Attachment 7

Monitoring, Assessment, and Performance Measures

San Diego Integrated Regional Water Management Grant Application

PIN 13105

San Diego Region Implementation Grant Proposal

ATTACHMENT 7:
Monitoring, Assessment and Performance Measures

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For each project in this Proposal, specific performance measures and monitoring approaches have been developed to assess project performance on an ongoing basis. The purpose of this attachment is to describe the monitoring, assessment, and performance measures that will be used to evaluate each project. These measures will ensure that this Proposal meets its intended goals, achieves measurable outcomes and provides value to the Region and the State of California.

The monitoring systems that will be employed for each project, the performance measures that will be used to measure progress toward achieving stated project goals, and the data gathered to evaluate these measures are described in the following sections. In addition, the following sections present preliminary project assessment and evaluation plan (PAEP) tables for each proposed project. Project activities are categorized according to the five major categories outlined in the SWRCB's Guidance for Preparing Project Assessment and Evaluation Plans which are as follows:

- Planning, Research, Monitoring and Assessment
- Education, Outreach, and Capacity Building
- Habitat Restoration
- Load Reduction
- Beneficial Use Improvement and Protection

CONSERVATION PROGRAM

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

To determine the overall success of water use efficiency programs implemented by the San Diego County Water Authority (Water Authority), a baseline will be established using the following measures:

- Average water consumption over 2 years (1 year prior to the intervention and 1 year after the intervention)
- Average reference evapotranspiration over 5 years (values will be obtained from the Department of Water Resources' CIMIS web site); reference evapotranspiration on the CIMIS site is measured in inches and is affected by the following factors: solar radiation, temperature, wind and relative humidity

Future water consumption at sites will be compared to this baseline to estimate the amount of savings attained. All future calculations will be weather-normalized (adjusted for weather)) to ensure that savings are attributable to conservation as opposed to weather changes. Monitoring and performance evaluation for the agricultural and landscape components are described below:

Agricultural Water Use Efficiency

The effectiveness of the agricultural water use efficiency component of this project will be assessed through completion of the agricultural audit savings study and through site re-evaluations. Random re-evaluations will be conducted to determine the reduction in water requirements and use at sites (pre and post installation water use). The agricultural savings study will evaluate previously audited sites and determine reliable water estimates for future audits. The Water Authority will retain customer audit results and assign a staff member to randomly verify audits were performed. Prior to collaborating on agricultural research projects, the Water Authority and its collaborators will identify performance metrics to ensure the successful and timely completion of the research effort.

Landscape Water Use Efficiency

Quantifiable water use savings are expected to result from irrigation retrofits offered to commercial, multifamily, public and residential customers, as well as the implementation of a web-driven water budget program. Monitoring of the retrofit program will involve: 1) documentation of retrofits conducted; 2) follow-up with a select number of customers to verify installation and receipt of funds (to be conducted by the contractor administering the program and by Water Authority staff not affiliated with the program); and 3) review of pre and post installation water use. Monitoring of the water budget program will involve tracking the number participants in the program. Examination of the pre- and post- water budget water use records of participants can determine the amount of actual savings experienced by water budget implementation.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Program	Monitoring Locations	Types of Analyses	Measuring Performance
Agricultural WUE	At individual audited customer sites	Re-evaluations of audited sites Agricultural audits savings study	Compare actual water savings to targeted 500 AFY water savings for 375 audits (2 to 4 year period) Determine overall effect of agricultural WUE program
	Across agricultural sector	Examination of annual water use for agricultural sector	Determine overall effect of agricultural WUE program
Landscape WUE	At individual retrofitted customer sites	Water use records	Compare to 530 AFY water savings target per irrigation retrofit
	At water budget participant sites	Water use records	Compare to 2,507 AFY water savings target for 17% enrollment in water budgets

Project Performance Measures Table – Implementation of Integrated Landscape and Agricultural Efficiency Programs

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Increase agricultural water use efficiency	2. Increase agricultural water use efficiency	1. Reduce agricultural water usage 2. Update crop acreage and estimate crop water needs in SD County. 3. Identify new methods for efficiency	1. # of agricultural audits performed 2. # of research efforts funded	1. Reduced water use 2. Report of changes in crop acreage and crop use 3. Increase in #of peer-reviewed reports published and/or new technologies or use of recycled-water in an increased number of agricultural sites	1. Agricultural audits and re-evaluations 2. 2007 Agricultural Crop and Water Use Assessment 3. Agricultural Audits Savings Study 4. New Agricultural Water Use Efficiency Methodologies or Technology
2. Increase landscape irrigation efficiency	1. Reduce landscape irrigation usage at participating sites 2. Issue water budgets to large landscape with water budgets 3. Identify mixed use meter customers for which water budgets are feasible 4. Identify landscape conservation implementation obstacles	1. # of sites where irrigation or landscape retrofits performed 2. # of water budget web site visits 3. Mixed-use meter feasibility study 4. # of research or evaluation efforts funded 5. Water savings model developed 6. # of agencies adopting regional landscape ordinance 7. # of sites enrolled in water budgets	1. Amount of water used (AFY) by retrofitted sites 2. # of water budget enrollments 3. Number of efforts benefiting from research funds.	1. Customer pre- and post- retrofit water use records 2. Water budget web site database 3. Mixed-use meter water budget feasibility report	1. 2.1 AFY average water use reduction per multifamily, commercial/industrial /institutional, or public irrigation retrofit site (based on 1acre site) 2. Average water use reduction of 0.19AFY for residential irrigation retrofit site 3. 17% enrollment in water budgets 4. Water budget savings: up to 765 gpd water use reduction per dedicated irrigation meter
3. Educate public on water use efficiency	1. Successful implementation of a brand strategy	1. # of products, services, and programs identified	1.Good recall rates in advertisement campaign	1. Branding Study Report 2. Degree of alignment of collateral materials with	1. Adoption of 20-Gallon Challenge marketing campaign

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
	2.Successful implementation of an outdoor water conservation plan 3. Successful implementation of a short-term conservation marketing campaign 4. Successful integration of the short-term conservation marketing campaign and the outdoor water conservation implementation plan 5. Increased acceptance of a strong water ethic for the San Diego Region 6. Action-oriented water conservation messaging targeting long-term behavioral change	under brand 2. # of customers implementing water conservation measures 3. # of sites showcasing best management practices 4. # of water conservation events (workshops, landscape contests, fair exhibits, speaking engagements, etc) conducted	2. Change in attitude that water conservation is a priority and their duty 3. Increased participation rate in conservation programs 4. Change in perception that a water-wise landscape is beautiful and a desirable 5. Market chain responds to demand for water-wise plants and irrigation practices	brand strategy 3. List of conservation events 4. Public surveys and questionnaires 5. Implementation Plan research findings 6. Public Opinion Poll 7. Conservation database reports	2. Adoption of Outdoor Water Conservation Implementation Plan and brand strategy 3. Increase of quantifiable water savings
4. Improve water quality	1. Reduce runoff due to over irrigation	1. # of implementation sites that have visible evidence of irrigation runoff	1. % Reduction in dry weather runoff 2. Reduction in excess water applied (AFY)	1. Visual observations 2. Calculation of Maximum Applied Water Allowance (MAWA) 3. Water use records	1. Reduction in observed dry weather run-off

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

The main goals of this project are to (1) produce approximately 100 AFY in water savings resulting from increased landscape water use efficiency through irrigation hardware improvements and (2) demonstrate the dry weather runoff reduction associated with such improvements. The following measures will be employed to measure project performance.

Irrigation Hardware Giveaway
The number of customers that take advantage of the giveaway program will be tracked, and the equipment provided by the project will be recorded. Site verifications of hardware installations and analyses of water use will be conducted before and after irrigation improvements are made at selected sites. Flow rate multiplied by run times on irrigation systems and/or customer pre- and post- giveaway water use will be used to determine actual savings. Selected sites will receive post-improvement water use analysis which will provide before and after estimates of actual water consumption.

