Costs & Co-Funding
Total program implementation and operation	$4,134,167
Less: Participating hard dollar water agency funding	$1,083,095
Less: Customer funding (through co-payments)	$160,063
Less: Water agency In-kind services	$540,500
Remainder - Grant Application	$2,350,509

F-3 ECONOMIC EFFICIENCY

Expected benefits

The program of irrigation controller replacement will yield benefits to public and private entities over the expected 10-year useful life of the hardware. A quantification of the water savings benefits (has been included in Appendix A. The present value of those benefits and costs is shown below.

Project Benefits ($)(1)		$2,703,120
Project Costs ($)(2)		$561,701
Benefit/Cost Ratio		4.81

The avoided costs from implementing this project are derived from avoided water

purchases, reduced treatment costs, energy savings and delay of development of alternative sources of supply

The Alternative Water Cost of Foregone Conservation in the Metropolitan Service Area

Summary

The Metropolitan Water District of Southern California is a wholesaler of water to its 26 member agencies. As part of its ongoing support of locally developed water and conservation, Metropolitan offers incentives of $250 per acre-foot of locally developed recycled, recovered, or desalted water and $154 per acre-foot of conserved water. Although these incentives appear to be unequal, they are equivalent when accounting for Metropolitan's cost of capital and the fact that conservation is typically funded through up-front payments and recycled, recovered, and desalted seawater is typically funded on production.

Metropolitan's $250 per acre-foot incentive is based on avoided cost analyses performed during the development of Southern California's 1996 Integrated Water Resources Plan. However, the total value of conservation funded through Metropolitan's programs transcends Metropolitan's direct avoided costs and incentives. Metropolitan's member agencies are the host of most all of Metropolitan's conservation programs and they also enjoy avoided cost of Metropolitan's water rate or $435 per acre-foot. This rate is often cited by the member agencies as their least cost marginal supply of water.

Adding the rate and incentive together, and accounting for the member agencies higher discount rate, the alternative water cost of foregone conservation in Southern California is approximately $700 per acre-foot. This value also approximates the marginal cost of water recycling in Southern California, which Metropolitan uniformly uses as its alternative regional cost of alternative water supplies. Although this estimate accounts for avoided infrastructure costs at Metropolitan, it does not include the value of avoided infrastructure development for the member agency or retailer and therefore this cost could be higher.

Detail

1. Metropolitan Incentives

    a Equivalence of MWD Incentives

Year	Acre-feet	Recycling Payment	Conservation Payment	PV($250)	PV($154)
1	1	$ 250.00	$3,080.00	$ 250.00	$3,080.00
2	1	$ 250.00	$ -	$ 235.85	$ -
3	1	$ 250.00	$ -	$ 222.50	$ -
4	1	$ 250.00	$ -	$ 209.90	$ -
5	1	$ 250.00	$ -	$ 198.02	$ -
6	1	$ 250.00	$ -	$ 186.81	$ -
7	1	$ 250.00	$ -	$ 176.24	$ -
8	1	$ 250.00	$ -	$ 166.26	$ -
9	1	$ 250.00	$ -	$ 156.85	$ -
10	1	$ 250.00	$ -	$ 147.97	$ -
11	1	$ 250.00	$ -	$ 139.60	$ -
12	1	$ 250.00	$ -	$ 131.70	$ -
13	1	$ 250.00	$ -	$ 124.24	$ -
14	1	$ 250.00	$ -	$ 117.21	$ -
15	1	$ 250.00	$ -	$ 110.58	$ -
16	1	$ 250.00	$ -	$ 104.32	$ -
17	1	$ 250.00	$ -	$ 98.41	$ -
18	1	$ 250.00	$ -	$ 92.84	$ -
19	1	$ 250.00	$ -	$ 87.59	$ -
20	1	$ 250.00	$ -	$ 82.63	$ -
Total	20	$5,000.00	$3,080.00	$3,039.53	$3,080.00

