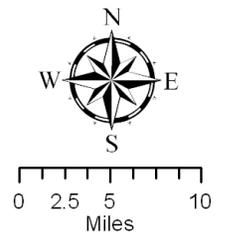
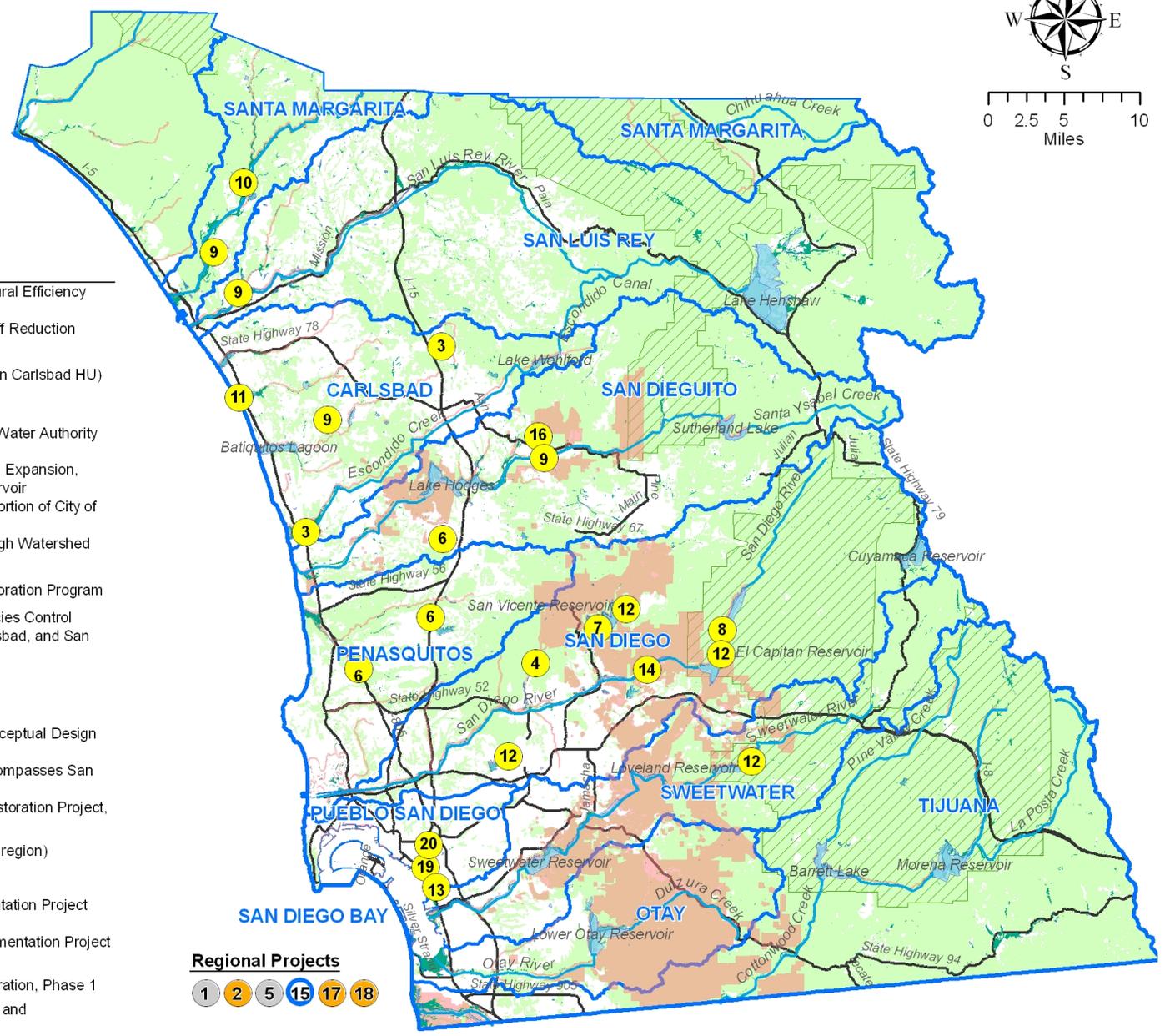


Figure A-10: Locations of Proposed Projects, Environmentally Sensitive Areas, Wetlands, Vegetation, and National Forest



- # Project Title**
- ① Implementation of Integrated Landscape and Agricultural Efficiency Programs (Within Water Authority Service Area)
  - ② Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration (Throughout City of San Diego)
  - ③ Over-Irrigation/Bacteria Reduction (Multiple locations in Carlsbad HU)
  - ④ Santee Water Reclamation Facility Expansion Project
  - ⑤ Recycled Water Retrofit Assistance Program (Within Water Authority Service Area)
  - ⑥ City of San Diego Recycled Water Distribution System Expansion, Parklands Retrofit, and Indirect Potable Reuse / Reservoir Augmentation Project (Multiple locations in northern portion of City of San Diego)
  - ⑦ San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration
  - ⑧ El Capitan Reservoir Watershed Acquisition and Restoration Program
  - ⑨ Northern San Diego County Invasive Non-Native Species Control Program (Within Santa Margarita, San Luis Rey, Carlsbad, and San Dieguito HUs - Locations shown are approximate)
  - ⑩ Santa Margarita Conjunctive Use Project
  - ⑪ Carlsbad Desalination Project Local Conveyance
  - ⑫ San Diego Region Four Reservoir Intertie Project Conceptual Design (Four Reservoirs)
  - ⑬ South San Diego County Water Supply Strategy (Encompasses San Diego Formation)
  - ⑭ El Monte Valley Groundwater Recharge and River Restoration Project, Phases 1 and 2
  - ⑮ San Diego Regional Pollution Prevention (Throughout region)
  - ⑯ Biofiltration Wetland Creation and Education Program
  - ⑰ San Dieguito Watershed Management Plan Implementation Project (Within San Dieguito Hydrologic Unit)
  - ⑱ San Diego River Watershed Management Plan Implementation Project (Within San Diego Hydrologic Unit)
  - ⑲ City of San Diego Green Mall Porous Paving and Infiltration, Phase 1
  - ⑳ County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge

- Regional Projects**
- ① ② ⑤ ⑮ ⑰ ⑱

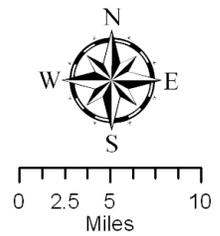


Point Project	SDCWA Service Area Project	Region Boundary	River	Environmentally Sensitive Areas	National Forest
Area Project (City, HU, etc.)	Regional Project	Hydrologic Unit (HU)	Lake	Wetlands	Natural Vegetation