Dry Weather Runoff Reduction
Monitoring will be performed at appropriate storm drain locations using flow meters and catch flow monitoring to determine dry weather runoff reductions associated with irrigation enhancements at each of the 50 sites in the demonstration portion of the project. Baseline data will be obtained prior to the installation of irrigation improvements, and monitoring will be conducted over the duration of the demonstration. Measurements of the cumulative quantity of runoff produced in the project area will be tracked at storm drain(s) within the project site during dry weather before and after improvements are implemented. Comparisons between the pre- and post-improvement installation monitoring results will illustrate the actual level of dry weather runoff reduction achieved.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Program	Monitoring Locations	Types of Analyses	Measuring Performance
Irrigation Hardware Giveaway	Record reviews of hardware giveaway sites	Selected water use records before and after hardware installation	Compare to goal of 75 AFY target for 700 giveaways
Dry Weather Runoff Reduction	At demonstration sites	Water use records before and after hardware installation	Compare to .44 AFY for residential WBICs per site conserved target and 4.48 AFY for commercial WBICs
	At selected storm drains near demonstration sites	Runoff flow and quality (Baseline and after conservation implemented)	Compare to a minimum of 50% runoff reduction target

Project Performance Measures Table – Irrigation Hardware Giveaway and Dry Weather Runoff Reduction

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Decrease landscape irrigation water usage	1. # of site surveys 2. # of WBICs given away 3. # of irrigation retrofits performed	1. % reduction in water use	1. Customer water use records	1. Reduce irrigation water usage by 20-50%
2. Reduce Over-Irrigation Runoff	1. Reduce runoff from landscape irrigation	1. # of site surveys 2. # of WBICs given away 3. # of Irrigation retrofits performed 4. # of California Friendly Palettes provided	1. % reduction in runoff quality to storm drain compared with pre-project conditions 2. Visible reduction in evidence of flow off property compared with pre-project conditions (at demonstration project sites) 3. Reduction in excess water applied (AFY)	1. Flow meters at storm drains 2. Visual observations of catch flow 3. Calculation of Maximum Applied Water Allowance (MAWA) (at demonstration project sites) 4. Water use records	1. 50%-reduction in flow to storm drain from site 2. Evidence of substantially reduced runoff from site 3. Minimize excess water applied (Excess = Actual – MAWA)
3. Determine Link between Water Conservation and Reduced Runoff	1. Show a correlation between water conservation program implementation and decreased runoff	1. # of sites participating in demonstration 2. # of flow meters deployed at storm drains 3. # of visual inspections performed per site	1. Quality of correlation between reduction in water use and reduction in flow to storm drain 2. Visual evidence that reductions in water use are accompanied by reduced runoff	1. Comparison of water use reduction to flow meter results 2. Comparison of water use reduction to visual observations of runoff leaving site	1. Positive correlation between reduction in water usage at a site and flow reductions at the storm drain associated with that site 2. No evidence of runoff from site

Work Item #3: Over-Irrigation/Bacteria Reduction

This project is expected to eliminate runoff from over-irrigation by employing water conservation measures and reduce pollutant loading of bacteria, metals and nutrients to the Carlsbad Watershed. The monitoring system that will be used to verify these benefits and measure project performance will consist of water use records, flow meters, visual inspections and lab analyses. These are described in detail below.

Water Conservation
To evaluate the actual water conservation achieved, customer water use records pre- and post- project will be evaluated. In order to account for variations in weather and other factors, a statistical analysis of historical water consumption records will be performed and data will be compared to a control group.

Runoff Reduction
Runoff reduction will be verified by visual inspection during irrigation events and through flow monitoring devices installed at storm drains associated with each site. The selection of monitoring sites will be guided by 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 and will provide a baseline for determining actual runoff reduction achieved by the project.

Water Quality Improvements
Direct flow measurements and water quality analyses will be performed to assess water quality benefits. Monitoring will be conducted before, during, and after implementation of water conservation efforts. Monitoring will be performed in the storm drain system and at control sites. Water quality monitoring will address a variety of constituents including bacteria (total and fecal coliform and enterococcus), nutrients, and conductivity. Bacteria testing will be performed at a state certified laboratory using EPA approved methods described in the Standards Methods for the Examination of Water and Wastewater, 18th edition. Estimates of pollutant loads and pollutant load reductions will then be calculated using flow monitoring and chemical test data together. The study will be performed in accordance with the San Diego Regional Water Quality Control Board Watershed Management Initiatives (WMI) Watershed Management Chapter, Goal 3.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Customer sites	Water use records	Compare to 20%-50% water savings target
At storm drain locations	Visual inspections for runoff Flow monitoring Water quality analyses for bacteria, metals and nutrients	Compare to 100% reduction of runoff target Determine runoff reductions and load reductions

Project Performance Measures Table – Over-Irrigation/Bacteria Reduction

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Improve water use efficiency	1. Decrease landscape irrigation water use	1. # of water audits performed 2. # of WBICs installed 3. # of irrigation retrofits performed	1. % decrease in water use from pre-project conditions	1. Customer water records	1. 20-50% reduction in water use
2. Reduce over-irrigation	1. Decrease runoff from landscape irrigation	1. # of water audits performed 2. # of WBICs installed 3. # of irrigation retrofits performed	1. % reduction in flow off of site 2. Amount of excess runoff from site (estimated AFY) 3. Reduction in excess water applied (AFY)	1. Flow monitors 2. Visual Inspections 3. Calculation of Maximum Applied Water Allowance (MAWA) 4. Water use records	1. Measurable reduction in runoff from site
3. Improve water quality	1. Reduce bacteria loading to storm drains 2. Reduce metals loading to storm drains 3. Reduce nutrient loading to storm drains	1. # of sites participating 2. # of analyses performed 3. # flow measurements 4. # of visual inspections for runoff during irrigation	1. % reduction in bacteria concentrations 2. % reduction in metals concentrations 3. % reduction in nutrient concentrations	1. Monitoring for bacteria, metals and nutrients conducted at storm drain sites in project area before and after implementation of water conservation efforts	1. Measurable reduction in concentrations of bacteria, metals and nutrient following project implementation
4. Establish effective outreach program	1. Increase in public education about the link between over-irrigation and water quality 2. Adoption and maintenance of new conserving behaviors	1. # of consultations performed 2. # of maintenance staff trained in water conservation and on maintenance of ET Controllers	1. Increase in educated stakeholders (#) 2. Increase in trained staff (#)	1. Meeting records 2. Training logs 3. Quiz on concepts learned	1. Eight site representatives are informed on conservation and over-irrigation 2. Eight maintenance staff groups are knowledgeable on water conservation and proficient with ET controllers
5. Protect Habitat	1. Contribute to	1. Calculations of load	1. Reductions in mass	1. TMDL	1. Measurable

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
and Beneficial Uses	meeting TMDL requirements for San Elijo Lagoon	reductions for bacteria, metals and nutrients	loading to San Elijo Lagoon (kg/year)		reduction in loading of bacteria, metals and nutrients (kg/year)

WATER RECYCLING PROGRAM

Work Item #4: Santee Water Reclamation Facility Expansion Project

This project will expand the treatment capacity at the Santee Water Reclamation Facility (WRF) from 2 to 4 mgd in compliance with Title 22 and Title 17 of the California Water Code. Important milestones will include obtaining a revised National Pollutant Discharge Elimination System (NPDES) permit along with preparation of the appropriate environmental documents to meet National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA) requirements. The approval of the revised NPDES permit and environmental documents for Phase 2 construction work is planned for June 2008.