Preceding is a 20-year example of payment steams for projects, such as conservation, that receive funding at $154 per acre-foot up-front compared to projects, such as recycling, that receive up to $250 per acre-foot on production. Column 1 shows the years of the compared projects 1 through 20. Column 2 shows that both projects are produce 1 acre-foot per year. If the project is water recycling, it can receive up to $250 per acre-foot produced in the year of production. Column 3 shows this payment. Alternatively, if the project is for conservation, it may receive $154 per acre-foot of projected production over an agreed life of the program. In this case, column 4 shows the up-front payment of $3,080 ($154 per acre-foot * 1 acre-foot per year * 20 Years) in year one of the program. Columns 5 and 6 show the comparable present value of

payments, discounted at 6% (the typical long-term discount rate used by Metropolitan since 1996), under the two programs. This simple example yields results within 1.5% of each other. Under certain conditions the $154 per acre-foot yields more on a present value basis and sometimes this result is reversed, however this example is not atypical.

b Added Value to Member Agencies with Higher Discount Rates
Typically, the discount rate for Metropolitan's member agencies is higher than Metropolitan's own discount rate. As a result, the member agencies see greater value in up-front payments for programs. If, instead of a 6% discount rate, the analysis used a higher discount rate of 7%, then the value of the up-front payment to member agencies climbs to a value of over $270 per acre-foot. This is a closer approximation of the value derived by member agencies from the Metropolitan conservation incentive program.

Metropolitan's Rate Structure and Member Agency Avoided Cost

Metropolitan charges unbundled rates for it water services, however adding its component part will derive an avoided aggregate rate. This aggregate rate in currently $435 per acre-foot for delivered treated water and is forecasted to keep pace with the consumer price index over the next ten years. Member agencies regularly use this price signal as their alternative cost of water. They also often use the cost of recycled water at approximately $700 per acre-foot and member agencies may soon use upwards of that number, as they seriously consider the introduction of seawater desalination into Southern California's water resource plans.

Total Avoided Cost

Using the member agency value of recycling ($700 per acre-foot) or the aggregate of Metropolitan's conservation incentives ($250-$270 per acre-foot) and avoided water rate (currently $435 per acre-foot), it is clear that the value of conservation in the Southern California region approximates $700 per acre-foot. This estimate does not account for potential member agency infrastructure savings or the forecasted increases in Metropolitan water rates, which if estimated could make these estimates higher.

BENEFIT/COST ANALYSIS TABLES- HIGH LEVEL

Table 1: Capital Costs

	Capital Cost Category (a)	Cost (b)	Contingency Percent (c)	Contingency $ (d) (bxc)	Subtotal (e) (b+d)
(a)	Land Purchase/Easement	0	0.00%	0	0
(b)	Planning/Design/Engineering	0	0.00%	0	0
(c)	Materials/Installation	341,739	0.00%	0	341,739
(d)	Structures	0	0.00%	0	0
(e)	Equipment Purchases/Rentals	2,237,197	0.00%	0	2,237,197
(f)	Environmental Mitigation/Enhancement	0	0.00%	0	0
(g)	Construction/Administration/Overhead	0	0.00%	0	0
(h)	Project Legal/License Fees	0	0.00%	0	0
(i)	Other	1,555,231	0.00%	0	1,555,231
(j)	Total (1) (a + ... + i)				4,134,167
(k)	Capital Recovery Factor: Use Table 6				0.1359
(l)	Annual Capital Costs (j x k)				561,701

(1) Costs must match Project Budget prepared in Section F-2.

Table 2: Annual Operations and Maintenance Costs

Administration (a)	Operations (b)	Maintenance (c)	Other (d)	Total (e)
0	0	0		0

Table 3: Total Annual Costs

Annual Capital Costs (1) (a)	Annual O&M Costs (2) (b)	Total Annual Costs (c) (a+b)
$561,701	$0	$561,701

(1) From Table 1, line (l)
(2) From Table 2, column ***(e)***

4a. Avoided Costs of Current Supply Sources

Sources of Supply (a)	Cost of Water ($/AF) (b)	Annual Displaced Water Supply (AF) (c)	Annual Avoided Costs ($) (d) (b x c)
Metropolitan Water District	$700.00	3,862	$2,703,120
			$0
			$0
			$0
			$0
			$0
			$0
			$0
Total		3861.6	$2,703,120