Data Sources: SANDAG, SANGIS

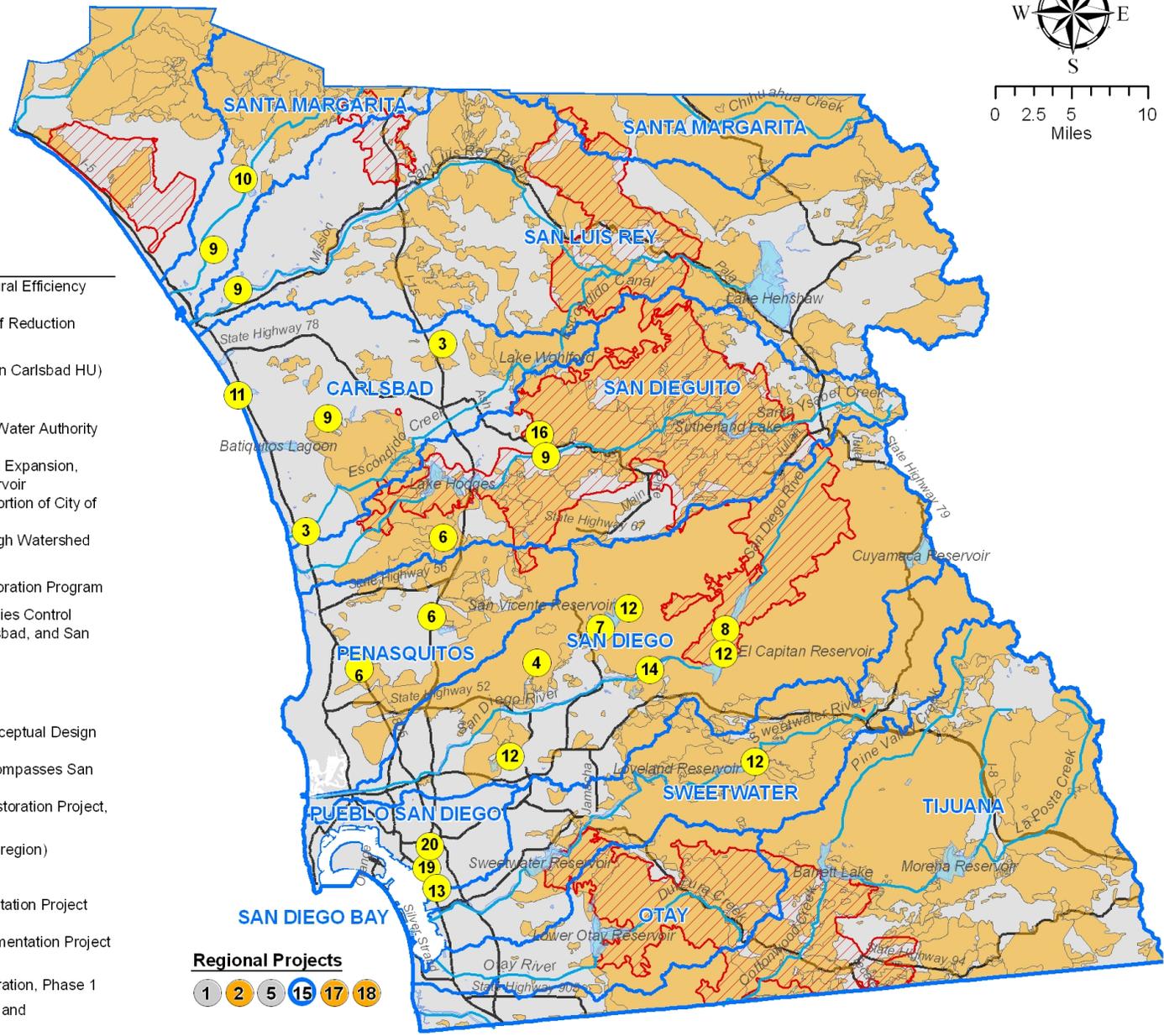


Figure A-11: Locations of Proposed Projects and Historical Fire Areas



- # Project Title**
- ① Implementation of Integrated Landscape and Agricultural Efficiency Programs (Within Water Authority Service Area)
  - ② Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration (Throughout City of San Diego)
  - ③ Over-Irrigation/Bacteria Reduction (Multiple locations in Carlsbad HU)
  - ④ Santee Water Reclamation Facility Expansion Project
  - ⑤ Recycled Water Retrofit Assistance Program (Within Water Authority Service Area)
  - ⑥ City of San Diego Recycled Water Distribution System Expansion, Parklands Retrofit, and Indirect Potable Reuse / Reservoir Augmentation Project (Multiple locations in northern portion of City of San Diego)
  - ⑦ San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration
  - ⑧ El Capitan Reservoir Watershed Acquisition and Restoration Program
  - ⑨ Northern San Diego County Invasive Non-Native Species Control Program (Within Santa Margarita, San Luis Rey, Carlsbad, and San Dieguito HUs - Locations shown are approximate)
  - ⑩ Santa Margarita Conjunctive Use Project
  - ⑪ Carlsbad Desalination Project Local Conveyance
  - ⑫ San Diego Region Four Reservoir Intertie Project Conceptual Design (Four Reservoirs)
  - ⑬ South San Diego County Water Supply Strategy (Encompasses San Diego Formation)
  - ⑭ El Monte Valley Groundwater Recharge and River Restoration Project, Phases 1 and 2
  - ⑮ San Diego Regional Pollution Prevention (Throughout region)
  - ⑯ Biofiltration Wetland Creation and Education Program
  - ⑰ San Dieguito Watershed Management Plan Implementation Project (Within San Dieguito Hydrologic Unit)
  - ⑱ San Diego River Watershed Management Plan Implementation Project (Within San Diego Hydrologic Unit)
  - ⑲ City of San Diego Green Mall Porous Paving and Infiltration, Phase 1
  - ⑳ County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge

- Regional Projects**
- ① ② ⑤ ⑮ ⑰ ⑱



● Point Project	● SDCWA Service Area Project	⊕ Region Boundary	~ River	▨ Fire Perimeters (10/31/07)
● Area Project (City, HU, etc.)	○ Regional Project	▭ Hydrologic Region	☪ Lake	■ Historic Fire Areas

Data Sources: SANDAG, SANGIS



### **Work Completed by July 1, 2008**

Significant work has been completed on projects included in this Proposal. By July 1, 2008, the following work will have been completed on the programs included herein:

#### ***Conservation Program***

##### **Project 1: Implementation of Integrated Landscape and Agricultural Efficiency Programs**

- Purchase of Infrared Imagery - February 2007
- Classification of Imagery by Vegetation - October 2007
- Classification of Large Water Features (Pools) - December 2007
- Landscape Certification and Training Study - October 2007
- Branding Study - April 2008
- Water Budget Website Development - July 2008
- Commercial, Industrial, and Public Landscape Retrofits - Ongoing since 2005

##### **Project 2: Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration**

No work performed prior to July 2008

##### **Project 3: Over-Irrigation/Bacteria Reduction**

- Site Selection - January 2008
- Project Assessment and Evaluation Plan - February 2008

#### ***Water Recycling Program***

##### **Project 4: Santee Water Reclamation Facility Expansion Project**

- Feasibility study for increasing WRF treatment capacity from 2 MGD to 4 MGD – 2006
- Feasibility study to increase WRF treatment capacity to 10 MGD, and configure 4 MGD and 10 MGD expansions to accommodate advanced treatment upgrade – December 2007

##### **Project 5: Recycled Water Retrofit Assistance**

- Collect and review irrigation system schematics (if none are available, begin to conduct on-site surveys involving irrigation system checks and mapping) – April 2007
- Identify and begin to collect site-specific customer information – December 2007
- Issue Letters of Intent for Use of Reclaimed Water to potential customers – February 2008
- Conduct stakeholder outreach and confirm customer commitment to project – February 2008

##### **Project 6: City of San Diego Recycled Water Distribution System Expansion, Parklands Retrofit, and Indirect Potable Reuse / Reservoir Augmentation Project**

- Design for Distribution Expansion System – May 2007
- Water Reuse Study – March 2006

#### ***Local Supply Protection and Development***

##### **Project 7: San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration**

- In-house prioritization of parcels – June 2008

##### **Project 8: El Capitan Reservoir Watershed Acquisition and Restoration Program**

- Negotiations with Land Owner – June 2008
- Land Appraisal - June 2008

Project 9: Northern San Diego County Invasive Non-Native Species Control Program

No work performed prior to 2008

Project 10: Santa Margarita Conjunctive Use Project

- Preparation and Completion of a Joint Environmental Impact Report (EIR) / Environmental Impact Statement (EIS) – December 2008
- Engineering Feasibility Study – August 2008

Project 11: Carlsbad Desalination Project Local Conveyance

- Geotechnical Survey – September 2008
- Aerial Survey and Mapping - July 2008

Project 12: San Diego Region Four Reservoir Intertie Project Conceptual Design

No work performed prior to July 2008

Project 13: South San Diego County Water Supply Strategy

- USGS Study, Phase I – December 2001
- USGS Study, Phase 2 – July 2007

Project 14: El Monte Valley Groundwater Recharge and River Restoration Project, Phases 1 and 2

- Feasibility Study (Planning Stage) - April 2006
- Feasibility Study, 2<sup>nd</sup> Phase (Demonstration Project Stage) - October 2008
- Groundwater Management Plan (Draft) - June 2008
- Environmental Documentation/Permitting (Subsequent Environmental Impact Report) - June 2008
- Design - June 2008

Project 15: San Diego Regional Pollution Prevention

No work performed prior to July 2008

Project 16: Biofiltration Wetland Creation and Education Program

No work performed prior to July 2008

Project 17: San Dieguito Watershed Management Plan Implementation

- Convene Watershed Council 4-6 times per year - Various dates in 2007 and 2008

Project 18: San Diego River Watershed Management Plan Implementation

No work performed prior to July 2008

Project 19: City of San Diego Green Mall Porous Paving and Infiltration, Phase 1

- Concept Planning - June 2007
- Project Added to City's Capital Improvement Program - May 2007
- Solicitation of Design Engineer - Initiated October 1, 2007

Project 20: County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge

- California Environmental Quality Act (CEQA) Compliance - October 2008

## WORK ITEMS

The Region has developed a proposal package that effectively leverages the Region's priority projects to maximize consistency with the regional objectives and the Proposition 50 IRWM program preferences. As a package, this Proposal focuses on multi-benefit water supply, water quality, and natural resources projects. These projects, while providing substantial water supply reliability and water quality benefits to the Region, work together to simultaneously provide significant benefits to the Region's unique and sensitive ecosystem. Four programs were developed for inclusion in the Proposal, and comprise the major organizing structure for this Proposal. Within each program, specific projects are identified as work items:

- ❖ Program: Conservation
  - Work Item #1: Implementation of Integrated Landscape and Agricultural Efficiency Programs
  - Work Item #2: Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration
  - Work Item #3: Over-Irrigation/Bacteria Reduction
- ❖ Program: Water Recycling
  - Work Item #4: Santee Water Reclamation Facility Expansion Project
  - Work Item #5: Recycled Water Retrofit Assistance Program
  - Work Item #6: City of San Diego Recycled Water Distribution System Expansion, Parklands Retrofit, and Indirect Potable Reuse / Reservoir Augmentation Project
- ❖ Program: Local Supply and Development
  - Work Item #7: San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration
  - Work Item #8: El Capitan Reservoir Watershed Acquisition Program and Restoration
  - Work Item #9: Northern San Diego County Invasive Non-Native Species Control Program
  - Work Item #10: Santa Margarita Conjunctive Use Project
  - Work Item #11: Carlsbad Desalination Project Local Conveyance
  - Work Item #12: San Diego Region Four Reservoir Intertie Project Conceptual Design
  - Work Item #13: South San Diego County Water Supply Strategy
  - Work Item #14: El Monte Valley Groundwater Recharge and River Restoration Project, Phases 1 and 2
- ❖ Program: Education and Outreach
  - Work Item #15: San Diego Regional Pollution Prevention
  - Work Item #16: Biofiltration Wetland Creation and Education Program
  - Work Item #17: San Dieguito Watershed Management Plan Implementation
  - Work Item #28: San Diego River Watershed Management Plan Implementation
  - Work Item #19: City of San Diego Green Mall Porous Paving and Infiltration, Phase 1
  - Work Item #20: County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge Project

### Procedures for Coordinating with Partner Agencies

As the primary grant applicant, the Water Authority will contract directly with the State Water Resources Control Board (SWRCB) and/or California Department of Water Resources (DWR) for receipt of grant funding resulting from this Proposal. The RWMG is currently organized under a Memorandum of Understanding (MOU). According to the MOU, the Water Authority will enter into a grant agreement with

the State, and will, in turn, enter into contractual agreements with the City of San Diego and County of San Diego. The three RWMG entities will then enter into contractual agreements with individual project proponents as follows:

- The Water Authority shall be responsible for managing funding for member agency projects (other than the City of San Diego, which is a Water Authority member agency);
- The City of San Diego shall be responsible for managing funding for projects that fall within its jurisdictional boundaries, are located on city-owned property, or are projects in which the City is involved as a partner; and
- The County of San Diego shall be responsible for managing funding for regional non-governmental organizations, storm water and watershed projects or projects not otherwise explicitly within the responsibilities of the Water Authority or City of San Diego.

In this way, while the Water Authority alone will contract to receive grant funding and will be responsible for ensuring all projects are implemented, the RWMG will share the responsibility of coordinating with specific project proponents throughout the Region to accomplish the work items described in this Proposal. The MOU, included as Appendix 9 to the 2007 San Diego IRWM Plan (Attachment 2) formalizes this relationship and articulates the relationship between the RWMG and the RAC and states that the purpose of the RAC is to make recommendations to the RWMG and that the RWMG is committed to a cooperative relationship with the RAC.

#### **Detailed Workplans**

Detailed workplans have been prepared for each Proposal work item. Proposal work items are organized by Program.

## CONSERVATION PROGRAM

### Work Item #1: Implementation of Integrated Landscape and Agriculture Efficiency Programs

#### Implementing Agency

San Diego County Water Authority

#### Project Description

The Implementation of Integrated Landscape and Agricultural Efficiency Programs support regional efforts to increase water efficiency in the agricultural industry and in the area of landscape irrigation while also improving water quality through runoff reduction. Agriculture and landscape irrigation offer the highest potential for additional water savings in the Region. The Water Authority will conduct agricultural audits that will improve water efficiency without compromising crops or production. This will include an assessment of agriculture by crop and associated water requirements. The Water Authority will address landscape water efficiency by: 1) retrofitting sites to improve irrigation efficiency and promoting water-wise and /or California Friendly landscapes; 2) developing a web- driven water budget program to communicate water use targets to customers and to identify a regional conservation target; 3) conducting a branding study and outreach to determine how to deliver water conservation messages most effectively; and 4) developing a Regional Landscape Model Ordinance and leading regional adoption efforts and implementation of the ordinance. The programs that comprise this project have the potential to achieve over 3,600 AFY of water savings upon the widespread utilization of water budgets facilitated by this project.