Effectiveness monitoring at the Santee WRF will be conducted upon construction of the facilities necessary to achieve the treatment capacity expansion. This will demonstrate that recycled water produced meets Title 22 requirements and that the expanded treatment capacity can be attained. Post construction operational records of influent and effluent treatment volumes will also verify the actual recycled water production achieved by the expanded facility. As this project is linked closely with Work Item #14, another measure of performance to be tracked will be the quantity of recycled water that is actually delivered to the El Monte Groundwater Basin for recharge.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Santee WRF	Flow monitoring	Compare to design 4 mgd capacity target
	Water quality	Compare to Title 22 requirements for recycled water quality
	Record of recycled water deliveries	Compare to 5,000 AFY recycled water target

Project Performance Measures Table – Santee Water Reclamation Facility Expansion Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependency on imported water	1. Increase recycled water treatment capacity 2. Decrease imported water usage	1. NPDES permit for expansion from 2 mgd to 4 mgd 2. Completion of CEQA documentation 3. As-built construction documents	1. Increased tertiary treatment capacity 2. Decreased imported water demand	1. Performance testing 2. Operational records of water treated 3. Imported water delivery logs	1. Increase in treatment capacity to 4 mgd in Phase 2 (this project) and to 10 mgd in Phase 3 2. Decrease imported water demand by 5,000 AFY
2. Increase water supply reliability	1. Use recycled water at commercial, homeowners associations (HOAs) large landscape customers, and Santee Lakes	1. # of customer surveys completed 2. # of agreements to use recycled water	1. % increase in recycled water deliveries to Padre Dam customers	1. Customer records of recycled and potable water use 2. Recycled water delivery records	1. 100% increase in recycled water use to Padre Dam customers
3. Provide water for groundwater recharge to Helix Water District	1. Recharge El Monte Basin with recycled water	1. Connection made to groundwater recharge distribution system (constructed in Work Item #14)	1. Quantity of recycled water deliveries to groundwater recharge system (AFY)	1. Delivery records	1. 5,000 AFY recycled water delivered to Helix Water District
4. Minimize wastewater flows to ocean	1. Flows to the Point Loma Wastewater Treatment Plant (WWTP) are not increased 2. Maximum amount of reuse occurs	1. # of customers requesting recycled water 2. Connection made to groundwater recharge distribution system (constructed in Work Item #14)	1. Reduction in flows to the Point Loma WWTP (AFY) 2. % of recycled water beneficially reused	1. Santee WRF effluent flow monitoring 2. Point Loma WWTP influent flow monitoring 3. Records of recycled water deliveries	1. 5,000 AFY reduction in flows to Point Loma WWTP 2. 100% of recycled water beneficially reused

Work Item #5: Recycled Water Retrofit Assistance Program

The Recycled Water Retrofit Assistance Program will facilitate the delivery of 2,000 AFY recycled water by providing funds to customers to assist them in retrofitting their sites to receive recycled water. This estimate is based on an assumption that 40 sites will be retrofitted at an average of 50 AFY of recycled water use at each site; however the actual number of sites and range of usages will vary.

During the retrofit construction phase, project monitoring will consist of examining daily construction logs and photo documentation, conducting periodic site visits to ascertain construction progress, reviewing and approving submitted price quotes for materials and services to determine reasonableness of costs, and ensuring that the materials to be purchased are of high quality.

Once retrofits are in place, the monitoring system that will be used to evaluate project performance will include recording the retrofits that have been performed and examining customer water use records. Customer water use records for each site will be analyzed to determine historical baseline of water use. Water records will be re-evaluated after retrofits have been installed and deliveries have begun to verify that the target quantity of recycled water is being delivered. Customers will also be requested to provide information about the reduction in fertilizer usage experienced as a result of the conversion to recycled water.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Customer retrofit sites	Recycled water use records	Compare total recycled water use of retrofitted customers to 2,000 AFY target
	Fertilizer usage	Determine actual reductions in fertilizer use

Project Performance Measures Table – Recycled Water Retrofit Assistance Program

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependency on imported water	1. Increase in the number of customers retrofitting their property to receive recycled water	1. # of customers contacted 2. # of sites assessed 3. # of retrofit grant checks issued	1. # of customer sites retrofitted 2. Volume of additional recycled water deliveries (AFY)	1. Installation records. 2. Reimbursement receipts. 3. Photo documentation 4. Customer records	1. 40 sites retrofitted 2. 2,000 AFY additional recycled water delivered
2. Minimize wastewater flows to ocean	1. Increase usage of recycled water from the North City Water Reclamation Plant (WRP) 2. Decrease the volume of recycled water from the North City Reclamation Plant discharged into the ocean	1. # of additional customers using recycled water	1. Increase in recycled water delivered from the North City WRP to customers 2. Decrease in recycled water from North City WRP discharged to ocean	1. Customer records 2. Effluent flow measurements	1. Additional 2,000 AFY recycled water delivered from the North City WRP to customers 2. 2,000 AFY decrease in recycled water discharged to ocean
3. Reduce fertilize usage	1. Decrease fertilizer needs	1. # of parks, golf courses, schools identified	1. Reduction in fertilizer applied to landscaping (lb/year)	1. Maintenance Records 2. Asano, 1981	1. Measurable reduction in fertilizer applied to landscaping
4. Improve water supply reliability	1. Provide reliable source of recycled water during times of drought and mandatory cutbacks	1. # of additional recycled water customers	1. % of time that customers experience required cutbacks on water deliveries	1. Customer records	1. Required water supply cutbacks in effect 0% of the time
5. Maintain recreational opportunities	1. Maintain appearance and utility outdoor landscaping at all times	1. # of parks, golf courses, schools, identified	1. % of time that site meets intended aesthetic/functional standards 2. % of time that site receives 100% of necessary irrigation	1. Visual inspection 2. Photo documentation 3. Maximum Applied Water Allowance (MAWA) calculations	1. Site meets standards 100% of the time 2. Site receives 100% of necessary irrigation water 100% of the time

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

Project monitoring for this project will include monitoring for the distribution system expansion and the parklands retrofit. These are described below.

Distribution System
Monitoring during project construction will consist of tracking construction progress. The customers connecting to the system and their demands will be documented. Once the distribution system is complete, actual flows through the pipeline will be monitored using flow monitoring devices. Records of the amount of recycled water delivered through the pipeline will be used to verify the actual project water supply benefits achieved. In terms of recycled water quality, monitoring will be conducted at different points of the distribution system for total dissolved solids (TDS) content. The City of San Diego has committed to its customers a maximum TDS concentration of 1000 mg/L, which is 200 mg/L below Title 22 regulations.

Parklands Retrofit
Once retrofits are complete, they will be inspected and tested by City of San Diego staff to ensure compliance with Title 22 standards. Performance monitoring will consist of examination of customer water use records to determine the actual amounts of recycled water delivered. Customer surveys will be conducted to determine the reliability of recycled water as well as any potential reduction in fertilizer needs experienced.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Program	Monitoring Locations	Types of Analyses	Measuring Performance
Distribution System	Distribution pipeline North City WRP	Flow Monitoring	Compare to 1,500 AFY recycled water supply target
Parklands Retrofit	At retrofit sites	Water use records	Compare to 209 AFY recycled water supply target
IPR / RA project	At North City Water Reclamation Plant	Flow monitoring	Compare to 16 MGD production

Project Performance Measures Table – City of San Diego Recycled Water Distribution System Expansion and Parklands Retrofit

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Increase recycled water usage	1. Linear feet of recycled water distribution pipeline constructed 2. # of retrofits completed 3. # of customer agreements	1. # of recycled water connections are completed at HOAs, parks and highway medians 2. % Increase in recycled water delivered	1. Cross connection tests and inspections 2. Customer metered use	1. 15-20 water connections completed at HOAs, parks and highway medians 2. Use approximately 1,709 AFY of recycled water
2. Increase the amount of beneficially used recycled water from North City WRP	1. Beneficially reuse tertiary treated water	1. Recycled water usage	1. % recycled water used from North City WRP	1. Each customer's recycled water meter will record the amount of recycled water used.	1. Allows for the beneficial reuse of 40% of treated effluent (assists in meeting the overall goal of reusing 50% of the effluent at the North City WRP)
3. Reduction in wastewater sent to Point Loma WWTP	1. Delay expansion of Point Loma WWTP	1. Volume of wastewater treated at Point Loma WWTP	1. Reduction in volume of wastewater leaving North City WRP (AFY)	1. Measurement of volume of wastewater leaving North City WRP	1. Reduce amount of wastewater sent to Point Loma by 890 AFY
4. Reduced TDS in demonstration advanced water treatment plant effluent	1. 100 mg/L TDS concentrations from demonstration advanced water treatment plant effluent	1. Concentration of TDS in advanced treated recycled water stream	1. Reduction in TDS in advanced treated recycled water stream	1. Water quality monitoring	1. TDS of 100 mg/L in advanced treated recycled water stream

LOCAL SUPPLY PROTECTION AND DEVELOPMENT PROGRAM

Work Item #7: San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration

The San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration project will acquire land to provide a buffer against contamination. The performance of this project will be based on the successful acquisition of the land, which will be documented in the closing documents.