4b. Alternative Costs of Future Supply Sources

Future Supply Sources (a)	Total Capital Costs ($) (b)	Capital Recovery Factor (1) (c)	Annual Capital Costs ($) (d) (bxc)	Annual O&M Costs ($) (e)	Total Annual Costs ($) (f) (d+e)
			0		
			0		0
			0		0
			0		0
			0		0
Total					0

(1) Use number from Capital Recovery Factor Table 6

4c. Water Supplier Revenue (Vendability)

Parties Purchasing Project Supplies (a)	Amount of Water to be Sold (AF) (b)	Selling Price ($/AF) (c)	Expected Frequency of Sales (1) (%) (d)	Expected Selling Price ($/AF) (e) (cxd)	"Option" Fee (2) ($/AF) (f)	Total Selling Price ($/AF) (g) (e+f)	Annual Expected Water Sale Revenue ($) (h) (b x g)
				0		0	0
				0		0	0
				0		0	0
				0		0	0
				0		0	0
Total							0

(1) During the analysis period, what percentage of years are water sales expected to occur?
For example, if water will only be sold half of the years, enter 50% (0.5).

(2) "Option" fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

Table 4d. Total Water Supply Benefits

(a) Annual Avoided Costs of Current Supply Sources from 4a, column *(d)*	$2,703,120
(b) Annual Avoided Costs of Alternative Future Supply Sources from 4b, column *(f)*	$0

(c) Annual Expected Water Sale Revenue from 4c, column *(h)*	$0
(d) Total Net Annual Water Supply Benefit ($) (a+b+c)	$2,703,120

Table 5: Benefit/Cost Ratio

Project Benefits ($)(1)	$2,703,120
Project Costs ($)(2)	$561,701
Benefit/Cost Ratio	4.81

(1) From Table 4d, row
(d): Total Annual Water
Supply Benefits

(2) From Table 3. column *(c)*: Total Annual Costs

Table 6: Capital Recovery Table

Life of Project (in years)	Capital Recovery Factor
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674

39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644
47	0.0641
48	0.0639
49	0.0637
50	0.0634

BENEFIT/COST ANALYSIS TABLES- LOW LEVEL

Table 1: Capital Costs

	Capital Cost Category (a)	Cost (b)	Contingency Percent (c)	Contingency $ (d) (bxc)	Subtotal (e) (b+d)
(a)	Land Purchase/Easement	$0	0.00%	$0	$0
(b)	Planning/Design/Engineering	$0	0.00%	$0	$0
(c)	Materials/Installation	$219,875	0.00%	$0	$219,875
(d)	Structures	$0	0.00%	$0	$0
(e)	Equipment Purchases/Rentals	$1,602,431	0.00%	$0	$1,602,431
(f)	Environmental Mitigation/Enhancement	$0	0.00%	$0	$0
(g)	Construction/Administration/Overhead	$0	0.00%	$0	$0
(h)	Project Legal/License Fees	$0	0.00%	$0	$0
(i)	Other	$1,287,434	0.00%	$0	$1,287,434
(j)	Total (1) (a + ... + i)				$3,109,740
(k)	Capital Recovery Factor: Use Table 6				$0
(l)	Annual Capital Costs (j x k)				$422,514

(1) Costs must match Project Budget prepared in Section F-2.

Table 2: Annual Operations and Maintenance Costs

Administration (a)	Operations (b)	Maintenance (c)	Other (d)	Total (e)
0	0	0		0

Table 3: Total Annual Costs

Annual Capital Costs (1) (a)	Annual O&M Costs (2) (b)	Total Annual Costs (c) 1287434
$422,514	$0	$422,514

(1) From Table 1, line (l)

(2) From Table 2, column ***(e)***

Table 4: Water Supply Benefits
(2002 Dollars)