In response to the landscape industry, agricultural sector, and observational data, the Water Authority began development of a “Blueprint for Water Conservation” which aims to conserve 100,000 AFY by the year 2030. This project implements the programs and efforts contained in the “Blueprint for Water Conservation” as described below.

#### Agricultural Water Use Efficiency, Assessment and Audits

Previous Water Authority agricultural audit data demonstrates that water waste is pervasive in the agricultural sector. This project will allow the Water Authority to provide 250 agricultural mini-audits and 125 full audits during fiscal year (FY) 09 and FY 10. The primary goal of the audits is to improve water efficiency without compromising crops or production. Demand for agricultural audits continues to exceed available Water Authority funding. The average savings potential for sets of 40 agricultural sites has been found to range from 500 to 1,000 acre-feet annually. Re-evaluations of sites continue to show, on average, a 13% improvement in system efficiency, consistent with projected savings. Audits allow the Water Authority to obtain first-hand accounts of water efficiency difficulties faced by the agricultural industry. An analysis of water savings generated by the agricultural audits will be conducted as part of the project to identify real savings. Observational data indicates there is savings potential, and this will be confirmed via the study.

An assessment of agricultural products by crop and water requirements will be conducted for the Water Authority’s service area. This will aid in planning for enhanced agricultural efficiency efforts and future water resources. An initial assessment was completed by the Water Authority in 2007; however, an updated assessment is critical due to the recent wildfires and agricultural water cutbacks.

Finally, this project will invest in agricultural water use efficiency research to ensure that new, more efficient practices are tested, evaluated, and implemented. Included among the research that the Water Authority will conduct as part of this project are: new methods of irrigation, use of recycled water, runoff prevention, capture and reuse of runoff before it becomes runoff, and alternate crops. This project will

implement approximately 250 mini-audits and 125 full audits, for an estimated savings of 2,000 AF over the four year life of the project.

#### Commercial, Multifamily, Institutional, Public and Residential Landscape Irrigation Retrofits

Incentives will be offered to promote and install water efficient landscapes at residential (single family and multifamily), industrial, commercial and public sites. Incentives for the following may be offered: low-water use plants, irrigation hardware upgrades, irrigation design services and any other associated project costs. Funding may also be used to develop landscape designs that are water-wise and San Diego County-appropriate (e.g. designs that incorporate predominant home/site architecture in landscape designs). The Water Authority will also explore the possibility of requiring participating customers to adhere to California Friendly Landscape guidelines. This project will implement approximately 335 retrofits, for an estimated savings of 2,651 AF over the five year life of the project.

#### A Web-Driven Water Budget Program and Implementation Assistance Incentives

This project will develop a web-enabled water budget program that will allow the Water Authority to end the guesswork that customers find inherent in the development of efficient watering schedules. Landscape industry representatives at the 2006 Water Conservation Summit hosted by the Water Authority said “Tell us how much water we should use, make it financially viable, and we will find a way to do it.” The water budget program will allow member agencies to develop water budgets, measure landscapes, and communicate to their customers “how much water they should use.” Creation of a water budget program accessible to all member agencies will enable agencies to implement water budget rates at their discretion. An evaluation of water budgets within Metropolitan Water District of Orange County’s service showed that water budgets can lead to water savings of 765 gallons per day per meter.

Water budget-based programs are designed to inform the customer of how much water they should be using on their landscapes. The goal of the web-driven water budget based program will be to reduce outdoor water use by 20% for dedicated irrigation meter sites. If all 18,000 dedicated meter sites in the Region are enrolled in water budgets, the Region would save an estimated 15,000 acre-feet of water annually. Initially, water budgets will be made available only to sites with dedicated irrigation meters. However, as part of this project, the Water Authority will also conduct a feasibility study to explore expansion of water budgets to mixed meter sites in excess of 1/4 irrigated acre and recommendations from this study will be then be implemented. This project will implement approximately 3,000 water budgets, for an estimated savings of 12,853 AF over the five year life of the project.

Implementation of the web-driven water budget program will include: designing and developing enhancements; upgrading program software, associated hardware and website applications; conducting studies for mixed meter sites; and facilitating implementation by member agencies via incentives and personnel assistance. Development of the initial tool will be complete prior to June 30, 2008.

#### Branding Outreach and Education

To increase the likelihood that Water Authority marketing, awareness campaigns and educational messages will lead to water savings, the Water Authority launched a branding study designed to identify messages that will lead to behavior modifications resulting in water savings. The Water Authority will use grant funds to incorporate recommendations into awareness and education campaigns as well as into its program marketing efforts. Funds will also be used to disseminate technical information to industry audiences (e.g. presentations at industry conferences to promote awareness and discuss program findings).

#### Regional Landscape Model Ordinance Support

The Water Authority, in collaboration with its stakeholders, recently drafted a Regional Landscape Model Ordinance, which if adopted will ensure that new or retrofit irrigation systems and landscapes are water efficient. To support adoption of the plan, this project will develop an implementation plan to assist local planning authorities with implementation and enforcement. Acceptance and utilization of the new landscape ordinance standards will also reinforced via retrofits of designated high visibility sites. This

project will implement ordinance-related demonstration retrofits for an estimated savings of 30 AF over the five year life of the project.

#### Landscape Conservation Research and Development

Funds will be dedicated to develop solutions to existing problems and implementation obstacles and to explore potential new program elements.

#### **Need for the Project**

Additional funds are needed to meet demands for agricultural audits and to maximize water savings in the agricultural sector of the Region. The lack of future, reliable data on agriculture by crop type in the Region impedes the ability of Water Authority to assign resources commensurate with potential water savings to agricultural water efficiency efforts. The lack of data also will prevent staff from accurately projecting future agricultural and regional water needs.

Landscape irrigation offers a significant potential for additional water savings, however outdoor landscape conservation is challenging to achieve because behavioral modifications are needed in addition to providing efficient devices. An effective and widely accepted water budget-based program is the only financially viable way for the Water Authority and its member agencies to change behavior by setting landscape conservation targets, obtaining, verifying, and measuring outdoor water savings. Without water budgets, the Water Authority and its member agencies will not be able to set measurable water conservation targets and track progress toward the reduction of outdoor water consumption. In light of the 30% of normal snow levels in the Colorado Rockies and the Region's reliance on MWD water supplies (73% reliance), expediting the implementation of water budgets is in the Region's best interest.

#### **Eligibility**

Implementation of Integrated Landscape and Agricultural Efficiency Programs is eligible to receive funding from Proposition 50, Chapter 8, under California Water Code Section 79561. Section 79561 reads:

*79561. Money appropriated in Section 79560 shall be available for grants for water management projects that include one or more of the following elements:*

- (a) Programs for water supply reliability, water conservation, and water use efficiency.*
- (b) Storm water capture, storage, treatment, and management.*
- (c) Removal of invasive non-native plants, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands.*
- (d) Non-point source pollution reduction, management, and monitoring.*
- (e) Groundwater recharge and management projects.*
- (f) Contaminant and salt removal through reclamation, desalting, and other treatment technologies.*
- (g) Water banking, exchange, reclamation, and improvement of water quality.*
- (h) Planning and implementation of multipurpose flood control programs that protect property; and improve water quality, storm water capture and percolation; and protect or improve wildlife habitat.*
- (i) Watershed management planning and implementation.*
- (j) Demonstration projects to develop new drinking water treatment and distribution methods.*

Consistent with Section 79561(a), the program is an eligible project type because it is a program for water supply reliability, water conservation, and water use efficiency.

#### **Work Tasks**

##### **Task 1A. Direct Project Administration**

Subtask 1A.1: Project Management: This subtask will involve administering contracts for water management programs. The Water Authority will continue ongoing contracts but will need to retain new

consultants to fulfill some of the tasks for this project. This will involve maintaining contracts with consultants and participating agencies (e.g. member agencies), invoice processing and the development of program evaluation and performance standards.

Subtask 1A.2: Quarterly and Final Reports: This subtask involves the preparation of quarterly report which will include budget progress reports, milestone reports, results of assessments and program evaluations, invoices for billable activity, and goals for the next quarter. A final report will be prepared that consists of a final budget report (matching fund and grant funds accounting), deliverables report, results of programs assessments (copies of reports), and lessons learned.

### **Task 1B. Land Purchase/Easement**

Not applicable

### **Task 1C. Planning/Design/Engineering/Environmental Documentation**

Not applicable

### **Task 1D. Construction/Implementation**

Subtask 1D.1 – Agricultural Efficiency and Research: This subtask will consist of four activities:

- 250 agricultural mini-audits and 125 full audits will be offered to customers via the Water Authority's contractor. Audits are intended to improve the irrigation efficiency of agricultural sites. Due to agricultural water cutbacks of 30%, demand for audits is outpacing available funding.
- The Water Authority may retain a consultant and/or utilize Water Authority staff to conduct an agricultural assessment to determine the effect of the recent wildfires and agricultural water cutbacks on the types of crops and crop acreage in San Diego County. An assessment was conducted for the Region by the Water Authority in 2007 prior to the fires and the agricultural water cutbacks.
- Research in the following areas will be funded: new methods of irrigation; use of recycled water; runoff prevention; capture and reuse of runoff before it becomes runoff; and alternate crops.
- An independent consultant will be hired to perform an analysis of water savings for agricultural audits that were completed.

Subtask 1D.2 – Web-Driven Water Budget Program and Implementation Assistance: This subtask will involve development of a web-driven water budget program for member agencies that relies on measurements obtained from satellite imagery. A web site will be created to allow an efficient and easy to use interface for member agencies to access the program. Customized software will be utilized to allow imagery classification and measurement to guide development of water budgets. Mini-audits will be performed with member agencies that will facilitate water budget development. Water budget interns will assist in marketing water budgets and providing assistance. Water budget feasibility studies will be performed for mixed meter sites prior to these sites enrolling in the water budget program to ensure that it will be worthwhile to participate.