Water Quality Monitoring

The ultimate success of this and other land acquisition and restoration projects in protecting water quality will be determined by the actual water quality that is attained in the San Vicente Reservoir. Since this project is limited to land acquisition, there will be no additional water quality monitoring specific to the project. However, the San Diego Water Department (SDWD) has in place an extensive water quality monitoring program for San Vicente Reservoir and its watershed. *In situ* water quality monitoring at the reservoir and in the watershed, sample collection, laboratory analyses, and data management are conducted by the San Diego Water Department's Water Quality Laboratory following rigorous Standard Operating Procedures. The Water Quality Laboratory is certified by California's Environmental Laboratory Accreditation Program [ELAP #1058].

This excerpt from 2005 Watershed Sanitary Survey Update describes the location of sampling points at the reservoirs:

Each of the four reservoirs of the San Diego River System has sampling points near the outlet structure (Station "A"), at surface level, and at various outlet gauges. There are also several watershed sampling points in the El Capitan and San Vicente Watersheds, and sampling points at the influent and effluent of the Alvarado WTP. The reservoirs and treatment plant influent/effluent were monitored for general physical characteristics, organic and inorganic constituents. El Capitan, Murray, and San Vicente Reservoirs and Alvarado WTP influent were sampled for radiation. Sutherland Reservoir does not directly feed the Alvarado WTP, and so is not monitored for radiation.

Of the thirty sample locations in the watershed, eleven are presented, based on the amount of data available. Those sample locations with fewer than five data points were deemed to be unrepresentative of a five year period. The Cedar Fire of October 2003, and the extremely wet winter the following year, prompted increased monitoring of the watershed, particularly in the vicinity of El Capitan and San Vicente Reservoirs, the main local water sources for the Alvarado Water Treatment Plant (WTP). Samples were analyzed for a complete panel of trace metals, nutrients, and organic constituents. Microbiological parameters were not monitored.

Data from this water quality monitoring program will be evaluated over time to confirm whether water quality is being improved, maintained or degraded, and will be used to demonstrate the benefit of the land acquisitions.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
City of San Diego	Deed to acquired land	Compare to 1-2 parcels land acquisition target
San Vicente Reservoir (Existing SDWD sampling program)	Lab water quality analyses for complete panel of trace metals, nutrients, and organic constituents	Compare to target of no degradation in source water quality

Project Performance Measures Table – San Vicente Reservoir Source Water Protection through Watershed Property Acquisition

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Acquire land to form continuous buffer zone around San Vicente Reservoir	1. Purchase parcels that fill in buffer zone	1. # of landowners negotiated with 2. # of parcels targeted that are bordering a previously purchased parcel	1. Number of parcels of land acquired by the City of San Diego	1. Closing documents 2. Map Assessment 3. 2005 Watershed Sanitary Survey (WSS) Update	1. 1-2 parcels of land acquired
2. Protect source water quality	1. Prevent increase in runoff to reservoir 2. Prevent degradation of water quality in the reservoir 3. Avoid additional drinking water treatment	1. # of landowners negotiated with 2. # of acres of buffer properties acquired 3. # of water quality samples at San Vicente Reservoir collected	1. % increase in peak flow or total runoff to reservoirs 2. % net increase in dry weather runoff 3. Increase in contaminant concentrations	1. Visual site observations 2. Photo documentation 3. Reservoir sampling 4. Drinking water standards 5. 2005 WSS Update	1. 0% net increase in runoff to reservoirs after storm events 2. 0% net increase in dry weather runoff 3. No measurable increase in concentrations of monitored water quality constituents at reservoir
3. Maintain pervious surface	1. Surface in acquired lands will remain in natural state 2. Recharge of groundwater is maintained	1. Prohibition on development of site 2. # of site visits	1. % of acquired land that is further developed 2. % decrease in percolation capacity	1. Survey of pervious surface before and after project 2. Visual observations of pooling, runoff or erosion	1. 0% of acquired lands undergo further development 2. 0% decrease in percolation capacity

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
4. Maintain open space and recreational opportunities	1. No visual impacts added by site	1. Prohibition on development of site	1. % of acquired land that is further developed 2. % increase in visual obstruction	1. Visual observation 2. Photo documentation	1. 0% of acquired lands undergo further development 2. 0% increase in impeded sight lines across property
5. Preserve habitat	1. Acquired land remains suitable for endangered and special status species	1. # of key species catalogued 2. # of observations of key species made 3. # of site visits by qualified biologist	1. Acres of habitat lost 2. Number of lost endangered or special status species	1. Multi Species Conservation Plan and City (MSCP) of San Diego Sub- Area Plan 2. Map assessment 3. Biological survey	1. Zero acres of habitat lost 2. Zero endangered or special status species species lost

Work Item #8: El Capitan Reservoir Watershed Acquisition and Restoration Program

The El Capitan Reservoir Watershed Acquisition Program will acquire and restore land to provide a buffer against contamination. The performance of this project will be based on the successful acquisition of the land, which will be documented in the closing documents.

Water Quality Monitoring

The ultimate success of this and other land acquisitions in protecting water quality will be determined by the actual water quality that is attained in the El Capitan Reservoir. Since this project is limited to land acquisition, there will be no additional water quality monitoring specific to the project. However, the SDWD has in place an extensive water quality monitoring program for El Capitan Reservoir and its watershed. *In situ* water quality monitoring at the reservoir and in the watershed, sample collection, laboratory analyses, and data management are conducted by the SDWD's Water Quality Laboratory following rigorous Standard Operating Procedures. The Water Quality Laboratory is certified by California's Environmental Laboratory Accreditation Program [ELAP #1058].

This excerpt from 2005 Watershed Sanitary Survey Update describes the location of sampling points at the reservoirs:

Each of the four reservoirs of the San Diego River System has sampling points near the outlet structure (Station "A"), at surface level, and at various outlet gauges. There are also several watershed sampling points in the El Capitan and San Vicente Watersheds, and sampling points at the influent and effluent of the Alvarado WTP. The reservoirs and treatment plant influent/effluent were monitored for general physical characteristics, organic and inorganic constituents. El Capitan, Murray, and San Vicente Reservoirs and Alvarado WTP influent were sampled for radiation. Sutherland Reservoir does not directly feed the Alvarado WTP, and so is not monitored for radiation.

Of the thirty sample locations in the watershed, eleven were selected as representative monitoring locations based on the amount of data available. Those having fewer than five data points were deemed to be unrepresentative of a five year period. The Cedar Fire of October 2003, and the extremely wet winter the following year, prompted increased monitoring of the watershed, particularly El Capitan and San Vicente, the main local water sources for the Alvarado WTP. Samples were analyzed for a complete panel of trace metals, nutrients, and organic constituents. Microbiological parameters were not monitored.

Data from this water quality monitoring program will be evaluated over time to confirm whether water quality is being improved, maintained or degraded, which will determine the performance of the land acquisitions, including this project, as a whole.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
City of San Diego	Deed to acquired land	Compare to 120 acres land acquisition target
El Capitan Reservoir (Existing SDWD sampling program)	Lab water quality analyses for complete panel of trace metals, nutrients, and organic constituents	Compare to target of no degradation in source water quality
Acquired lands	Number of trees planted	Compare to 800 trees planted

Project Performance Measures Table - El Capitan Reservoir Watershed Acquisition Program

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Acquire land to form continuous buffer zone around El Capitan Reservoir	1. Purchase parcels that fill in buffer zone	1. # of landowners negotiated with 2. # of parcels targeted that are bordering a previously purchased parcel	1. Increased ownership of land by the San Diego River Park Foundation	1. Closing documents 2. Map Assessment 3. 2005 Watershed Sanitary Survey (WSS) Update	1. Acquire 120 acres of land
2. Protect source water quality	1. Prevent increase in runoff to reservoir 2. Prevent degradation of water quality in the reservoir 3. Avoid additional drinking water treatment	1. # of landowners negotiated with 2. # of acres of buffer properties acquired 3. # of water quality samples at El Capitan Reservoir taken	1. % increase in runoff to El Capitan Reservoir after storm events 2. % net increase in dry weather runoff to reservoir 3. Percent increase in contaminant concentrations	1. Visual site observations 2. Photo documentation 3. Reservoir sampling 4. Drinking water standards 5. 2005 WSS Update	1. 0% net increase in runoff to El Capitan Reservoir after storm events 2. 0% net increase in dry weather runoff 3. 0% increase in concentrations of monitored water quality constituents at reservoir
3. Maintain pervious surface	1. Retain natural state of acquired lands 2. Maintain groundwater recharge	1. Prohibition on development of site 2. # of site visits	1. % of acquired land that is further developed 2. % decrease in percolation capacity	1. Survey of pervious surface before and after project 2. Visual observations of pooling, runoff or erosion	1. 0% of acquired lands undergo further development 2. 0% decrease in percolation capacity