Net water savings (acre-feet / year) _____ 2,793

4a. Avoided Costs of Current Supply Sources

Sources of Supply (a)	Cost of Water ($/AF) (b)	Annual Displaced Water Supply (AF) (c)	Annual Avoided Costs ($) (d) (b x c)
Metropolitan Water District	$700.00	2,793.0	$1,955,100
			$0
			$0
			$0
			$0
			$0
		1287434	$0
			$0
Total		1290227	$1,955,100

4b. Alternative Costs of Future Supply Sources

Future Supply Sources (a)	Total Capital Costs ($) (b)	Capital Recovery Factor (1) (c)	Annual Capital Costs ($) (d) (bxc)	Annual O&M Costs ($) (e)	Total Annual Costs ($) (f) (d+e)
			0		
			0		0
			0		0

			0		0
			0		0
Total					0

(1) Use number from Capital Recovery Factor Table 6

4c. Water Supplier Revenue (Vendability)

Parties Purchasing Project Supplies (a)	Amount of Water to be Sold (AF) (b)	Selling Price ($/AF) (c)	Expected Frequency of Sales (1) (%) (d)	Expected Selling Price ($/AF) (e) (cxd)	"Option" Fee (2) ($/AF) (f)	Total Selling Price ($/AF) (g) (e+f)	Annual Expected Water Sale Revenue ($) (h) (b x g)
				0		0	0
				0		0	0
				0		0	0
				0		0	0
				0		0	0
Total							0

(1) During the analysis period, what percentage of years are water sales expected to occur?
For example, if water will only be sold half of the years, enter 50% (0.5).

(2) "Option" fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

Table 4d. Total Water Supply Benefits

(a) Annual Avoided Costs of Current Supply Sources from 4a, column *(d)*	$1,955,100
(b) Annual Avoided Costs of Alternative Future Supply Sources from 4b, column *(f)*	$0

(c) Annual Expected Water Sale Revenue from 4c, column *(h)*	$0
(d) Total Net Annual Water Supply Benefit ($) (a+b+c)	$1,955,100

Table 5: Benefit/Cost Ratio

Project Benefits ($)(1)	$1,955,100
Project Costs ($)(2)	$422,514
Benefit/Cost Ratio	4.63