The following activities in this subtask have already been accomplished:

#### *Water Budget Software, Imagery Classification and Measurement Tool Development*

- Purchased infrared imagery of San Diego County
- Retained consultant for classification of imagery by vegetation types
- Classified infrared imagery according to vegetation types and water features
- Retained consultant for development of the landscape area measurement tool and water budget software. The software will automate measurements of landscape area and enable the integration of customer specific measurements and water budget calculations with consumption data to produce water use targets

- Conducted water budget needs assessment
- Developed project plan

The following activities in this subtask are projected to have been accomplished by July 2008:

*Water Budget Software, Imagery Classification and Measurement Tool Development*

- Develop landscape measurement tool for use with satellite imagery and measurement tool
- Begin measuring landscaped areas for dedicated meter accounts with landscape area measurement tool
- Develop water budget software
- Begin loading measurements for water budget program participants from previous programs
- Develop water budget web site with a password protected user interface for customers, agencies, and the Water Authority project manager
- Conduct Beta testing
- Begin issuing water budgets to customers

*Water Budget Implementation Agency Incentives and Assistance*

- Develop incentive structure in collaboration with retail agencies
- Develop performance and reporting criteria
- If needed, amend member agency memorandums of understanding
- Begin issuing incentives
- Begin development of landscape intern program in collaboration with the local community colleges and member agencies
- Identify training needs and scope of work for interns
- If needed, create new memorandums of understanding to facilitate collaboration on the landscape intern program
- Create a roll-out schedule for the intern program

The following activities in this subtask will be conducted after July 2008:

*Water Budget Software, Imagery Classification and Measurement Tool Development*

- Continue issuing water budgets to customers with previously measured sites
- Continue measuring sites with dedicated irrigation meters
- Enhance water budget web site to enable uploading and retention of customer participation data in incentive programs
- Conduct feasibility study for mixed meter sites including single family residences
- Implement software updates and fixes (ongoing)

*Water Budget Implementation Agency Incentives and Assistance*

- In order to encourage agencies to enroll customers in water budgets, incentives will be provided to agencies for each site enrolled to help offset personnel costs
- Provide trained interns to assist with the implementation of water budgets or other related efforts
- Continue issuing incentives
- Roll-out landscape intern program

Subtask 1D.3 – Commercial, Multifamily, Institutional, Public and Residential Landscape Irrigation Retrofits: This subtask consists of offering a variety of residential and commercial incentive programs throughout the Water Authority service area which include incentives for irrigation retrofits, low-water use plants, water-wise landscape designs, and potentially other incentives necessary to conform to California Friendly Landscape guidelines. Incentives may be offered for the following: plant incentives, irrigation retrofits, soil amendments, mulch, design services and associated project costs

Subtask 1D.4 – Branding Outreach and Education: A branding study to determine the effectiveness of potential water conservation messages is underway under this subtask and is projected to be completed

by July 2008. This study involves the review of branding-related documents, public opinion surveys and focus group reports. Four branding focus group sessions will be facilitated and an evaluation will be conducted to analyze and score the performance of potential message brands. Recommendations will be provided in a final report. Based on the findings of the branding study, this subtask will involve redevelopment of marketing materials for landscape conservation programs and web-site redevelopment. Finally, this subtask will conduct outreach through landscape programs, a water conservation garden, homeowner landscape contests, San Diego County Fair outreach and development of an exhibit, landscape awards and garden outreach. Other outreach activities may be added or substituted.

Subtask 1D.5 – Regional Landscape Model Ordinance Support: This subtask will consist of local assistance and development of model landscape sites to promote awareness and compliance with the Regional Landscape Model Ordinance. To provide technical assistance, a consultant will be retained to aid local jurisdictions with the following: 1) incorporate the Regional Landscape Model Ordinance into local ordinances; and 2) assist Planning Departments with developing enforcement plans. Other technical assistance will also be provided as opportunities are identified. As part of this subtask, high visibility sites in strategic locations will be retrofitted to conform to the Regional Landscape Model Ordinance in order to reinforce the aesthetic beauty and feasibility of the landscape guidelines.

Subtask 1D.6 – Landscape Conservation Research and Development: This subtask will involve the development of solutions to existing programs and implementation obstacles and to test the feasibility of potential new program elements. A water savings model will be created. A consultant will be retained to evaluate conservation programs, associated savings, identify new program elements and assist with resolving implementation problems. Technical work or analysis necessary to support research and development will be performed.

***Task 1E. Environmental Compliance/Mitigation/Enhancement***

Not applicable

***Task 1F. Construction Administration***

Not applicable

***Task 1G. Other Costs***

Subtask 1G.1 – Preparation of Project Assessment and Evaluation Plan (PAEP): This subtask includes preparation of a PAEP.

**Project Maps**

The Implementation of Integrated Landscape and Agricultural Programs will be implemented throughout the Water Authority's service area which is shown in Figure 1.1, along with member agencies. Figure 1.2 shows agricultural sites in the Water Authority's service area that will be potential benefactors of this project.

**Figure 1.1 Location of Implementation of Integrated Landscape and Agricultural Efficiency Program: Agricultural Sites: Water Authority Member Agencies and Agricultural Program Participants**

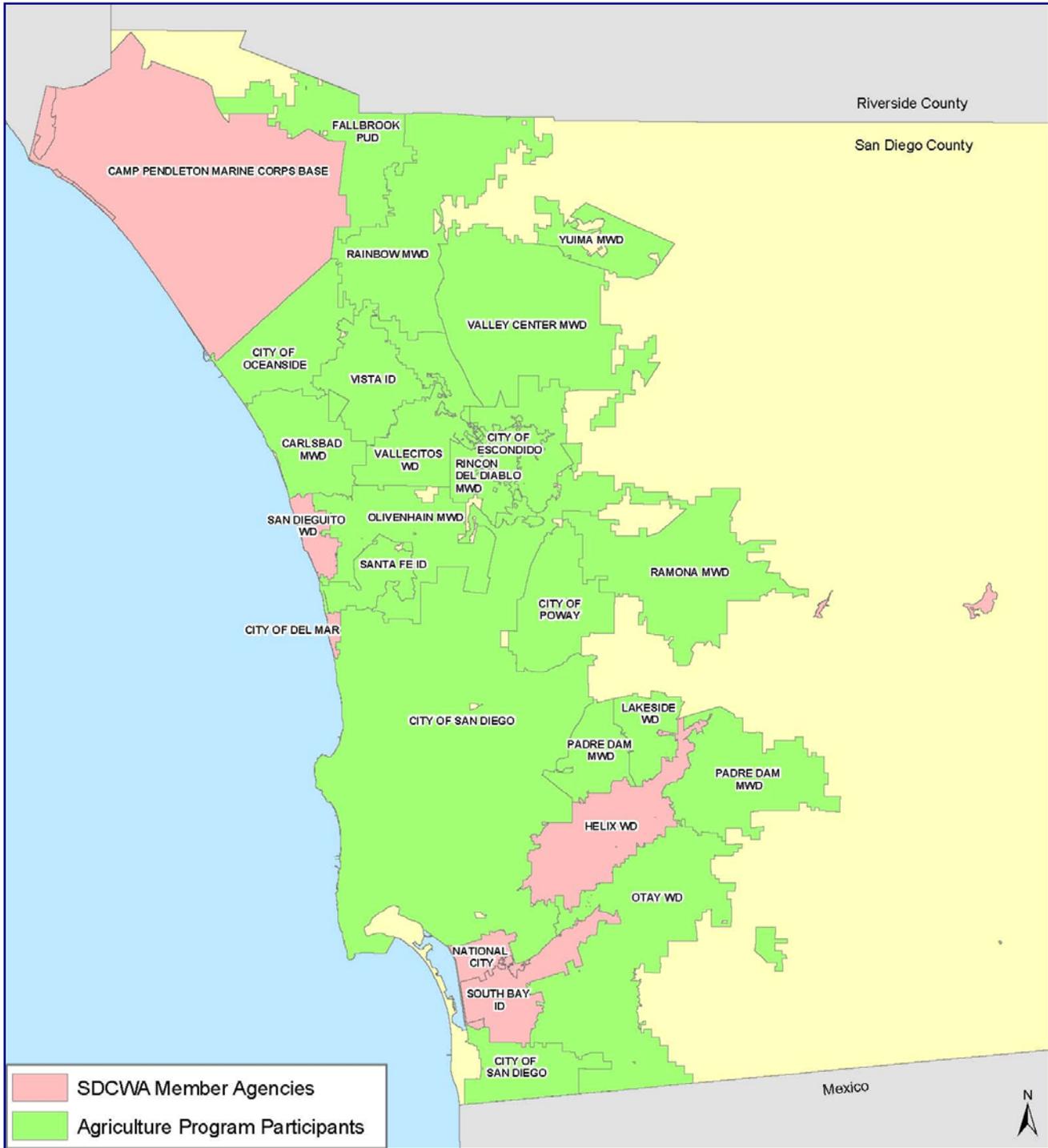
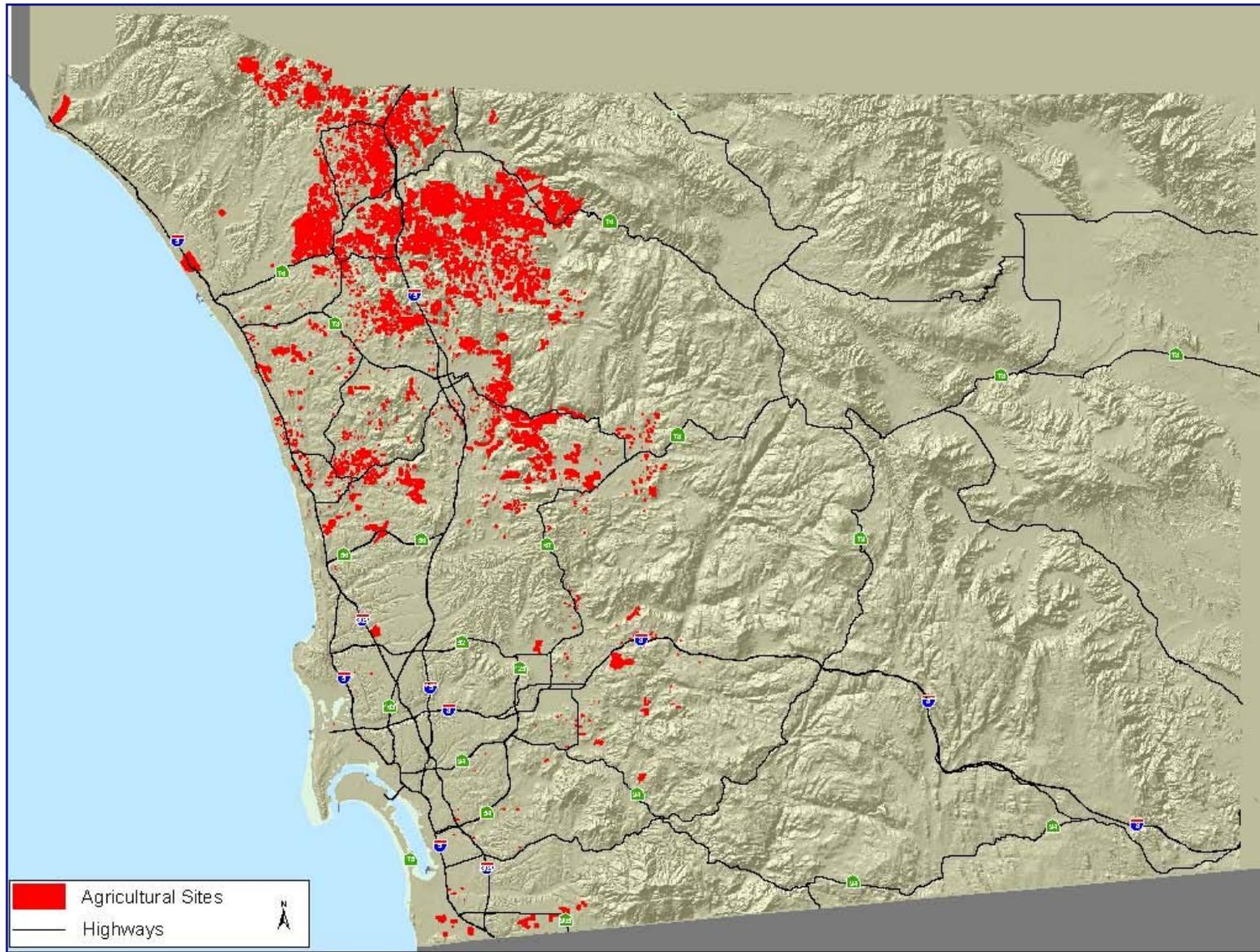