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
4. Maintain open space and recreational opportunities	1. No visual impacts added by site	1. Prohibition on development of site	1. % of acquired land that is further developed 2. % increase in visual obstruction	1. Visual observation 2. Photo documentation	1. 0% of acquired lands undergo further development 2. 0% increase in impeded sight lines across property
5. Preserve habitat	1. Acquired land remains suitable for endangered and special status species	1. # of key species catalogued 2. # of observations of key species made 3. # of site visits by qualified biologist	1. Acres of habitat lost 2. Number of endangered or special status species lost	1. MSCP and City of San Diego Sub- Area Plan 2. Map assessment 3. Biological survey	1. Zero acres of habitat lost 2. Zero endangered or special status species lost
6. Restore acquired parcels	1. Land clear of trash and debris 2. Increased vegetative cover	1. Trash and debris removed 2. Trees planted	1. Pounds of trash and debris removed 2. Number of trees planted	1. Record of pounds of trash and debris removed 2. Record of number of trees planted	1. Measurable weight of trash and debris removed 2. 800 trees planted

Work Item #9: Northern San Diego County Invasive Non-Native Species Control Program

Project Monitoring and Performance

The monitoring for project performance evaluation will involve revisiting sites one year after the initial removal of invasive species. Upon revisiting a site, an assessment will be made to determine how successful the removal was in preventing regrowth. Monitoring will be used to measure performance by documenting the successful eradication of exotic species.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Sites of Arundo Removal	Visual and photo documentation	Compare to goal of 373.5 acres of invasives removal

Project Performance Measures Table – Northern San Diego County Invasive Non-Native Species Control Program

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1.Remove Arundo and invasives from 5 miles of rivers	1. Control of 373.5 acres of invasives: Arundo: 185 acres Pampas: 8.5 acres Lepidium: 90 acres Tamarisk: 90 acres	1. # of landowners granting permission 3. Acreage of landowners giving permission 3. River miles treated	1. # acres of invasives removed 2. % of project area treated for Arundo 3. % of native planting survival	1. Photo documentation 2. Mission Resources Conservation District (MRCD) Treatment and Restoration Plan 3. Invasive Plants of CA Wildlands (2000)	1. 373.5 acres of invasives removed 2. >95% Arundo control by year 2 3. >80% native planting survival
2. Re-vegetate 70 acres of riparian habitat	1. Reestablish native vegetation on 70 acres where invasives have been controlled	1. Number of landowners allowing re-vegetation 2. % of landowners allowing revegetation 3. Acreage of landowners allowing re-vegetation 4. River miles re-vegetated	1. Percent survival of native plantings (survival & cover – document in monitoring plan) 2. Acreage of new habitat for endangered species	1. MRCD Treatment and Restoration Plan 2. Invasive Plants of CA Wildlands (2000)	1. >80% survival of native plantings 2. 70 acres of new habitat for endangered species
3. Pollution load reduction	1. Reduce water and sediment pollution/toxicity	1. # of landowners granting permission 2. Acreage of landowners giving permission 3. River miles treated and re-vegetated	1. Acres of Arundo and other invasive biomass removed (organic and debris inputs) 2. Number of illegal encampments [1] removed 3. Annual increase in sediment transported (cubic yards) 4. Acres converted to native habitat for biofiltration and water quality benefits	1. Regional Water Quality Control Board (RWQCB) Region 9 Basin Plan (1994)	1. 185 acres Arundo biomass reduced 2. 7 camps removed 3. Average increase of 150,000 cubic yards sediment annually 4. 373.5 acres converted to native habitat 5. Reduction 12,000 kilograms/year ash load

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
			5. Reduced inputs of ash and sediment from fire (kilograms per year)		
4. Flow capacity restoration	1. Increase flow capacity of rivers by eliminating cover of Arundo	1. # of landowners granting permission 2. Acreage of landowners giving permission 3. River miles treated and re-vegetated	1. % increase in flow capacity	1. River flow monitoring	1. 5-10% increase in flow capacity
5. Fire risk reduction	1. Eliminate fire fuel source 2. Reduce fire ignition sources from encampments	1. # of landowners granting permission 2. Acreage of landowners giving permission 3. River miles treated and re-vegetated	1. Pounds of Arundo removed (pounds of Arundo removed)	1. Fire threat from Arundo donax (Scott 1994)	1. Removal of 12 million (M) pounds of Arundo fuel weight removed

Work Item #10: Santa Margarita Conjunctive Use Project

The Santa Margarita Conjunctive Use Project (CUP) will create 6,500 AFY of new local supply from diversions from the Santa Margarita River and optimal conjunctive use management of the Santa Margarita groundwater basin. The project also will set aside 1,380 acres of land for recreational and habitat benefits.

Extensive monitoring will be performed to demonstrate the performance of the project. The United States Bureau of Reclamation (USBR) has recently initiated water quality and biological monitoring of the Santa Margarita River to establish baseline conditions, the effect of urbanization upstream of the project, and the impact of augmenting streamflow. A solid foundation of baseline conditions prior to project implementation will provide scientific and engineering basis for locating future long-term monitoring stations. Relying on the entire historical water quality database available for all monitoring stations on the Santa Margarita River, both observed trends and conceptual models well provide the framework for anticipating future changes that might occur due to implementation of the CUP. These water quality datasets will be used with biological monitoring of the riparian stream system in order create a baseline dataset to be used for the CUP's adaptive management program.

In 2006 and 2007, Camp Pendleton installed automatic water level dataloggers in all monitoring wells in the Santa Margarita River groundwater basin. The location of these dataloggers was based on hydrologic and hydrogeologic field work (drilling and pump testing) conducted in 2005 and 2006. In addition to monitoring groundwater levels, Camp Pendleton has also installed automatic conductivity meters do identify diurnal and seasonal changes in water quality. During fiscal year 2008, Camp Pendleton will be investigating real-time monitoring of groundwater levels and conductivity.

One aspect of both USBR's and Camp Pendleton's current monitoring efforts is to provide a basis for developing an adaptive management program that will be used by the CUP to protect the natural resources on Camp Pendleton. The adaptive management program consists of an interactive network of real-time monitoring and deterministic modeling to protect all natural resources on Camp Pendleton. For example, surface water diversions and groundwater pumping will be managed on both a monthly and annual schedule using the tools described above. Following each winter's rainfall events, annual groundwater pumping for the upcoming year will be calculated using surface water flow, groundwater level, water quality, biological, and modeling data so that all resources are protected. Each year's groundwater pumping plan will be updated monthly based on actual real-time data collected in the field.

<u>Groundwater recharge</u>
Groundwater recharge will be measured using a series of surface water flow recorders and groundwater levels in the basin. Surface water diverted from the Santa Margarita River will be measured at both the point of diversion as well as the flow between each pond. The total quantity of water that flows from the river, and to each pond, will be monitored and reported both monthly and annually. Groundwater level recorders beneath the recharge ponds will measure "mounding" and provide operators with guidance on efficiently managing the resource. As previously described, the winter's surface water flow will be used to adaptively manage how and when recharge occurs in the groundwater basin.

<u>TDS levels</u>
TDS will be measured using automatic conductivity meters the measure water quality in both surface and groundwater. One aspect of managing the CUP to protect the basin will be to avoid diverting surface flows that are of poor water quality. These flows tend to occur during the first rainfall events of the season or following prolonged dry periods. Characteristic of basins where upstream urbanization and agricultural development has taken place, high concentrations of certain water quality constituents occur during the beginning of storm flows. Based on installation of monitoring devices and the adaptive management plan, the CUP will allow poor quality streamflow events to remain highly diluted and flow to the ocean unimpeded by the project.

Increase in yield

The increase in groundwater yield generated by the project will be assessed using both groundwater and surface water modeling techniques. Surface water flow and groundwater level data collected by the CUP will be used to identify the total annual yield of the project. The yield of the project for each given year will be compared to baseline conditions that establish groundwater yield as though no facilities had been constructed, or the "no project" condition.