(1) From Table 4d, row (d): Total Annual Water Supply Benefits

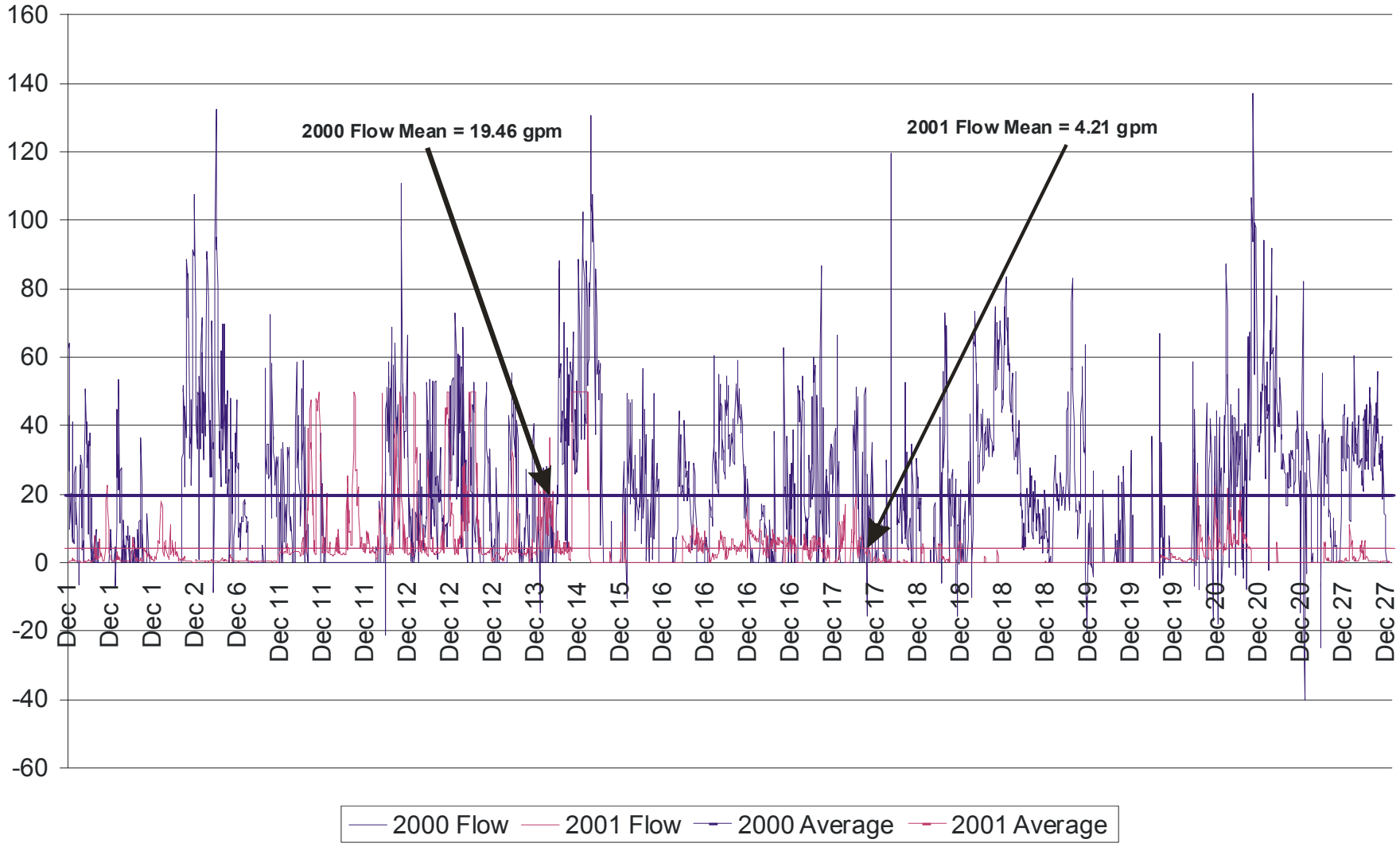
(2) From Table 3. column *(c)*: Total Annual Costs

Table 6: Capital Recovery Table

Life of Project (in years)	Capital Recovery Factor
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674

39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644
47	0.0641
48	0.0639
49	0.0637
50	0.0634