Figure 1.2 Location of Implementation of Integrated Landscape and Agricultural Efficiency Program: Agricultural Sites



## **Project Standards**

### Water Use Survey Standards

The Water Authority and its member agencies' water use surveys are designed and performed in accordance with the California Urban Water Conservation Council's (CUWCC) BMPs.

### Device Ratings

Smart Controllers must be tested by the Irrigation Association's Smart Water Application Technologies group (SWAT) to qualify for Water Authority incentives. The Water Authority also relies on Metropolitan Water District (MWD) to determine product eligibility for device incentives. Prior to incentivizing a device, MWD - in collaboration with its member agencies - evaluates studies assessing the device's water conservation potential. Other products incentivized through the Water Authority's grant programs (not related to MWD's incentives) are products that have already gained market acceptance, therefore additional requirements are not imposed. The Environmental Protection Agency (EPA), through its WaterSense program, is setting standards for a larger number of irrigation products. The Water Authority will consider adoption of the EPA's standards for individual products.

### **PAEPs, MPs, and QAPPs**

A PAEP will be developed (Subtask 1G.1) which will provide a framework for assessment and evaluation of project performance, identify measures that can be used to monitor progress towards achieving project goals, and provide a tool to monitor and measure project progress and guide final project performance reporting.

### **Land Acquisition & Rights-of-Way**

Not applicable

### **Project Building Materials or Computational Methods**

The merits of the methods and equipment that will be provided or utilized by this program have been well documented, as discussed below.

### Water Budget Software

The Water Budget Software will integrate measurements obtained from infrared imagery classified into vegetation types. The classification of vegetation was performed with Feature Analyst software. A pilot program validating the accuracy of imagery classification by vegetation was previously performed by the City of San Diego in collaboration with the USBR in 2005. Water budget calculations will be based on Assembly Bill (AB) 1881 guidelines which use the formula of square feet of porous landscape multiplied by evapotranspiration adjustment factor (Eto) x adjustment for the evapotranspiration controller (ET Adjustment). Water budget targets will be made available to designated customers via web, email and/or letters. The Eto for the Water Authority's water budget program will be 0.7, which incorporates a crop coefficient of 0.5 and a distribution uniformity of 0.71. Local planners and landscape contractors attending the 2<sup>nd</sup> Annual Water Conservation summit did not oppose the use of an Eto adjustment factor of 0.7 (Note: The Water Authority will recommend the use of 0.7 Eto Adjustment to its member agencies, but it cannot guarantee they will implement water budgets or adhere to its recommendations.)

### Smart Controllers

The Residential Runoff Reduction Study conducted by the Irvine Ranch Water District (IRWD) in collaboration with the Municipal Water District of Orange County (MWDOC) and MWD demonstrated that the average residential customer saved 41 gallons per day (gpd) and the average dedicated irrigation meter saved 545 gpd after a smart controller was installed.

### Other Incentivized Equipment

Sample list of eligible devices under the current Water Authority's retrofit program:

- Pressure regulators
- Flow interruption sensors
- Pressure compensating heads
- Booster Pumps
- Check valves
- Irrigation heads
- Rotating nozzles
- Manifolds
- Pipes
- Wiring

This is not a comprehensive list; it is meant to serve as a sample of the most commonly reimbursed items.

**Project Permits**

Not applicable

**Environmental Compliance**

Not applicable

**Groundwater Management Plan Work Items**

Not applicable

**Project Submittals**

Table 1.1 displays the anticipated schedule of submittals to granting agencies for assessing progress and accomplishments (quarterly and final reports).

**Table 1.1: Project Submittals for the Implementation of Integrated Landscape and Agricultural Efficiency Programs**

No.	SUBMITTAL	SCHEDULE
1-1	Quarterly reports	Quarterly
1-2	Final report	June 2013 (or upon completion)

**Other**

Not applicable

**Plans & Specifications References**

Not Applicable

**Completed Work**

Work completed to date is summarized in Table 1.2 below.

**Table 1.2: Work Completed on the Implementation of Integrated Landscape and Agricultural Efficiency Programs as of July, 2008**

WORK ELEMENT	COMPLETION DATE
Purchase of infrared Imagery	February 2007

WORK ELEMENT	COMPLETION DATE
Classification of Imagery by Vegetation	October 2007
Classification of Large Water Features (Pools)	December 2007
Landscape Certification and Training Study	October 2007
Branding Study	April 2008
Water Budget Website Development	July 2008
Commercial, Industrial, and Public Landscape Retrofits	Ongoing since 2005.

**Work Item #2: Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration**

**Implementing Agency**

City of San Diego

**Project Description**

The Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration project is being implemented by the City of San Diego to provide an opportunity to offer customized commercial landscape and residential surveys along with state-of-the-art efficient irrigation hardware free-of-charge to customers maintaining irrigation systems at landscaped sites throughout the City of San Diego. A selected group of 50 participating sites will also serve as a study group to demonstrate the link between use of landscape conservation hardware and observable levels of urban runoff reduction. The giveaway program will promote further utilization (and market penetration) of up to 700 residential and commercial weather-based irrigation controllers (WBICs), also known as “smart controllers” as well as other types of distribution hardware (i.e. drip/micro spray/sprinkler heads). The project is projected to conserve at least 91 AFY of water and will aim to reduce the extensive amount of over-watering that occurs in commercial, residential, and institution urban landscapes, thereby conserving potable water and reducing pollutant-laden dry weather urban runoff flows into sensitive receiving waters.



Irrigation Hardware Giveaway Program

The program is structured to complement the City of San Diego Water Department’s (SDWD’s) existing Commercial Landscape Survey Program (CLSP) and Residential Survey Program. Interested SDWD customers with sites that qualify to participate would *receive* a customized, survey and analysis of the property’s irrigation system and efficiency, suggested to improvements to the system, and *upgrades* will be offered to improve irrigation efficiency. Surveyors providing residential and commercial surveys are highly trained in outdoor water conservation practices. For irrigation only-meters, surveyors will be able to utilize state-of-the-art satellite based data to categorize the amount and type of vegetation present on a site and corresponding watering requirements.

The giveaway program ties recommended hardware installation to the items identified/suggested in each customized CLSP and residential survey. Site verification of hardware installation and analysis of water use would occur for a period of time “before and after” hardware and management improvements are made at a site. Measurements and analysis of water use before and after improvements are made at commercial sites is feasible through the use of the City’s proprietary Water Resources Landscape Database (WRLD). The visual inspection of each site for the presence of runoff production will be catalogued before enhancements are made, at the time the survey is performed. A “before and after” analysis of water use will be conducted for all irrigation-only metered sites. A small sample group selected from the sites participating in the program would be inspected in depth before and after enhancements are implemented to provide a “before and after” comparison water usage and runoff

analysis. The final analysis will focus on potential barriers to entry regarding customers' use of WBICs and various advanced irrigation hardware.

#### Dry Weather Runoff Reduction Demonstration

This project will also include exploration of the link between water conservation and water quality improvement through irrigation runoff reduction. Approximately 50 landscaped sites within the City of San Diego that actively produce irrigation runoff collected in defined drainage basin(s) of the San Diego watershed will be targeted for the demonstration. A "before and after" analysis intended to be completed to compare how enhancement of irrigation hardware and management impacts the amount of water used, and in turn, the amount of dry-weather runoff produced. This study will estimate water savings and actual dry-weather runoff reductions, and report implied water quality improvements due to reductions in the quantity of runoff to the storm drain system, and ultimately into the waterways.

Participants in the demonstration project would receive WBICs and irrigation upgrades, and would be invited to select from a limited "California-Friendly" plant palette intended to further reduce landscape water consumption. Visual inspection for the presence of runoff at each property as well as measurements of the cumulative quantity of runoff produced in the project area will be tracked at selected storm drain basin(s) within the project site during dry-weather, both before and after improvements are implemented. Published studies on the quality of dry-weather runoff from landscapes will be used as the basis for assumptions made regarding the reduction in contaminant loading to San Diego water bodies from the enhancements made as part of this demonstration project.

#### **Need for the Project**

Outdoor water conservation through the enhancement of irrigation management practices, use of state-of-the-art WBICs, and distribution hardware have been shown in some studies to result in the conservation of potable water, and in turn, a reduction in the occurrence of irrigation-related runoff to the storm drain system.

Through the use of state-of-the-art satellite technology, the SDWD has determined that the City's urban landscapes are over-watered by as much as 40,000 acre feet annually. Nearly 50% of the water used by a typical single family household is dedicated to landscape irrigation and those landscapes are typically over-watered by at least 25%. It is suspected that a large component of this over-irrigation stems from the customer's lack of understanding as to how much water a landscape really needs, and how those needs change continuously throughout the year. This project will provide education to residential and commercial customers regarding the appropriate amount of water that should be applied to maintain healthy landscapes. In addition, these customers will be provided the means to achieve efficient irrigation in the form of state-of-the-art irrigation hardware.