USBR has developed baseline conditions for each hydrologic condition based on historical datasets. Incorporated in the groundwater model, the baseline conditions simulate the conditions as if no project facilities were to be constructed. While this model run has been used to compare future yield to historical yield throughout the development of the feasibility and environmental analysis, the baseline alternative may also be used to show differences in yield under "with project" conditions.

The development of a future program that compares actual groundwater yield to "no project" groundwater yield will be incorporated in the annual groundwater management of the CUP. While the tools exist to execute this analysis, the method would be included in the adaptive management plan to assure that it was executed.

Habitat Preservation

USBR and Camp Pendleton have been developing a monitoring program since 2005. The monitoring includes a combination of water levels, water quality, and biological (including aerial surveys) datasets to assess changes that may occur in the basin. USBR and Camp Pendleton began the most important step in this process with a two-year monitoring–modeling effort to measure baseline conditions in the Santa Margarita River. This program began in November 2007. The data, conceptual models, and recommendations from this study will be used to create the framework for monitoring habitat in the future.

Camp Pendleton also provides two different frameworks for monitoring the preservation of habitat in the Santa Margarita River basin. The first is a cooperative 5-year monitoring program developed between Camp Pendleton and the U.S. Fish and Wildlife Service to monitor changes in habitat following the cessation of sewer effluent releases from Camp Pendleton's wastewater reclamation facilities. The program concluded in 2007, but provided significant documentation of how groundwater levels and biological monitoring work together to assess potential impacts, whether quantity- or quality-related, to habitat on Camp Pendleton. The monitoring program was administered on Camp Pendleton through U.S. Navy, southwest naval facilities division. The second is Camp Pendleton's Integrated Natural Resources Management Plan that addresses base-wide monitoring.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Program	Monitoring Locations	Types of Analyses	Measuring Performance
Water Supply	Groundwater Production Wells	Flow measurements	Compare system yield to 6,800 AFY additional water created on average
Habitat	Habitat preservation area	Biological surveys and habitat mapping	Compare to 1,383 acres of habitat restoration target

Project Performance Measures Table – Santa Margarita Conjunctive Use Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Maximize diversions from the Santa Margarita River 2. Maximize yield from conjunctive use	1. Diversion weir installed 2. # of times diversion weir is deployed 3. # acres of spreading basins created	1. Increase volume of water diverted (AFY) 2. Maximize infiltration to maintain or increase groundwater levels 3. Volume of groundwater extracted from the basin (AFY)	1. Flow gauges at the diversion site 2. Measurements of pond levels 3. Groundwater monitoring 4. Groundwater pumping records	1. Pass only 100 AFY of flow (maximum) 2. Maintain consistently high groundwater levels 3. Manage the basin to a yield of 6,800 AFY on average
2. Reduce salinity impacts to groundwater in the lower Santa Margarita Valley groundwater basin.	1. Reduce TDS levels	1. Membrane systems installed 2. Volume of groundwater treated	1. % reduction in groundwater TDS concentrations	1. Groundwater sampling. 2. Historical records.	1. 5-10% reduction in groundwater TDS concentrations
3. Develop local, reliable source of supply	1. Increase groundwater stored in basin	1. Increase in # of spreading basins	1. Increase water stored in groundwater basin (AFY)	1. Groundwater monitoring	1. 6,800 AFY of new supply
4. Restore and preserve ecosystem	1. Restore 1,380 acres	1. # acres of habitat restored 2. Mapping of existing habitat 3. Site visit by qualified biologist 4. Natural resources management plan	1. # acres restored 2. # acres preserved 3. # of species observed at site	1. Field survey 2. Visual observations	1. 1,383 acres restored 2. 1,383 acres preserved 3. Increase of species observed at site
5. Open space and recreation	1. Maintain land in undeveloped state 2. Maintain access	1. Open space preserved and recreational opportunities maintained	1. # of visits to site	1. Surveys 2. Counts	1. Increase in # visits to site

Work Item #11: Carlsbad Desalination Project Local Conveyance

The Carlsbad Desalination Project Local Conveyance project will generate 56,000 AFY of new water supply once the desalination plant comes online. The monitoring system to verify project performance will include records at the deaslintaion facility's flow monitoring station. Customer delivery records can also be compiled across the six agencies that will receive desalinated water from the plant. Before operations begin, tests will be performed to ensure that the plant can deliver the design capacity. TDS concentrations will also be monitored closely through sampling. The TDS of the delivered water is guaranteed by Poseiden to be 40% lower than that of the imported water that is being replaced.

Monitoring will also be conducted to verify the ecosystem restoration and recreational and open space benefits of the project. A major benefit of the desalination plant is the maintenance of the inlet to the ocean, which will be necessary for the seawater source intake, but will also ensure the preservation of the Agua Hedionda Lagoon and associated habitat. 37 acres of wetlands will be restored by the project and this will be confirmed through an ongoing monitoring and maintenance program. Recreation and public access benefits will be verified by the records of land dedicated to public use, as well as water quality monitoring which will ensure permit conditions are met and the beneficial uses of the lagoon and near shore waters are protected.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Project Component	Monitoring Locations	Types of Analyses	Measuring Performance
Water Supply	Desalination plant	Product flow monitoring	Compare production to 56,000 AFY estimated water supply benefit
	Distribution pipeline system	Records of deliveries to contract member agencies	Compare deliveries to 56,000 AFY of estimated water supply benefit
Water Quality	Desalination plant	Monitoring of TDS and other parameters	Compare to permit and water purchase agreement requirements
Ecosystem Restoration	Aqua Hedionda Lagoon	Photo documentation and mapping Verification of inlet opening	Compare to 388 acres of estimated restoration benefit and inlet maintenance
	Restoration site	Third party monitoring	Compare to 37 acres of marine habitat restoration benefit
Recreation and Public Access	Aqua Hedionda Lagoon fishing beach and Carlsbad Blvd. ocean front bluff	Dedication records	Compare to 15 acres of improved public access through purchase of private land and conversion to public use
Carbon Emissions	Desalination plant, San Diego Gas and Electric, MWD	Energy use, energy sources, carbon offsets	Annual comparison of net carbon footprint of project operations to carbon offsets and other carbon reduction measures

Project Performance Measures Table – Carlsbad Desalination Project Local Conveyance

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Create a new local supply 2. Improve water supply security and reliability	1. # miles of distribution pipe constructed	1. Quantity of desalinated water delivered to contracted member agencies (AFY) 2. Reduction in imported water demand	1. Product flow stations	1. 54,375 AFY desalinated water deliveries 2. 56,000 AFY reduction in imported water demand
2. Provide high quality drinking water	1. Provide improved quality drinking water compared to imported water	1. Connection to desalination plant	1. Concentration of total dissolved solids in delivered water	1. Water quality testing of total dissolved solids before delivery	1. 250-400 mg/L
3. Restore and preserve ecosystem	1. Restore and enhance coastal wetlands 2. Restore and enhance habitat at Aqua Hedionda and San Dieguito Lagoons 3. Expand Hubbs SeaWorld Fishery 4. Minimize impacts to species along distribution pipeline	1. Poseiden assumes stewardship of Aqua Hedionda Lagoon 2. Cubic feet of existing fill removed 3. # acres of non-native species removed 4. # acres of revegetation	1. # acres of wetlands maintained at Aqua Hedionda Lagoon 2. # acres of maine habitat restored 3. # acres for hatchery research expansion 4. # of species impacted by pipeline	1. Site biological survey before and after restoration 2. Photo documentation 3. Pre-construction biological survey	1. 388 acres of marine wetlands at Aqua Hedionda Lagoon maintained 2. 37 acres of marine habitat restored 3. 2 acres dedicated to Hubbs SeaWorld for expansion of hatchery program 4. Zero species with unmitigated impacts from pipeline construction
4. Maintain Recreation and Public Access	1. Allow improved public access to coastline through conversion of private property	1. Private property owners' commitment to dedicate	1. # acres of land adjacent to Aqua Honda Lagoon and ocean bluffs purchased and dedicated	1. Land transfer agreement	1. 300 acres of water contact recreation beneficial use area at Aqua Hedionda Lagoon 2. 15 acres of land adjacent to Aqua Hedionda Lagoon and ocean bluffs

Work Item #12: San Diego Region Four Reservoir Intertie Project Conceptual Design