Flow Volume Comparison



THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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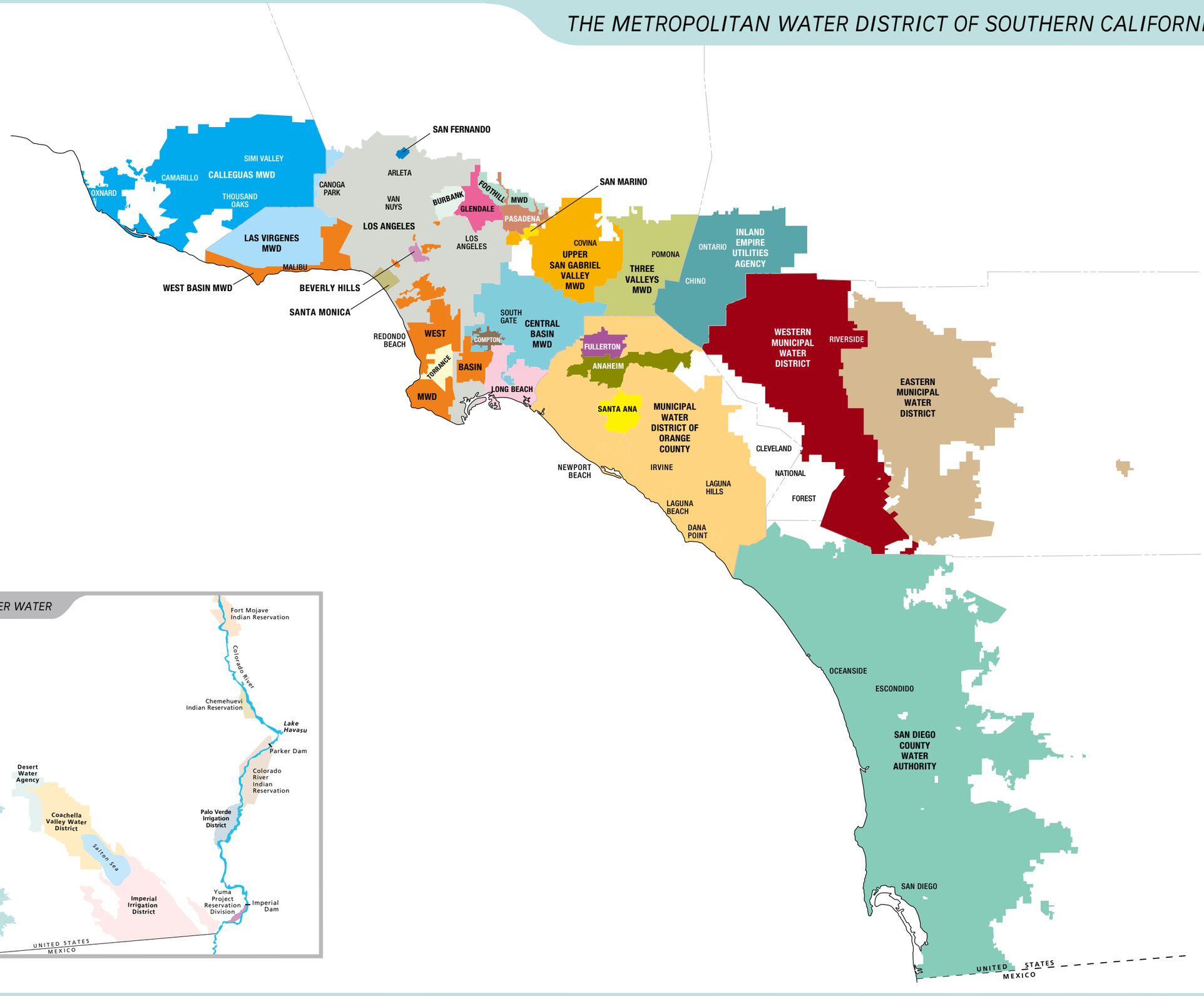
METROPOLITAN'S MEMBER AGENCIES



CALIFORNIA ENTITIES USING COLORADO RIVER WATER

The mission of the
Metropolitan Water District
of Southern California
is to provide its service area with
adequate and reliable supplies
of high-quality water to meet
present and future needs in an
environmentally and
economically responsible way.

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

POST OFFICE BOX 54153
LOS ANGELES, CA 90054-0153

www.mwdH2O.com

EA October 2001

Metropolitan's Member Agencies and Communities Served

Anaheim
Beverly Hills
Burbank
Compton
Fullerton
Glendale
Long Beach
Los Angeles
Pasadena
San Fernando
San Marino
Santa Ana
Santa Monica
Torrance

Calleguas Municipal Water District
- Bell Canyon
- Camarillo
- Channel Islands Beach
- Lake Sherwood
- Las Posas Estates
- Moorpark
- Oak Park
- Oxnard
- Pleasant Valley Heights
- Point Mugu
- Port Hueneme
- Simi Valley
- Santa Rosa Valley
- Somis
- Thousand Oaks

Central Basin Municipal Water District
- Artesia
- Bell
- Bellflower
- Bell Gardens
- Cerritos
- Commerce
- Cudahy
- Downey
- East Compton
- East La Mirada
- East Los Angeles
- Florence
- Graham
- Hawaiian Gardens
- Hollydale
- Huntington Park
- La Habra Heights
- Lakewood
- La Mirada
- Los Nietos
- Lynwood
- Maywood
- Montebello
- Norwalk
- Paramount
- Pico Rivera
- Santa Fe Springs
- Signal Hill
- South Gate
- South Whittier
- Vernon
- Walnut Park
- West Compton
- West Whittier
- Whittier
- Willowbrook

Eastern Municipal Water District
- Canyon Lake
- Good Hope
- Hemet
- Homeland
- Juniper Flats
- Lakeview-Nuevo
- Mead Valley
- Moreno Valley
- Murrieta
- Murrieta Hot Springs
- Perris
- Quail Valley
- Romoland
- San Jacinto
- Sun City
- Temecula
- Valle Vista
- Winchester