To add to the concern of over-irrigation of landscapes in the Region, it is commonly understood that non-point source water pollution in the form of landscape irrigation runoff entering the storm drain system is one of the larger unregulated sources of water quality degradation. In San Diego, water from over-irrigation that enters the storm drain system typically enters waterways (streams, bays, ocean) untreated, and is often polluted with fertilizer, pesticides, and other contaminants found in dry-weather runoff. Statistics indicate that this problem of over-irrigating and inefficient irrigation resulting in dry-weather runoff is fairly wide-spread. Of 1,090 residential water conservation surveys conducted during the most recent fiscal year in the City of San Diego, the occurrence of water leaving the property from irrigation was noted at slightly over 25% (273) of the homes. This project will increase local awareness of the link between landscape over-watering and dry weather runoff to the storm drains.

#### **Eligibility**

The Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration project is eligible to receive funding from Proposition 50, Chapter 8, under California Water Code Section 79561. Section 79561 reads:

79561. Money appropriated in Section 79560 shall be available for grants for water management projects that include one or more of the following elements:

- (a) Programs for water supply reliability, water conservation, and water use efficiency.
- (b) Storm water capture, storage, treatment, and management.
- (c) Removal of invasive non-native plants, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands.
- (d) Non-point source pollution reduction, management, and monitoring.
- (e) Groundwater recharge and management projects.
- (f) Contaminant and salt removal through reclamation, desalting, and other treatment technologies.
- (g) Water banking, exchange, reclamation, and improvement of water quality.
- (h) Planning and implementation of multipurpose flood control programs that protect property; and improve water quality, storm water capture and percolation; and protect or improve wildlife habitat.
- (i) Watershed management planning and implementation.
- (j) Demonstration projects to develop new drinking water treatment and distribution methods.

Consistent with Section 79561(a), the program is an eligible project type because it is a program for water supply reliability, water conservation, and water use efficiency.

## Work Tasks

### **Task 2A. Direct Project Administration**

Subtask 2A.1 – Project Management: This subtask includes project administration and efforts to coordinate the project.

Subtask 2A.2 – Final Reports: A final report will be prepared for both the Giveaway program and the Dry Weather Runoff Reduction program that consists of a final budget report (matching fund and grant funds accounting), deliverables report, results of programs assessments (copies of reports), and lessons learned.

### **Task 2B. Land Purchase/Easement**

Not applicable

### **Task 2C. Planning/Design/Engineering/Environmental Documentation**

Subtask 2C.1 – Runoff Reduction Demonstration: Design: This subtask will involve a number of activities to support design of the runoff reduction study. Fifty sites and customers will be identified and contacted to solicit voluntary participation in project, which is voluntary. Customer sites will be selected for the runoff reduction demonstration. The sites will be selected on the basis of their relationship to specific storm drain zones where runoff will be measured. After initial site selection, the project area, approximately 50 sites, and equipment and monitoring protocols will be refined. Any internal approvals will be sought (i.e. hiring consultants, consultant selection process, irrigation hardware selection, plant selection, etc.).

Subtask 2C.2 – Runoff Reduction Demonstration: Preoptimization Field Testing/Inspection/Analysis: This subtask includes installation of flow meters at drainage basins and catch flow monitoring before enhancements are installed at sites to obtain baseline data.

### **Task 2D. Construction/Implementation**

Subtask 2D.1 – Irrigation Hardware Giveaway: Outreach and Marketing: This subtask involves coordination of the project, as well as advertising and publicizing the program to customers throughout the life of the project.

Subtask 2D.2 – Irrigation Hardware Giveaway: Residential and Commercial Surveys and Verifications: The proposed hardware equipment giveaways are recommended during the residential and commercial survey process. Analysis of water use will occur for a period of time before and after irrigation enhancements are made at the sites.

Subtask 2D.3 – Irrigation Hardware Giveaway: Residential and Commercial WBICs: This subtask will involve providing up to 100 WBICs to commercial landscape customers and up to 600 WBICs to residences participating in the City's survey programs. Installation services by a contractor may be included.

Subtask 2D.4 – Irrigation Hardware Giveaway: Residential and Commercial Hardware Irrigation Retrofits: Based on the results of the surveys, a variety of other irrigation hardware material and equipment that will contribute to the increased efficiency of the irrigation system will be offered. Installation services by a contractor may be included.

Subtask 2D.5 – Runoff Reduction Demonstration: Media/Public Outreach/Education: Efforts to coordinate the project as well as advertise/publicize the program to customers will occur up-front and throughout the project.

Subtask 2D.6 – Runoff Reduction Demonstration: Landscape Contractor Selection: This subtask will involve the selection of the landscape consultant/contractor to carry out the irrigation optimization subtask (2D.7)

Subtask 2D.7 – Runoff Reduction Demonstration: Irrigation Optimization for 50 homes: This subtask, which may be accomplished by a landscape consultant, will involve developing a site-specific plan to implement water efficiency improvements at the 50 sites. Enhanced irrigation hardware will be installed at project sites.

Subtask 2D.8 – Runoff Reduction Demonstration: Before and After Residential Reviews: This subtask will be conducted by staff and will occur before and after irrigation hardware installation.

Subtask 2D.9 – Runoff Reduction Demonstration: Residential WBICs: This subtask will involve providing a WBIC to each home in the demonstration.

Subtask 2D.10 – Runoff Reduction Demonstration: Other Irrigation Hardware: This subtask will provide other irrigation hardware based on the survey for each home in the demonstration.

Subtask 2D.11 – Runoff Reduction Demonstration: California Friendly Plants: This subtask involves offering a palette of California Friendly Plants to each home in the demonstration.

Subtask 2D.12 – Runoff Reduction Demonstration: Post Optimization Field Testing/Inspection/Analysis: This subtask includes removal of flow meters at drainage basins and catch flow monitoring equipment after project monitoring and efforts are completed as well as reporting of flow quantities.

***Task 2E. Environmental Compliance/Mitigation/Enhancement***

Not applicable.

***Task 2F. Construction Administration***

Not applicable.

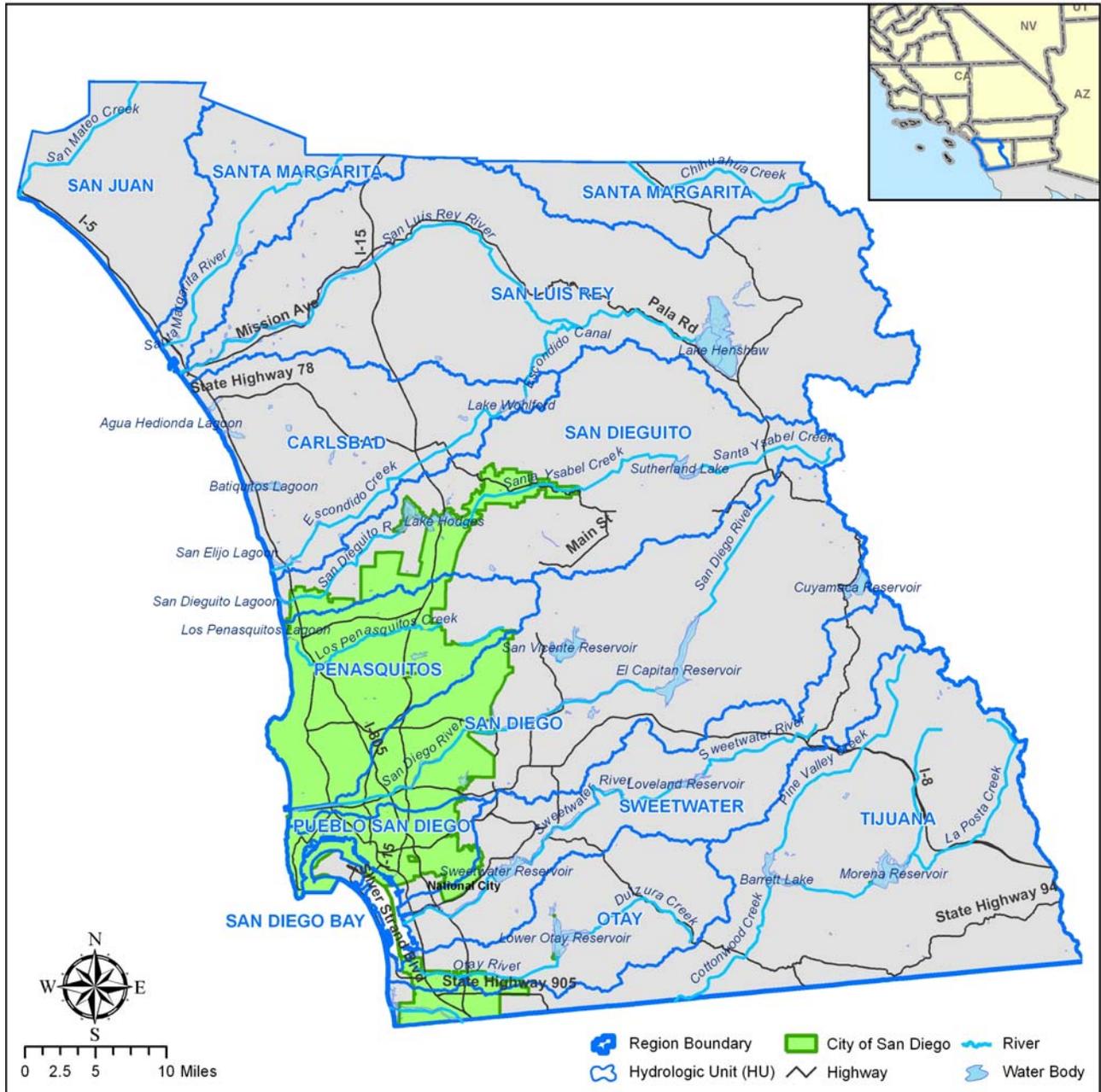
**Task 2G. Other Costs**

Subtask 2G.1 – Preparation of PAEP: This subtask includes preparation of a PAEP, monitoring and assessment of project implementation, overall project administration, and preparation of quarterly status reports and a final status report.

**Project Maps**

The Irrigation Hardware Giveaway and Dry Weather Runoff Demonstration will be implemented with the City of San Diego. Figure 2.1 shows the City boundaries.

**Figure 2.1 Location of Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration**



## **Project Standards**

### Water Use Survey Standards

Water use surveys are designed and performed in accordance with the CUWCCs BMPs.