This project is a conceptual design. Monitoring of project performance will consist of examining the alternatives that are identified by the project to ensure that they represent the most feasible options and that all major alternatives are included in the evaluation. The ideal target would be to maximize the reservoirs' storage capacity 100% of the time through efficient use of the proposed conveyance system.. However, there may be tradeoffs when considering other goals such as power generation, recreation and fire suppression. The Conceptual Design will be performed to generate scenarios that can approach the goal of 100% utilization, yet maximize other goals simultaneously. The project will be monitored to ensure that it produces distinct alternatives. The evaluation criteria will be revisited to verify that it achieves 100,000 AF of additional storage.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Reservoir and pipeline locations	Alternatives will be analyzed as part of the conceptual design. Variables include: total additional storage obtained, reservoir levels, pumping requirements, power generation, timing of imported water supply, timing of demand, pipeline sizing and length, and environmental compliance	Compare yield of alternatives to 100,000 AF additional storage target

Project Performance Measures Table – San Diego Region Four Reservoir Intertie Project Conceptual Design

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Assess best alternatives to increase local supply reliability	1. Optimize the use of four reservoirs 2. Maximize additional storage	1. Identification of alternatives 2. Evaluation of project components 3. Definition of pipeline alternatives	1. # of alternatives considered 2. Determination of conceptual level costs and preliminary sizing 3. Preferred alternative conceptual design	1. Weighted stakeholder evaluation criteria 2. Imported water rates and reliability comparison 3. Level of design	1. 3-5 alternatives considered 2. Cost/benefit analyses 3. Final report with conceptual design for preferred alternative
2. Increase water storage capacity without creating new reservoirs or new storage capacity	1. Utilize “unused” storage in existing reservoirs 2. Provide additional capacity for fire fighting 3. Create additional recreation opportunities through expansion in reservoir area 4. Utilize pumped storage to generate power	1. Hydraulic analysis 2. Supply/demand scenario analysis	1. % of available reservoir storage capacity utilized 2. Increase in additional storage capacity (AF) 3. Operational flexibility	1. Reservoir re-operation guidelines 2. Fire suppression needs 3. Fishing surveys 4. Energy demand profiles	1. 100% of available storage capacity 2. 100,000 AF of additional storage capacity 3. Flexible system and set of operational rules that allow for optimal use of reservoirs under a variety of scenarios

Work Item #13: South San Diego County Water Supply Strategy

This project will conduct groundwater sampling to determine characteristics of the San Diego Formation (SDF). A groundwater model will also be developed and calibrated to the monitoring data. The performance of the groundwater model will be determined by examining the quality of the model outputs and the model's ability to provide improved insight on the potential yield of the SDF. Additionally, scenarios for optimal conjunctive use opportunities will be provided. An ongoing groundwater monitoring plan will be developed as a component of the final report for the USGS San Diego Formation Implementation Study.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
At various locations through the SDF	Groundwater quality multi-depth sampling	A groundwater model will be developed using the results of the sampling. The performance of the model will be evaluated on how well it can: 1) facilitate understanding of surface water and groundwater system relationships, and 2) provide insight on how to expand use of the SDF for sustainable extraction and conjunctive use.

Project Performance Measures Table – South San Diego County Water Supply Strategy

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Determine optimal use of SDF 2. Determine sustainable yield of SDF 3. Develop accurate groundwater model	1. # of monitoring wells constructed 2. # of groundwater samples taken 3. Aquifer test conducted 4. Modeling simulations performed	1. Determination of sustainable yield 2. Components of optimal strategy identified 3. # of alternative scenarios evaluated 4. Adopted final report	1. Results of aquifer test 2. Monitoring results 3. Analysis of modeling results	1. Estimate of sustainable yield 2. Identification of pumping locations and strategies 3. 3-5 alternative conjunctive use scenarios considered 4. 1 final report
2. Ensure sustainable use of SDF	1. Groundwater levels are constant 2. Seawater intrusion is minimized	1. Boundary conditions established 2. Modeling simulations conducted	1. Identify production well locations and pumping such that groundwater levels at defined locations do not decrease below threshold and TDS concentrations do not exceed threshold	1. Analysis of modeling results	1. Optimal production well locations and pumping scenarios
3. Integrate groundwater management with overall water supply planning	1. Conjunctive use of SDF maximizes yield in conjunction with other supply considerations	1. # of recharge wells 2. # of spreading basin potential sites identified 3. Infrastructure to deliver imported water	1. Dry year strategies are identified	1. Imported water supply 2. Demand analysis 3. Analysis of modeling results	1. Coordinated conjunctive use of SDF

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

A pilot demonstration project and groundwater monitoring will be performed to confirm groundwater basin parameters. Once the project is operational, groundwater monitoring will continue.

Monitoring to verify the benefits will consist of groundwater monitoring that will verify that groundwater levels are responsive to recharge. Monitoring of the basin and understanding of the groundwater profile will determine if groundwater is being stored in the basin. An accounting of the groundwater recharge occurring and the withdrawals will ensure that recharged water is increasing the supply yield of the El Monte Basin.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
At various locations through the El Monte Valley Groundwater basins	Groundwater quality multi-depth sampling Groundwater depth measurements	Determine groundwater basin response to recharge
Recharge basins	Flow meters	Measure actual amount of recharge
Production wells	Groundwater pumping records	Compare actual recycled water recharge yield to 2,240 AFY target
River restoration area	Biological monitoring Photo Documentation	Verify that re-vegetated habitat survives. Compare to 350 acres restoration target.

Project Performance Measures Table – El Monte Valley Groundwater Recharge and River Restoration Project, Phases 1 and 2

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce dependence on imported water	1. Increase recycled water recharge 2. Increase groundwater storage in El Monte groundwater basin	1. # of spreading basins constructed 2. # miles of distribution pipeline constructed	1. Quantity of water delivered to spreading basins (AFY) 2. Change in groundwater levels 3. Increase in groundwater withdrawals	1. Flow measurements of water delivered to spreading grounds 2. Monitoring wells 3. Production well flow measurements	1. 2,240 AFY delivered to spreading basins 2. Increase in groundwater levels to achieve desired storage 3. 2,240 AFY groundwater withdrawals
2. Ecosystem Restoration	1. Restoration of 350 acres of riparian and upland habitat	1. # acres of non-native habitat removed	1. Acres of habitat restored with native vegetation	1. Field surveys 2. Mapping	1. 350 acres of habitat restored

EDUCATION AND OUTREACH PROGRAM

Work Item #15: San Diego Regional Pollution Prevention

This project consists of coastal and inland debris cleanups and citizen monitoring to gather water quality data. A monitoring plan will be developed as part of this project. Data will conform to the Surface Water Ambient Monitoring Program (SWAMP). For the water quality chemistry and bioassessment monitoring, all protocols are Environmental Protection Agency (EPA)/State Water Resources Control Board (SWRCB) approved methods, and conducted under an approved SWAMP-compliant QAPP.

The project performance will be based on the quantification and classification of debris removed from coastal and inland sites (including weight) for cleanups, and evaluation of the number of citizen monitors successfully trained and participating in the program. Other metrics include measuring the increase in the number of sampling locations as well as the frequency of existing sampling.