Foothill Municipal Water District
- Altadena
- La Cañada Flintridge
- La Crescenta
- Montrose

Inland Empire Utilities Agency
- Chino
- Chino Hills
- Fontana
- Montclair
- Ontario
- Rancho Cucamonga

Las Virgenes Municipal Water District
- Agoura
- Agoura Hills
- Calabasas
- Chatsworth
- Lake Manor
- Hidden Hills
- Malibu Lake
- Monte Nido
- Topanga
- Westlake Village

Municipal Water District of Orange County
- Aliso Viejo
- Brea
- Buena Park
- Capistrano Beach
- Corona del Mar
- Costa Mesa
- Coto de Caza
- Cypress
- Dana Point
- El Toro
- Fountain Valley
- Garden Grove
- Huntington Beach
- Irvine
- Laguna Beach
- Laguna Hills
- Laguna Niguel
- La Habra
- Lake Forest
- La Palma
- Leisure World
- Los Alamitos
- Mission Viejo
- Monarch Beach
- Newport Beach
- Orange
- Placentia
- Rancho Santa Margarita
- Rossmoor
- San Clemente
- San Juan Capistrano
- Seal Beach
- Stanton
- Tustin
- Tustin Foothills
- Villa Park
- Westminster
- Yorba Linda

San Diego County Water Authority
- Alpine
- Bonita
- Bonsall
- Camp Pendleton
- Cardiff-By-The-Sea
- Carlsbad
- Casa De Oro
- Castle Park
- Chula Vista
- Crest
- Del Mar
- De Luz
- El Cajon
- Encinitas
- Escondido
- Fallbrook
- Jamul
- Lakeside
- La Mesa
- Lemon Grove
- Leucadia
- Mount Helix
- National City
- Oceanside
- Otay
- Pauma Valley
- Poway
- Rainbow
- Ramona
- Rancho Santa Fe
- San Diego
- San Marcos
- Santee
- San Ysidro
- Solana Beach
- Spring Valley
- Valley Center
- Vista

Three Valleys Municipal Water District
- Azusa
- Charter Oak
- Claremont
- Covina
- Diamond Bar
- Glendora
- Industry
- La Puente
- La Verne
- Pomona
- Rowland Heights
- San Dimas
- Walnut
- West Covina

Upper San Gabriel Valley Municipal Water District
- Arcadia
- Baldwin Park
- Bassett
- Bradbury
- Covina
- Duarte
- El Monte
- Glendora
- Hacienda Heights
- Industry
- Irwindale
- La Puente
- Monrovia
- Montebello
- Pasadena
- Rosemead
- San Gabriel
- South El Monte
- South Pasadena
- South San Gabriel
- Temple City
- Valinda
- West Covina
- Whittier

West Basin Municipal Water District
- Alondra Park
- Angeles Mesa
- Carson
- Culver City
- Del Aire
- El Nido-Clifton
- El Porto
- El Segundo
- Gardena
- Hawthorne
- Hermosa Beach
- Howard
- Inglewood
- Ladera Heights
- Lawndale
- Lennox
- Lomita
- Malibu
- Manhattan Beach
- Marina Del Rey
- Miraleste
- Morningside
- Palos Verdes Estates
- Point Dume
- Portuguese Bend
- Rancho Dominguez
- Rancho Palos Verdes
- Redondo Beach
- Rolling Hills
- Ross-Sexton
- Topanga Canyon
- Parts of Topanga Park
- Victor
- View Park
- West Athens
- West Carson
- West Hollywood
- Westmont
- Windsor Hills
- Wiseburn

Western Municipal Water District of Riverside County
- Bedford Heights
- Canyon Lakes
- Corona
- Eagle Valley
- El Sobrante
- Green River
- Lake Elsinore
- Lake Mathews
- March Air Force Base
- Norco
- Orangecrest
- Rancho California
- Riverside
- Temecula
- Temescal
- Woodcrest