### Device Ratings

Devices that will be provided in this project have been incentivized by the Water Authority. Smart Controllers must be tested by the Irrigation Association's SWAT group to qualify for Water Authority incentives. The Water Authority also relies on MWD to determine product eligibility for device incentives. Prior to incentivizing a device the MWD, in collaboration with its member agencies, evaluates studies assessing the device's water conservation potential. Other products incentivized through the Water Authority's grant programs (not related to MWD's incentives) are products that have already gained market acceptance, therefore additional requirements are not imposed. The EPA through its WaterSense program, is setting standards for a larger number of irrigation products. The Water Authority will consider adoption of the EPA's standards for individual products.

## **PAEPs, MPs, and QAPPs**

A PAEP will be developed (Subtask 2G.1) which will provide a framework for assessment and evaluation of project performance, identify measures that can be used to monitor progress towards achieving project goals, and provide a tool to monitor and measure project progress and guide final project performance reporting.

## **Land Acquisition & Rights-of-Way**

Not applicable

## **Project Building Materials or Computational Methods**

The merits of the methods and equipment that will be provided or utilized by this program have been well-documented.

### Weather-Based Irrigation Controllers

The Residential Runoff Reduction Study conducted by the Irvine Ranch Water District (IRWD) in collaboration with MWDOC and MWD demonstrated that the average residential customer saved 41 gpd and the average dedicated irrigation meter saved 545 gpd after a smart controller was installed.

### Other Incentivized Equipment

Sample list of eligible devices under the current Water Authority's retrofit program:

- Pressure regulators
- Flow interruption sensors
- Pressure compensating heads
- Booster Pumps
- Check valves
- Irrigation heads
- Rotating nozzles
- Manifolds
- Pipes
- Wiring

This is not a comprehensive list; it is meant to serve as a sample of the most commonly reimbursed items.

## **Project Permits**

Not applicable

**Environmental Compliance**

Not applicable

**Groundwater Management Plan Work Items**

Not applicable

**Project Submittals**

Table 2.1 displays the anticipated schedule of submittals to granting agencies for assessing progress and accomplishments (quarterly and final reports).

**Table 2.1 Project Submittals for the Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration**

No.	SUBMITTAL	SCHEDULE
2-1	Dry Weather Runoff Reduction Demonstration Report	June 2013
2-2	Quarterly reports	Quarterly
2-3	Final report	June 2013 or upon completion

**Other**

Not applicable

**Plans & Specifications References**

Not Applicable

**Completed Work**

Not applicable

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**Work Item #3: Over-Irrigation/Bacteria Reduction**

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**Implementing Agency**

City of Encinitas

**Project Description**

The Over-Irrigation/Bacteria Reduction project will protect and enhance water quality by reducing irrigation runoff through improved water use efficiency at eight pilot sites located within the Carlsbad Watershed in San Diego County. These sites represent a mix of residential areas and small commercial/public areas that have been identified as high water users with frequent over-irrigation runoff. Six of the sites are located in close proximity to San Elijo Lagoon, which is a 303(d) listed water body impaired for bacteria, nutrients and sediment. The objectives of the project are to provide measurable water conservation and water quality benefits and to demonstrate the link between over-irrigation reductions and associated reductions in pollutant loads. This will be accomplished through water use assessment, flow monitoring and water quality monitoring both on-site and at key locations in the storm drain system.



Recent studies and local water quality monitoring have shown that irrigation runoff is a significant source of bacteria (and possibly nutrients). Residential areas and small commercial/public areas have been identified as major water users and often create large amounts of over-irrigation runoff. The Escondido Creek Watershed Alliance will implement this three year pilot program to assess the effectiveness of the use of irrigation runoff reduction as a best management practice (BMP) for reducing bacteria and nutrient loads in receiving waters and demonstrate the multiple benefits of water conservation. Project elements include: 1) the implementation of a comprehensive landscape water conservation program in selected residential areas and small commercial/public areas, 2) education and outreach on efficient irrigation methods and landscapes, and 3) measurements of effectiveness through the monitoring of water quality and quantity. The water conservation program will require working closely with users, offering incentives for installing upgraded irrigation hardware, weather-based irrigation controllers, low water use landscaping to reduce outside water use. The project will be closely coordinated with local water districts.

Water usage will be measured and assessed before, during and after program implementation to determine water usage reductions. Direct flow measurements and chemical testing will be used to assess water quality benefits. Monitoring will be conducted before, during, and after implementation of water conservation efforts. Water quality monitoring will consist of a variety of constituents including bacterial, nutrients, and conductivity. Estimates of pollutant loads and pollutant load reductions will be calculated using flow monitoring and chemical test data together.

This project integrates programs and strategies for enhancing the Region's water supply, water quality and watersheds. It will reduce the Region's reliance on imported water by reducing water use through the implementation of water conservation programs that increase the efficiency of current irrigation practices. It will protect and enhance the health and viability of the Region's watersheds by reducing pollutant loads that are contained in irrigation runoff. Monitoring and analyzing the quantity and quality of runoff before and after the implementation of water conservation programs will establish the project's effectiveness.

### **Need for the Project**

Water conservation is a critical need for the Region, as is reduction in bacteria loading. Population growth continues in the Region and water sources are limited. Bacteria loads, as demonstrated by annual regional monitoring programs, are increasing in the Region and over-irrigation runoff has been identified as a major potential contributor. TMDLs are currently being developed for bacteria in Creeks and Beaches and in Lagoons. It is critical to develop tools that water and stormwater managers can utilize to reduce water usage and pollutant loads.

### **Eligibility**

The Over-Irrigation/Bacteria Reduction project is eligible to receive funding from Proposition 50, Chapter 8, under California Water Code Section 79561. Section 79561 reads:

*79561. Money appropriated in Section 79560 shall be available for grants for water management projects that include one or more of the following elements:*

- (a) Programs for water supply reliability, water conservation, and water use efficiency.*
- (b) Storm water capture, storage, treatment, and management.*
- (c) Removal of invasive non-native plants, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands.*
- (d) Non-point source pollution reduction, management, and monitoring.*
- (e) Groundwater recharge and management projects.*
- (f) Contaminant and salt removal through reclamation, desalting, and other treatment technologies.*
- (g) Water banking, exchange, reclamation, and improvement of water quality.*
- (h) Planning and implementation of multipurpose flood control programs that protect property; and improve water quality, storm water capture and percolation; and protect or improve wildlife habitat.*

- (i) *Watershed management planning and implementation.*
- (j) *Demonstration projects to develop new drinking water treatment and distribution methods.*

Consistent with Section 79561(a), the program is an eligible project type because it is a program for water supply reliability, water conservation, and water use efficiency.

## **Work Tasks**

### **Task 3A. Direct Project Administration**

Subtask 3A.1 – Program Administration/Management: This subtask will involve coordinating the multiple stakeholders on a bi-monthly basis on the status of the grant implementation. The program administrator must also prepare the Request for Proposal and Scope of Work for the water quality monitoring, data analysis and flow monitoring. The administrator must also coordinate the PAEP, Monitoring Plan (MP) and the QAPP submittal. The administrator will collate and prepare the quarterly reports to the granting agency. The City administrator will manage the project through the Finance Department and prepare staff reports to the City Council.

Subtask 3A.2 – Quarterly and Final Reporting: This subtask will also include preparing required project reporting. It is assumed that quarterly reports will be required as well as a final report at the end of the three-year project period.

### **Task 3B. Land Purchase/Easement**

Not applicable

### **Task 3C. Planning/Design/Engineering/Environmental Documentation**

Not applicable

### **Task 3D. Construction/Implementation**

Subtask 3D.1 – Source/Site Identification: The project partners have identified eight locations throughout the Carlsbad HU for implementation. These sites represent a mix of residential and small commercial areas and media strips. This subtask will verify that the sites are good candidates. Customer water usage records will be reviewed for the potential sites to confirm that high water usage is occurring at the sites. Coordination will be conducted with property owners and managers.

Subtask 3D.2 – Water Quality Monitoring: This subtask will be guided by the Monitoring Plan (MP) and Quality Assurance Project Plan (QAPP) that will be developed in Task 3G. Selection of monitoring sites will be driven by established dry weather monitoring sites identified in the Carlsbad Watershed Urban Runoff Management Program (WURMP). The established sites have recorded flow, bacteria and analytical assessments since 2001. Water quality monitoring will be enhanced at each site prior to, during, and after implementation of the water conservation activities. Monitoring will be performed in the storm drain system and at control sites. Water quality monitoring will consist of a variety of constituents including bacteria, nutrients, and heavy metals. Bacteria testing will be performed at a state certified laboratory.

Subtask 3D.3 – Flow Monitoring: Flow monitoring will also be performed at each site. The methods for flow monitoring vary depending on the site and infrastructure conditions.

#### Subtask 3D.4 – Implement Water Conservation Program:

This subtask will consist of implementing a focused water conservation program at each site using existing conservation programs implemented by the Water Authority. The project will be implemented in two separate methods that build on existing incentive programs. The program for residential and small commercial areas will be tailored for each site and may consist of providing water audits, enhanced

incentives for installation of upgraded irrigation hardware, weather-based irrigation controllers, replacement of high water use landscaping and water conservation education.

Subtask 3D.5 – Program Monitoring and Maintenance: This subtask will provide maintenance of the flow monitoring equipment, ET controllers and the irrigation system. This subtask will also provide training for the maintenance supervisors.

Subtask 3D.6 – Data Analysis and Assessment of Load Reduction: Using the data from the water quality monitoring and flow measurements, pollutant loads will be estimated. Before and after data will be used to directly measure the effectiveness of the program. Water conservation evaluation will be a statistical analysis of historical water consumption records and data will be compared among the groups and the control group. A statistical analysis of the reduction of runoff induced by ET controller will also be completed.

### ***Task 3E. Environmental Compliance/Mitigation/Enhancement***

Not applicable.

### ***Task 3F. Construction Administration***

Not applicable.

### ***Task 3G. Other Costs***

Subtask 3G.1 – Preparation of PAEP: This subtask includes preparation of a PAEP.

Subtask 3G.2 – Preparation of MP: This subtask includes preparation of an MP that will guide water quality testing and flow measurement activities.

Subtask 3G.3 – Preparation of a Quality Assurance Project Plan (QAPP): This subtask includes development of a QAPP.