Project Monitoring Summary

Cleanup locations	Types of Data Generated	Measuring Performance
At various locations throughout the San Diego Region, both coastal and inland	Citizen participation count	Compare to target of 1500 citizens
	Weight, quantification by debris classification (tires, cigarette butts, e-waste, furniture, plastic bags, plastic and glass bottles, clothing, etc.)	Target of removing at least 250,000 lbs of debris from San Diego's waterways and beaches
Monitoring Locations	**Types of Analyses**	**Measuring Performance**
At various locations throughout the San Diego Region	Citizen monitor participation count	Compare to target of 300 citizen monitors
	Water quality sampling to include: temperature, dissolved oxygen, pH, conductivity, phosphate, nitrate, microbiology, metals and other constituents	Compare to target of increasing monitoring locations by 100% and increasing frequency of monitoring by 50%

Project Performance Measures Table – San Diego Regional Pollution Prevention

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Remove debris from inland and coastal sites throughout San Diego County	1. Pollution prevention through debris removal 2. identification of debris trends at the watershed level through data collection	1. Quantification of various classifications of debris and weight of debris 2. # of cleanups 3. # of participants at cleanups	1. # of cleanup participants 2. Weight and quantification of debris removed	1. Rosters 2. Clean up participants lists 3. Debris data records	1. 1500 cleanup participants 2. 110,000 lbs of debris removed
2. Improve assessment of water quality in the San Diego Region	1. Obtain water quality data that can identify water quality impacts at a watershed level	1. # of volunteers contacted 2. # of training workshops	1. # of citizen monitors 2. % increase in # of sampling locations 3. % increase in sampling frequency	1. Rosters 2. Training attendance lists 3. Sampling records	1. 300 citizen monitors 2. 100% increase in sampling locations 3. 50% increase in sampling frequency
3. Increase public education and awareness of adverse impacts on water bodies and water quality	1. Educate public on water bodies and watersheds 2. Create behavioral change that will improve water quality	1. # of public workshops 2. # of training sessions	1. Degree of access to educational material related to enhancing water quality 2. Degree of community participation in watershed stewardship activities	1. Local community participation (including disadvantaged communities) increased access of web	1. Increased access to educational material related to enhancing water quality 2. Increased community participation compared to current levels
4. Expansion of website to document debris and water quality data	1. Publically-accessed website to include data from cleanup and monitoring locations	1. Understanding of water quality in impaired waterbodies.	1. # of hits or visits to website	1. Website access tracking tools	1. Increased number of hits or visits to website compared to current levels.

Work Item #16: Biofiltration Wetland Creation and Education Program

Water quality monitoring will be the cornerstone for measuring project effectiveness. Measuring flow and pH on a continuous basis will help operators make adjustments and "dial in" the specific water quality parameters. Measuring bacteria levels and reduction in biological oxygen demand (BOD) will provide concrete feedback regarding project efficiency. Nitrate and temperature measurements will also provide meaningful data.

The Wild Animal Park's water management group will hold bi-weekly construction meetings onsite to measure construction progress. The group will also measure progress against previously established construction projects at the Wild Animal Park.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Influent and effluent locations to the wetland	Flows Water quality sampling to include: bacteria levels, BOD, Total Suspended Solis (TSS), organic nitrogen and nitrate	Compare to 60,000 pounds (lbs.) of nitrogen and 166,000 lbs. of BOD removed.

Project Performance Measures Table – Educational Demonstration Wetland Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Improve water quality	1. Reduce BOD, total suspended solids TSS and coliform bacteria in East and West Africa ponds	1. Amount of pollutants reduced	1. Pollutant concentrations	1. Water quality analysis to measure pollutant concentrations in ponds	1. Measurable reduction in BOD, TSS and coliform concentrations
2. Increase education to general public	1. Educate visitors to the park about conserving water and the Wild Animal Park's wetlands	1. Number of visitors attending the park	1. # of visitors at the park	1. Record of the number of visitors to the park	1. 1.5 million guests per year

Work Item #17: San Dieguito Watershed Management Plan Implementation

The project will monitor the amount of grant money received, number of outreach activities organized and the number of the San Dieguito Watershed Management Plan action steps implemented.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Project records	Evaluate dollar amounts received and number of outreach activities performed	Compare to San Dieguito Watershed Management Plan action steps

Project Performance Measures Table – San Dieguito Watershed Management Plan Implementation

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Implementation of the San Dieguito Watershed Management Plan (Plan)	1. Implement Plan's Action Steps	1. # of Plan action steps that are achieved	1. Grant money received 2. # of public outreach activities	1. Amount of grant money received. 2. Number of outreach activities or events organized	1. Increase amount of grant money received 2. Increase number of events organized compared to without program implemented

Work Item #18: San Diego River Watershed Management Plan Implementation

Effectiveness of he San Diego River Watershed Management Plan Implementation project will be tracked by following the number of projects implemented. This will be compared to the San Diego River Watershed Management Plan project list.

The table below summarizes the project monitoring for this project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
Project records	Evaluate number of projects implemented	Compare to San Diego River Watershed Management Plan project list

Project Performance Measures Table – San Diego River Watershed Management Plan Implementation

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Advance San Diego River Watershed Management plan	1. Develop forum to advance targeted goals and actions	1. Forum meetings	1. # of projects implemented	1. Number of forum meetings and	1. Increased number of projects implemented and documented advancement of targeted goals
2. Expand public education outreach	1. Advance a data clearinghouse to track project status, archive data collected by grant applicants, citizen-based monitoring programs and others within the watershed.	1. Expansion of data clearinghouse	1. Amount of watershed-related information generated to support a "State of the Watershed" report	1. Percentage increase of information in database	1. Develop a "State of the Watershed" report

Work Item #19: City of San Diego Green Mall Porous Paving and Infiltration, Phase 1

Performance of the project will be evaluated through visual inspection of the site during rain events to verify that runoff is reduced. The amount impervious concrete removed will also be documented.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
On site	Visual inspection	Compare to no visible evidence of runoff
	Construction records	Compare to 275 cubic yards of concrete removed

Project Performance Measure Table – City of San Diego Green Mall Porous Paving and Infiltration, Phase 1

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce pollutant loading to the Chollas Creek Watershed	1. Reduce runoff to Chollas Creek 2. Increased capture of storm water	1. # acres of concrete removed 2. Installation of pervious concrete 3. # of bio-retention planter boxes	1. % decrease in volume of runoff from site to Chollas Creek 2. % decrease in pollutant loading from site 3. Observations of reduced runoff	1. Flow Monitoring 2. Watershed monitoring of pollutant concentrations 3. Site visits during rain events	1. 100% decrease in volume of runoff from site to Chollas Creek 2. 100% decrease in pollutant loading from site 3. No visible evidence of runoff
2. Reduce impervious surfaces	1. Replace impervious concrete with pervious surface	1. Volume of concrete removed 2. # of bio-retention planter boxes 3. Perviousness of emplaced concrete	1. Area of pervious concrete removed and replaced 2. Observation of surface during wet weather	1. Site photographs and measurements 2. Visual confirmation	1. 275 cu. yd. of concrete removed 2. No runoff observed from pervious surface during wet weather
3. Infiltration of Groundwater	1. Increase the amount of groundwater recharge	1. Total acres (cubic feet) of permeable concrete emplaced	1. Groundwater levels	1. Groundwater monitoring	1. Increase in groundwater levels

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

A monitoring plan similar to the plan approved for Phase II of the Porous Pavement and Model Municipal Operations Center Demonstration Project will be prepared for this project. The monitoring plan will direct the pavement reference area to be used in estimating pollutant load reductions from the detention/infiltration components of the project. Flow and water level measurements, as appropriate, will also be used to assess performance of the various components of the project.

Project Monitoring Summary

Monitoring Locations	Types of Analyses	Measuring Performance
On site	Flow monitoring	Compare to no visible evidence of runoff
	Construction records	Compare to 14,000 square feet of concrete removed

Project Performance Measures Table – County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Reduce runoff to Chollas Creek	1. Reduce mass loadings of lead, copper and zinc	1. Acreage of concrete removed 2. Installation of pervious concrete 3. # of bio-retention planter boxes	1. % decrease in volume of runoff to Chollas Creek 2. % decrease in pollutant loading	1. Flow Monitoring 2. Watershed monitoring of pollutant concentrations	1. 100% decrease in runoff to Chollas Creek 2. 100% reduction in mass loading of lead, copper, and zinc
2. Reduce the rate of increase of impervious surfaces	1. Replace impervious concrete with pervious surface	1. Area of concrete removed	1. of impervious concrete removed and replaced	1. Land survey after project complete	1.14,000 square feet of impervious concrete pavement removed and replaced
3. Demonstrate technology to other dischargers in the watershed	1. Facilitate employment of pervious pavement technology by other dischargers	1. # of articles 2. # of presentations about the project	1. # of dischargers that utilize pervious pavement	1. Survey dischargers	1. Increase number of discharges that use pervious pavement technology
4. Reduce peak flow runoff to creeks.	1. Maintain surface in acquired lands in natural state	1. Acreage of land that remains undeveloped	1. % of acquired land that remains undeveloped	1. Land survey	1. 100% of acquired lands remain undeveloped.
5. Replenish groundwater reserves.	1. Increase amount of infiltration to groundwater	1. Reduction in runoff	1. Actual amount of runoff	1. Measure volume of runoff from project area	1. Reduction in runoff from project area