#### Subtask 3G.4 –Public Outreach and Education:

This subtask will consist of an initial consultation with property management, homeowner's association (HOA) representatives and maintenance staff on the goals of the project and identify specific tasks to implement the project. The property management and HOA will serve as a focal point for outreach and education to the homeowners and commercial businesses. As a secondary education measure the maintenance staff will be trained in water conservation measures and ET controllers' maintenance. The maintenance staff will also be trained in identifying excessive water usage and BMPs to reduce the runoff into the lagoon.

### **Project Maps**

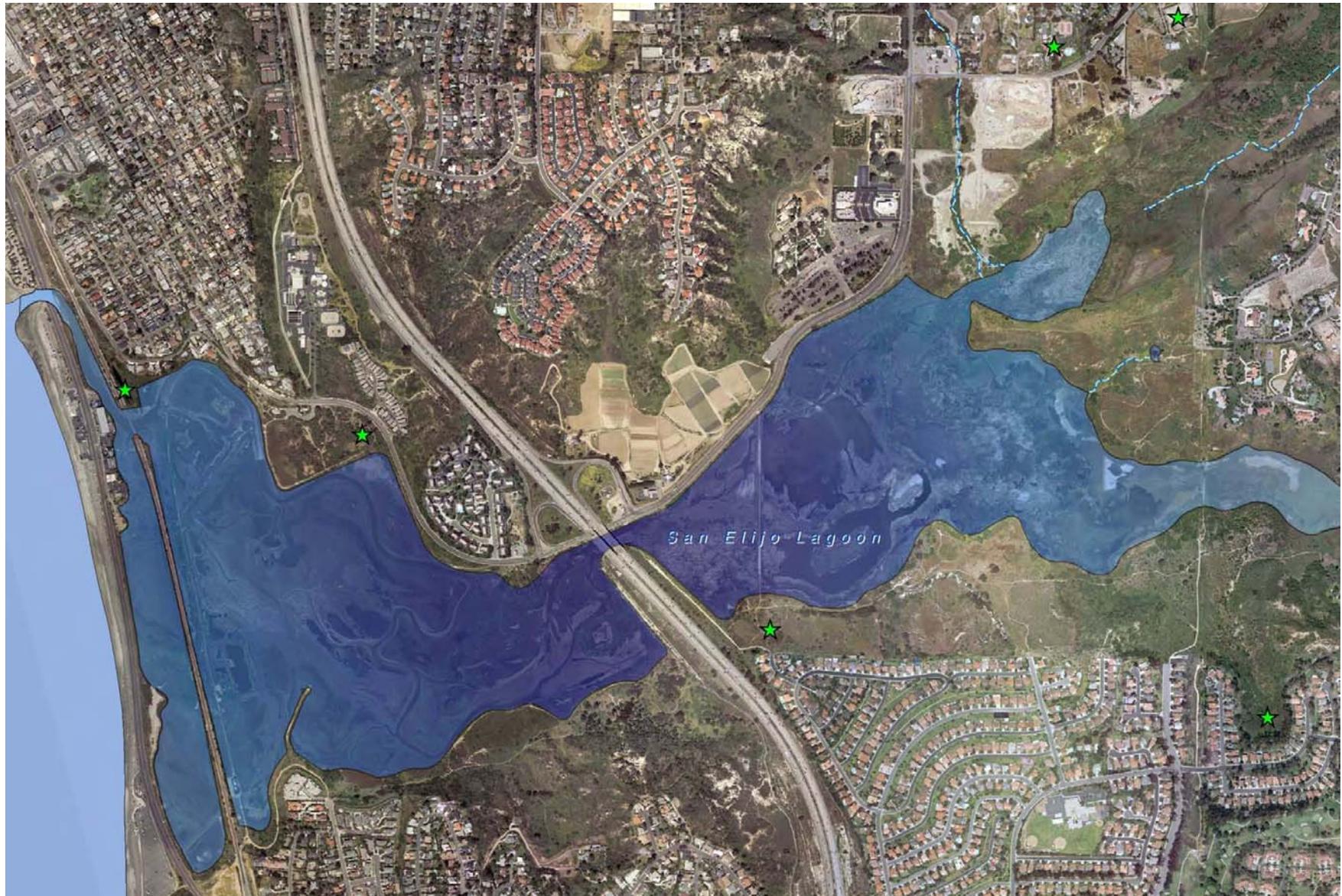
The Over-Irrigation/Bacteria Reduction project will take place at eight locations in the Carlsbad Watershed within the Cities of Encinitas, Escondido and Solana Beach. Figure 3.1 shows the location of all eight sites. Figure 3.2 shows the proximity of six sites to the San Elijo Lagoon, which is impaired for the nutrients, sediment and bacteria.

Additional maps showing site details and monitoring locations are provided in Appendix 3 (Disc 2 [DVD]).

Figure 3.1 Location of Over-Irrigation/Bacteria Reduction Project



Figure 3.2 Close up of Over-Irrigation/Bacteria Reduction Sites near San Elijo Lagoon



## **Project Standards**

### Water Use Survey Standards

Water use surveys are designed and performed in accordance with the CUWCC's BMPs.

### Device Ratings

Devices that will be provided in this project are ones that have been incentivized by the Water Authority. Smart Controllers must be tested by the Irrigation Association's SWAT group to qualify for Water Authority incentives. The Water Authority also relies on MWD to determine product eligibility for device incentives. Prior to incentivizing a device MWD, in collaboration with its member agencies, evaluates studies assessing the device's water conservation potential. Other products incentivized through the Water Authority's grant programs (not related to MWD's incentives) are products that have already gained market acceptance, therefore additional requirements are not imposed. The EPA, through its WaterSense program, is setting standards for a larger number of irrigation products. The Water Authority will consider adoption of the EPA's standards for individual products.

### Testing Standards

Testing for variances in bacterial TMDL loads will be performed in accordance with RWQCB standards. Water consumption comparisons will be weather-normalized to ensure that savings are due to irrigation changes and not weather.

## **PAEPs, MPs, and QAPPs**

A PAEP will be developed (Task 3G.1), and will provide a framework for assessment and evaluation of project performance, identify measures that can be used to monitor progress towards achieving project goals, and provide a tool to monitor and measure project progress and guide final project performance reporting. A QAPP will be completed to ensure that data collected are of adequate quality given the monitoring objectives.

## **Land Acquisition & Rights-of-Way**

Not applicable

## **Project Building Materials or Computational Methods**

The merits of the methods and equipment that will be provided or utilized by this program have been well-documented.

### Smart Controllers

The Residential Runoff Reduction Study conducted by IRWD in collaboration with MWDOC and MWD demonstrated that the average residential customer saved 41 gpd and the average dedicated irrigation meter saved 545 gpd after a smart controller was installed.

### Other Incentivized Equipment

Sample list of eligible devices under the current Water Authority retrofit program:

- Pressure regulators
- Flow interruption sensors
- Pressure compensating heads
- Booster Pumps
- Check valves
- Irrigation heads
- Rotating nozzles
- Manifolds
- Pipes
- Wiring

This is not a comprehensive list; it is meant to serve as a sample of the most commonly reimbursed items.

**Project Permits**

Not applicable

**Environmental Compliance**

Not applicable

**Groundwater Management Plan Work Items**

Not applicable

**Project Submittals**

Table 3.1 displays the anticipated schedule of submittals to granting agencies for assessing progress and accomplishments.

**Table 3.1: Project Submittals for the Over-Irrigation/Bacteria Reduction Project**

No.	SUBMITTAL	SCHEDULE
3-1	PAEP	February 2008
3-2	MP	August 2008
3-3	QAPP	September 2008
3-4	Quarterly Report	Quarterly
3-5	Final Report	September 2010
3-6	Statistical Analysis of Urban Runoff Reduction	September 2010
3-7	Statistical Analysis of Water Savings	September 2010

**Other**

Not applicable

**Plans & Specifications References**

Not applicable

**Completed Work**

Work completed to date is summarized in Table 3.2.

**Table 3.2: Work Completed on the Over-Irrigation/Bacteria Reduction Project as of July, 2008**

WORK ELEMENT	COMPLETION DATE
Site Selection	January 2008
PAEP	February 2008

## WATER RECYCLING PROGRAM

### Work Item #4: Santee Water Reclamation Facility Expansion Project

#### Implementing Agency

Padre Dam Municipal Water District

#### Project Description

The Santee Water Reclamation Facility (WRF) Expansion Project includes the design and construction of facilities necessary to expand the Title 22 treatment capacity of the WRF from 2 million gallons per day (MGD) to 4 MGD, with further expansion to 10 MGD and advanced treatment in a subsequent phase. This project is part of a coordinated effort to jointly implement two projects that will enhance local supplies through an expansion of recycled water production coupled with increased groundwater recharge using recycled water. Expansion of WRF capacity could involve design and construction of either a secondary clarifier and tertiary filter facilities or a membrane bioreactor.



This project has been developed and is now being implemented in conjunction with the El Monte Valley Groundwater Recharge and River Restoration project being implemented by Helix Water District. That project will utilize the increased recycled water production made available from the WRF for recharge of the El Monte groundwater basin. Because the WRF is the closest water source to the El Monte Valley, the two projects are not only integrated, but interdependent, as well. The Phase 2 expansion proposed by this project will generate 2,240 AFY and will be constructed in a configuration that will allow a further expansion to 10 MGD and upgrade to advanced treatment in a subsequent phase (Phase 3). When complete, the ultimate benefits of these combined projects will include 5,000 AFY of new water and a reduction in the amount of future capacity upgrades that will be necessary at the Point Loma Wastewater Treatment Plant.

#### Need for the Project

When the full expansion of the Santee WRF Title 22 treatment capacity to 10 MGD is achieved, it will provide 5,000 AFY of local, drought-resistant water, a valuable contribution to the Water Authority's 2020 regional water portfolio. This project also addresses the need for agencies to work together to develop synergistic solutions to the challenges that face the Region. As Padre Dam Municipal Water District (MWD) and Helix Water District have worked closely together to develop the Santee WRF Expansion and El Monte Valley Groundwater Recharge and River Restoration projects, they have demonstrated the value of partnering on complementary projects that can offer mutual benefits. Implementation of these integrated projects will also address growing public concern over pending drought and climate change and provide tremendous public education potential by demonstrating a collaborative, innovative, and efficient solution to these issues. This project can generate new recognition of the important role of recycled water in the Region's water supply portfolio.

#### Eligibility

The Santee Water Reclamation Facility Expansion project is eligible to receive funding from Proposition 50, Chapter 8, under California Water Code Section 79561. Section 79561 reads:

*79561. Money appropriated in Section 79560 shall be available for grants for water management projects that include one or more of the following elements:*

- (a) Programs for water supply reliability, water conservation, and water use efficiency.*
- (b) Storm water capture, storage, treatment, and management.*